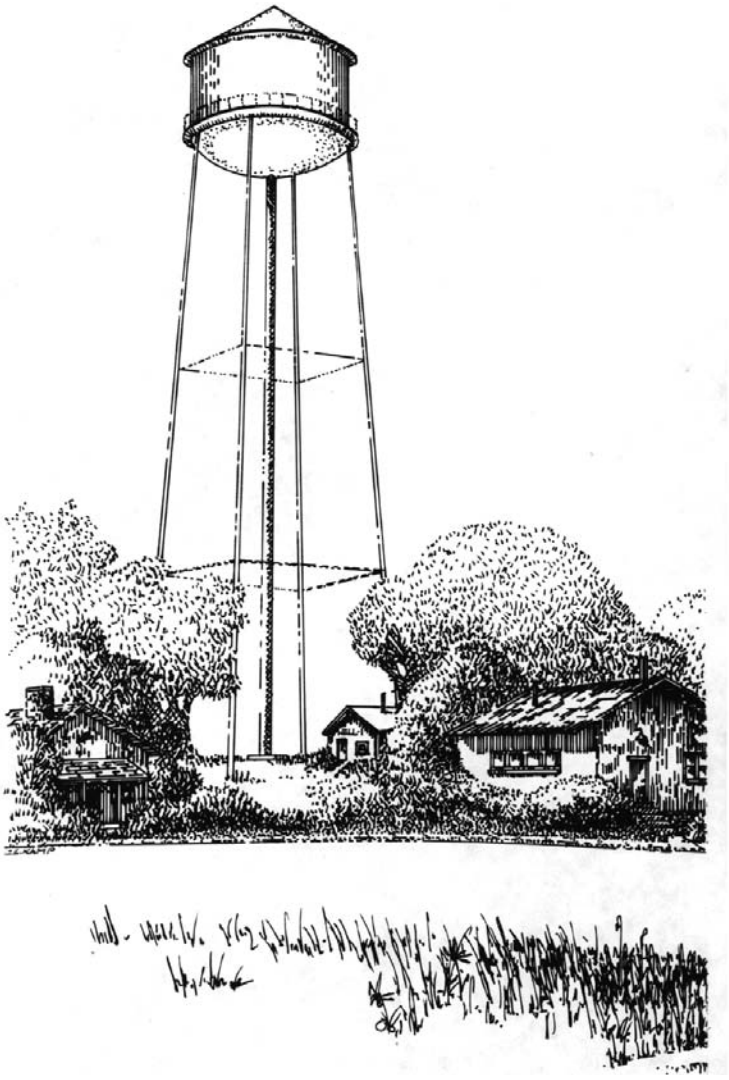
State of Illinois
Rod R. Blagojevich, Governor

Illinois Environmental Protection Agency
Douglas P. Scott, Director

Illinois Groundwater Protection Program

Biennial Comprehensive Status and Self-Assessment Report



January 2006

Prepared by the Interagency Coordinating Committee on Groundwater

Illinois
Environmental
Protection Agency

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The Honorable Rod Blagojevich
Governor
State of Illinois

The Honorable Members
of the Illinois General
Assembly

I am pleased to transmit our biennial report entitled, “Illinois Groundwater Protection Program”, which has been prepared pursuant to Section 4(b)(8) of the Illinois Groundwater Protection Act, 415ILCS55/4 (Act). This is the eighth biennial report of the Interagency Coordinating Committee on Groundwater with input from the Groundwater Advisory Council and four Priority Regional Groundwater Protection Planning Committees. This report provides a policy perspective on groundwater quality and quantity protection in Illinois, including a comprehensive status and assessment of the program. Further, this document provides the reporting required, concerning a water quantity planning and management program, pursuant to Executive Order #5.

The Act created a comprehensive, prevention-based policy focused on the beneficial uses of groundwater and preventing degradation. As shown in the report, much progress has been made but much more is needed, especially in regard to vulnerable regional groundwater supporting potable uses.

The report gives the status of various elements of groundwater protection, and provides future directions for groundwater protection program activities. The report also includes several figures and tables to help document our progress.

Sincerely,

Douglas P. Scott
Director

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ACRONYM GLOSSARY

Act	Illinois Environmental Protection Act
AO	Administrative Authority
API	American Petroleum Institute
ASTM	American Society for Testing and Materials
BGD	Billion Gallons per Day
BMP	Best Management Practices
Board	Illinois Pollution Control Board
BOL	Bureau of Land
BOW	Bureau of Water
CAS	Center for Atmospheric Science
CEG	Contaminant Evaluation Group
CGS	Center for Groundwater Science
COE	U.S. Army Corps of Engineers
CRS	Contamination Response Subcommittee
CWS	Community Water Supply
DCEO	Department of Commerce and Economic Opportunity
DNP	Dedicated Nature Preserve
DNR	Department of Natural Resources
DNS	Division of Nuclear Safety
DOQ	Digital Orthophotoquarter Quadrangle
DRG	Digital Raster Graphics
DRTF	Drought Response Task Force
ENFO	Environmental Facts Online
ENTICE	Environmental & Nature Training Institute for Conservation Education
EPA	Environmental Protection Agency
GAC	Groundwater Advisory Council
GEM	Groundwater Education Materials
GIS	Geographic Information System
GWQS	Groundwater Quality Standard
H2O Works	Waterworks Database
HA	Health Advisory
HR	House Resolution
IAC	Illinois Administrative Code (also, Ill. Adm. Code)
IAGP	Illinois Association of Groundwater Professionals
ICCG	Interagency Coordinating Committee on Groundwater
IDA	Illinois Department of Agriculture
IDNS	Illinois Department of Nuclear Safety
IDOT	Illinois Department of Transportation
IDPH	Illinois Department of Public Health
IEHA	Illinois Environmental Health Association
IEMA	Illinois Emergency Management Agency
IERG	Illinois Environmental Regulatory Group
IFCA	Illinois Fertilizer and Chemical Association

IGA	Illinois Groundwater Association
IGPA	Illinois Groundwater Protection Act
ILSAM	Illinois Streamflow Assessment Model
IML	Illinois Municipal League
IMS	Internet Map Server
INPC	Illinois Nature Preserves Commission
IOC	Inorganic Compounds
IPWSOA	Illinois Potable Water Supply Operators Association
ISAWWA	Illinois Section American Water Works Association
ISBE	Illinois State Board of Education
IRWA	Illinois Rural Water Association
ISGS	Illinois State Geological Survey
ISWS	Illinois State Water Survey
IVWA	Imperial Valley Water Authority
IWIP	Illinois Water Inventory Program
IWQPM	Integrated Water Quality Planning and Management
IWWAP	Illinois Water Well Abandonment Program
IWWSC	Illinois Water Well Sealing Coalition
KCL	Karst Conservancy of Illinois
LIMS	Laboratory Information Management System
LIRB	Lower Illinois River Basin
MAC	Mahomet Aquifer Consortium
MCL	Maximum Contaminant Level
MGD	Million Gallons per Day
MNA	Monitored Natural Attenuation
MTAC	Midwest Technology Assistance Center
MTBE	Methyl tertiary-Butyl Ether
NAWQA	National Water – Quality Assessment
NCPWS	Non-community Public Water Supply
NCSA	National Center for Supercomputing Applications
NCWS	Non-community Water Supply
NEIWPCC	New England Interstate Water Pollution Control Commission
NIPC	Northeastern Illinois Planning Commission
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NSDI	National Spatial Data Infrastructure
NTNCPWS	Non-Transient Non-Community Public Water Supply
OCS	Office of Chemical Safety
OSFM	Office of the State Fire Marshal
P2	Pollution Prevention
PA	Public Act
PICS	Public-Industrial-Commercial Survey
Plan	Groundwater Resources Management Plan
PPB	Parts per Billion
PPM	Parts per Million
PVC	Polyvinyl Chloride

PWD	Public Water District
PWS	Public Water Supply
RBCA	Risk-Based Corrective Action
RSVP	Retired Senior Volunteer Program
RTK	Right To Know
SAIC	Science Applications International Corporation
SB	Senate Bill
SDWA	Safe Drinking Water Act
SDWIS	Safe Drinking Water Information System
SEP	Special Exception Permit
SOC	Synthetic Organic Chemical
SRAC	Site Remediation Advisory Committee
SRRG	Site Remediation Referral Group
SWAP	Source Water Assessment Program
SWCD	Soil and Water Conservation District
SWP	Source Water Protection
SWPTF	State Water Plan Task Force
TACO	Tiered Approach for Corrective Action Objectives
TMDL	Total Maximum Daily Loadings
TNCPWS	Transient Non-Community Public Water Supply
TP	Transformation Products
UI Extension	University of Illinois Extension
UIRB	Upper Illinois River Basins
USDA	United States Department of Agriculture
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VOC	Volatile Organic Chemical
WARM	Water & Atmospheric Resources Monitoring
WET	Water Education for Teachers
WRAC	Water Resources Advisory Committee
WHPA	Well Head Protection Area
WHPP	Wellhead Protection Program
µg/L	Micrograms per Liter

EXECUTIVE SUMMARY

Since the inception of the Environmental Protection Act in 1970, it has been the policy of the State of Illinois to restore, protect, and enhance the groundwater of the state as a natural and public resource. Groundwater has an essential and pervasive role in the social and economic well being of Illinois, and it is vitally important to the general health, safety, and welfare of its citizens. Groundwater resources should be utilized for beneficial and legitimate purposes; waste and degradation of the resource should be prevented; and the underground water resource should be managed to allow for maximum benefit of the state.

The Illinois Groundwater Protection Act (IGPA) responds to this need to manage groundwater by emphasizing a prevention-oriented process that relies upon state and local partnerships. The IGPA establishes a unified groundwater protection policy by:

- Establishing a groundwater education program.
- Establishing water well protection zones.
- Providing for surveys, mapping, and assessments.
- Monitoring ambient groundwater quality.
- Establishing a regional groundwater protection-planning program.
- Establishing authority for recharge area protection.
- Requiring the establishment of two tiered groundwater quality standards.
- Requiring technology control regulations.

The IGPA established the Interagency Coordinating Committee on Groundwater (ICCG). The ICCG is comprised of various state agencies and is chaired by the Director of the Illinois Environmental Protection Agency (EPA). The ICCG considers diverse stakeholder input from the Groundwater Advisory Council (GAC) and four Priority Regional Groundwater Protection Planning Committees in developing groundwater protection policies and programs.

The GAC, also established by the IGPA, is comprised of nine members appointed by the Governor, including: two members representing industrial/commercial interests, two member representing environmental interests, one member representing a regional planning agency, one member from agricultural interests, one member representing public water supplies, one member representing the water well drilling industry, and one local and county government representative.

Illinois EPA selected the four existing priority groundwater protection planning regions to assist with establishing a regional groundwater protection planning program, as mandated in the IGPA. They are: Northern Groundwater Protection Planning Committee, Central Groundwater Protection Planning Committee, the Southern Groundwater Protection Committee, and the Northeastern Groundwater Protection Planning Committee. These committees advocate groundwater protection practices and procedures to municipal, county, state, and other local units of government throughout their respective regions.

The IGPA requires the ICCG to report biennially to the Governor and General Assembly on groundwater quality and quantity and the state's enforcement efforts. The intended purpose of this 2006 report is threefold:

- To provide a comprehensive status report on the implementation of the IGPA.
- To provide a self-assessment of program initiatives in relation to the goals and objectives of the program recommended in the IGPA Biennial Report, published in January 2004.
- To provide environmental and programmatic indicators to help measure and demonstrate program performance.

The current report has been organized according to the following chapters, each highlighting the considerable progress Illinois has made in groundwater protection through such initiatives as adoption of groundwater standards, water well construction code requirements, groundwater research, enhanced public education, agrichemical facility containment rules, and regional groundwater protection planning programs:

- Interagency Coordinating Committee on Groundwater Operations
- Groundwater Advisory Council Operations
- Education Program for Groundwater Protection
- Groundwater Evaluation Program
- Groundwater Quality Standards and Technology Control Regulations
- Wellhead Protection Program
- Regional Groundwater Protection Planning Program
- Non-community and Private Well Program
- Groundwater Quality Protection Recommendations and Future Directions

The major highlight of groundwater protection during 2004 and 2005 was the adoption and implementation of a comprehensive "right-to-know" (RTK) initiative which gave Illinois EPA the long overdue authority needed to order polluters to clean up contamination quickly. House Resolution (HR) 1010 and Senate Bill (SB) 241 make up the statutory framework for this initiative.

HR 1010 was adopted in June 2004, in response to incidents in Downers Grove and Lisle, Illinois. These incidents demonstrated a need for enhanced coordination of response and communication among federal, state, and local officials to appropriately investigate and characterize any health threat, and to make it known where private wells are located and to facilitate appropriate notification to potable well property owners. To that end, HR 1010 urged Illinois EPA to further strengthen its public outreach efforts by developing, after negotiations with individuals representing areas affected by contamination and other relevant state agencies, a procedure to notify property owners whenever Illinois EPA has confirmed an exceedence of applicable health and safety standards.

The ICCG/GAC spent considerable effort working with Illinois EPA and the Illinois Department of Public Health (IDPH) in responding to HR 1010. Illinois EPA presented a series of options to respond to HR 1010 at a joint ICCG/GAC meeting on July 27, 2004. The ICCG/GAC concurred with the strategic activities presented, and further recommended that a RTK Subcommittee be formed. The Subcommittee was comprised of several ICCG/GAC members, representatives from the regional priority groundwater protection planning committee, and other local stakeholders affected by private well contamination.

The mission of the RTK Subcommittee was to provide input on improving the method of notification as required under HR 1010. Illinois EPA held a series of meetings and conference calls with the RTK Subcommittee to obtain their input on how to effectively develop a notification process. In addition, during August 2004, Illinois EPA and the RTK Subcommittee began brainstorming on the elements of legislation that could be proposed to give Illinois EPA the long overdue authority needed to order polluters to clean up contamination quickly.

Governor Rod Blagojevich on July 25, 2005, signed SB 241 (Public Act 94-314). This landmark legislation expands notification of citizens of potential environmental threats at polluters' expense, and gives the Illinois EPA authority for the first time to issue "administrative orders" to compel cleanups or containment of hazardous contaminants.

This so-called "RTK law" requires Illinois residents to be notified if they live near polluted sites and gives state environmental regulators more power to order polluters to clean up the sites. In addition, the law requires additional stakeholder input to be gathered on the methods of notification. The GAC agreed to take the lead in obtaining stakeholder input and established the Notification Process Committee, which includes representatives from the Illinois Environmental Regulatory Group (IERG) and citizens affected by private well contamination in unincorporated areas of Lisle and Downers Grove, Illinois. The Illinois EPA and the GAC, with the participation of the public and the regulated community, are developing the specific process and range of notification tools.

The new law codifies a systematic approach and makes polluters responsible for reasonable notification costs. For newly identified contamination, Illinois EPA will evaluate the scientific information available to identify the responsible parties for any "off-site" spill or release which poses a significant public health threat, and work with the state and local health departments to notify area residents. For existing sites, Illinois EPA will review case files to determine if there is a potential off-site public health risk that warrants additional notification. Responsible parties will bear the costs of all reasonable measures taken to inform the affected public of exposure risks from any off-site contamination. This will now be mandatory in cases where groundwater and drinking water sources have been contaminated, at sites where entry and access have been prohibited to protect public safety, as well as emergencies involving the release of a hazardous substance.

Prior to implementation of the RTK law and HR 1010, staff from the Illinois EPA, IDPH, and the Cook County Department of Public Health implemented a pilot project in the south suburbs of Chicago. Approximately 2,400 residents were notified about potential well water contamination via a letter and fact sheet from the local county health department, in both English and Spanish. The notification was based on low levels of Volatile Organic Compounds that had been found in monitoring wells in the area. Residents subsequently attended a public workshop to discuss potential contamination of private well water and well water testing. These experiences, along with the results of a follow-up survey, will help the Agency begin full-scale implementation of the RTK law in 2006.

The ICCG with input from the GAC and the Priority Regional Groundwater Protection Planning Committees recommend that quality programs continue to be developed and implemented in an

effort to protect groundwater. The groundwater protection efforts recommended in Chapter IX for calendar years 2006 and 2007 are based on the results of the self-assessment and environmental indicators presented in this report. In some tasks, the priority may be shifted due to funding constraints.

While overall groundwater quality protection indicators show that the implementation of the IGPA continues to be adequate, several recommendations for improvement exist. These include:

- Improve proactive groundwater protection measures for new CWS wells.
- Focus efforts and resources critical regional recharge areas supporting unconfined CWS wells.
- Develop a strategy to address the increasing trend of VOC contamination in CWS wells.
- Address the issue of the integration of wellhead protection areas (WHPAs) as a factor the Tiered Approach for Corrective Action (TACO) regulations.
- Assist the GAC in the review and development of recommendations pertaining to groundwater quality and quantity issues.
- Initiate a policy discussion regarding prevention versus remediation.
- Initiate discussion of a strategy to address pesticide metabolites.
- Sponsor a Groundwater Protection Policy Forum.
- Integrate groundwater education efforts into other state environmental planning and protection programs.
- Evaluate the need to develop Class III: Special Resource Groundwater Standards.
- Develop new Illinois EPA source water protection criteria and regulations for wellhead protection.
- Evaluate efforts to expand the Illinois Water Well Decommissioning Program.
- Promote the new Source Water Protection Plan guidance.

CHAPTER I. INTERAGENCY COORDINATING COMMITTEE ON GROUNDWATER OPERATIONS

Section 1. Assist the GAC in the review and development of recommendations pertaining to groundwater quality and quantity issues

The members of the ICCG from the Illinois Department of Natural Resources (DNR) and Illinois EPA agreed to DNR's request that the State Water Plan Task Force (SWPTF), chaired by DNR, take the lead on following-up on water quantity policies and programs. However, DNR would keep ICCG and GAC updated on their progress. DNR's Office of Water Resources and the Illinois State Water Survey (ISWS) provided updates to the ICCG and GAC on July 27, 2005, and on May 3, 2005. In addition, Illinois EPA also regularly attends the SWPTF meetings.

At the ICCG meeting on May 3, 2005, DNR provided a two-page summary of their *Integrated Water Quantity Planning and Management (IWQPM) Activities*. This report included a listing of reports prepared in 2004 related to water quantity planning and management. It also provided the following listing of IWQPM target goals for 2005:

1. Work toward development of a regional and multi-state pilot plan for northeastern Illinois, working with the Northeastern Illinois Planning Commission (NIPC) and the Southern Lake Michigan Regional Water Supply Consortium.
2. Work toward development of a pilot or model aquifer management plan, working with local and regional authorities. For example, preliminary discussions with the Mahomet Aquifer Consortium (MAC) Executive Board have shown them to be receptive to the creation of a management committee to initiate discussions of what aquifer management means to the consortium and the various forms such management might take.
3. Work toward development of a pilot management plan for the Fox River, working with the existing Fox River Study Group coalition, which includes the Fox River Ecosystem Partnership, NIPC, et al.
4. Work at updating the "Mitigative Measures for At-Risk Public Surface Water Supply Systems in Illinois" report completed by Singh and McConkey in 1990. A standard research agreement between DNR's Office of Water Resources (as sponsor) and the University of Illinois was executed late this year for the ISWS to begin this effort. The proposed study is expected to have a three-year duration, depending on available funding levels.
5. Provide input and comment on proposed water quantity related legislation.
6. Continue planning strategies and data collection for addressing a worst-case drought scenario for Illinois.

As a follow-up to the ICCG report to the Governor as set forth in Executive Order #5 (2002), the ISWS launched a new website in 2003 on water supply issues in Illinois. The site is laid out in a question and answer format, asking a variety of questions on such topics as the availability of water, water quality, water law, and providing answers along with links to further resources. Go to http://sws.uiuc.edu/docs/wsfaq/ for details.

7. Draft reports on Priority Water Quantity Planning Areas have been prepared and can be accessed from the ISWS web site. The SWPTF has received some comments on these reports, for example, a consideration to add the Kishwaukee River to the watershed priority list. They intend to finalize these reports this year in consideration of the comments received. The SWPTF will promote the development of voluntary, cooperative regional water management consortia in these priority areas by providing technical and financial assistance for planning and management efforts.
8. The IWQPM Subcommittee recommended that the state should consider voids in current law, such as instream flow and well interference, by initially developing guidelines identifying best management practices (BMPs) for voluntary adoption. The task force stated that experience with voluntary implementation of such BMPs will clarify whether it is necessary to adopt them statutorily. Efforts have been initiated to develop draft BMP reports for review and comment by the end of the year.
9. Expand county-wide studies of groundwater resource potential to more counties in high priority areas. Research being completed for Kane County has been a good model for these studies. The Illinois State Geological Survey (ISGS) and the ISWS began a similar study in Kendall County earlier this year. Also, the ISGS plans to start assimilating detailed geologic quadrangle maps for Lake County into county-wide maps which emphasize aquifer occurrence, an effort that began in 2005.

The IWQPM Subcommittee continues to meet quarterly prior to scheduled SWPTF meetings. The SWPTF is regularly apprised on work accomplishments and reports relating to the goals and objectives set for the IWQPM. Presentations and progress reports on water quantity planning and management issues are routinely provided, followed by the opportunity for discussion and comment. Outreach and information transfer are also provided at conferences and meetings. An annual summary report is completed each year.

The IWQPM will continue to disseminate information and reports on the ISWS web page. The Water Supply homepage (http://www.sws.uiuc.edu/docs/wsfaq/) provides a link to the IWQPM page (http://www.sws.uiuc.edu/docs/iwqpm/). A “hot button” is included to provide a forum for public comments and questions.

Section 2. Enhance coordination between Illinois EPA Bureau of Water (BOW) and Bureau of Land (BOL) remediation programs

A Groundwater Contamination Response Strategy (Strategy) and legislation (415 ILCS 55/9.1**)** has been developed and adopted that sets forth procedures to be used by State of Illinois agencies in their response to existing and potential groundwater contamination of private wells by volatile organic compounds (VOCs). The Strategy was developed by the Contamination Response Subcommittee (CRS) of the ICCG in consultation with the ICCG and GAC and was finalized and approved by the ICCG on April 1, 2002. The Strategy and legislation (effective July 11, 2002) was developed to notify private well owners in the vicinity of community water system (CWS) wells with VOC detections of potential groundwater problems in the area. The Strategy requires significant coordination between the BOW, Groundwater Section and the BOL, Division of Remediation Management to identify potential sources of groundwater contamination and location of private drinking water wells. In the past, operators of these CWS

have only been obligated to notify homeowners connected to their system about groundwater contamination concerns. To accomplish this task, the Strategy identifies three primary objectives, as described below:

Program Goal - All potential private well owners in the vicinity of the CWSs contaminated with VOC(s) that exceed groundwater or drinking water standards will be notified by the local health department of the potential risk of their wells being contaminated and will be strongly encouraged to sample their wells for VOCs.

Program Objective 1 - Illinois EPA will use the geographic information system (GIS) to re-evaluate the area that is adjacent to each of the CWS well(s) where VOCs exceed groundwater or drinking water standards. In addition, Illinois EPA will also include as part of the evaluation any additional CWS with past VOC detections from ambient or Safe Drinking Water Act (SDWA) compliance monitoring not already included. The private well data from the ISGS and ISWS will be overlaid with this existing data to predict areas where private wells may be impacted.

Program Outcome Measure - Number of fact sheets that have been developed for CWS with VOCs that exceed groundwater or drinking water standards. Of the 82 CWSs that exceed groundwater or drinking water standards, 49 are under development, and 30 are completed. In addition, three are in the process of internal review.

Program Objective 2 - Further, Illinois EPA will conduct a file search to determine the proximity of potential contamination source information that may be in this same geographic area and any known groundwater restricted use ordinances adopted in the area.

Program Outcome Measure – A number of potential contamination source file searches and groundwater restricted use ordinance evaluations that have been conducted relative to each CWS and included with Program Objective 1 fact sheets. A total of 30 source file searches have been completed to date.

Program Objective 3 - Illinois EPA will develop a fact sheet and transmittal document that provides the information compiled above to the Illinois Department of Public Health (IDPH) and to the local health departments.

Program Outcome Measure – The number of letters and fact sheets that are sent to IDPH, including local health departments, pursuant to the agreed upon Strategy and 415 ILCS 55/9.1. To date, a total of 30 letters and fact sheets have been developed and provided to IDPH.

In addition, working together through the Site Remediation Referral Group (SRRG), BOW and BOL reviewed and discussed in depth contaminated CWS sites of concern. The SRRG includes various BOL and BOW representatives knowledgeable in CWS wells, active remediation facilities, facility investigations, and facility cleanups performed throughout the state. The purpose of SRRG is to determine, if necessary, what Illinois EPA program(s) will serve best in investigating the source of contamination for a particular CWS. The following are the CWSs reviewed through July 2005 and their current Illinois EPA status:

Facility Name	County	IEPA Status
Beardstown	Cass	BOL overseeing work by responsible parties.
Belvidere	Boone	Illinois EPA pursuing U.S. EPA Region V for investigation of the entire city.
Byron	Ogle	BOL to investigate.

Crystal Lake	McHenry	BOL conducting investigation.
Downers Grove	DuPage	BOL overseeing remediation by responsible parties.
East Peoria	Tazewell	BOL investigating possible sources.
Edwardsville	Madison	BOL to sample wells, if viable.
Fox River Grove	McHenry	BOL investigating possible sources.
Freeport	Stephenson	BOL investigating possible sources.
Harvard	McHenry	Illinois EPA no further action. IDPH private well sampling found no detections.
Hebron	McHenry	BOL conducting investigation.
Hull	Pike	No further action by Illinois EPA at this time.
Island Lake	Lake	BOW conducting investigation.
Kershaw Mobile Home Park	Henry	BOL investigating possible sources.
Loves Park	Winnebago	BOL conducting investigation.
Milan	Rock Island	No further action by Illinois EPA at this time.
Mill Creek	Adams	No further action by Illinois EPA at this time.
Momence	Kankakee	BOL investigating possible sources. BOW contacted County Health regarding sampling private wells.
Morrison	Whiteside	BOL overseeing investigation by responsible parties.
New Lenox	Will	No further action by Illinois EPA at this time.
Nokomis	Montgomery	BOL completed investigation.
Petersburg	Menard	BOW sampling public well.
Plano	Kendall	BOW sampling public well.
Princeville	Peoria	No further action by Illinois EPA at this time.
Roanoke	Woodford	BOL conducting an investigation.
Sandwich	DeKalb	BOL conducting an investigation.
Scales Mound	Jo Davies	No further action by Illinois EPA at this time.
Six Oaks Mobile Home Park	Winnebago	No further action by Illinois EPA. IDPH sent letters regarding 1998 sampling.
South Chicago Heights	Cook	No further action by Illinois EPA at this time.
Union-York	Clark	BOW contacted County Health regarding sampling private wells.

Section 3. Continue to review and update the Implementation Plan and Regulatory Agenda

The IGPA required the creation of the ICCG. The ICCG is required to report biennially to the Governor and General Assembly on groundwater quality and quantity and the state's enforcement efforts. In summary, the ICCG is responsible for:

- Reviewing and coordinating the state's policy on groundwater protection.
- Reviewing and evaluating state laws, regulations, and procedures that relate to groundwater protection.
- Reviewing and evaluating the status of the state's efforts to improve the quality of the groundwater, the state enforcement efforts for protection of the groundwater, and make recommendations in improving the state's efforts to protect the groundwater.
- Recommending procedures for better coordination among state groundwater programs and local programs related to groundwater protection.

- Reviewing and recommending procedures to coordinate the state's response to specific incidents of groundwater pollution and coordinate dissemination of information between agencies responsible for the state's response.
- Making recommendations for and prioritizing the state's groundwater research needs.
- Reviewing, coordinating, and evaluating groundwater data collection and analysis.

The ICCG is chaired by the Director of Illinois EPA and has members from ten state agencies/departments that have some jurisdiction over groundwater. The ICCG continues to review and update an Implementation Plan and Regulatory Agenda pursuant to the IGPA. The following is a list of participating agencies/departments on the ICCG:

Environmental Protection Agency	(Chair) Marcia Willhite, designee
Department of Natural Resources	Todd Rettig, designee
Office of Water Resources (DNR)	Gary Clark, designee
Office of Mines and Minerals (DNR)	Scott Fowler, designee
Department of Public Health	Jerry Dalsin, designee
Office of The State Fire Marshal	Dale Tanke, designee
Department of Agriculture	Dennis McKenna, designee
Emergency Management Agency	Marjorie Walle, designee
Division of Nuclear Safety (EMA)	Rich Allen, designee
Department of Commerce And Economic Opportunity	David Kramer, designee

Also attending the ICCG meetings are: Steve Gobelman, Illinois Department of Transportation's Division of Highways; Alan Wehrmann, Illinois State Water Survey, Don Keefer, Illinois State Geological Survey, and George Groshen, United States Geological Survey.

The ICCG assisted with responding to Right-to-Know (RTK) issues in coordination with the GAC. Chapter II describes the mission and composition of the GAC. Development of the RTK process was the predominant issue that the ICCG and GAC focused on during this biennial reporting period. HR 1010 was passed on June 1, 2004, and urged Illinois EPA to:

> " ... further strengthen its public outreach efforts by developing, after negotiations with individuals representing areas affected by contamination and other relevant State agencies, a procedure to notify property owners whenever the Agency has confirmed an exceedence of applicable health and safety standards, using scientifically credible data and procedures under Illinois regulations; ... "

Illinois EPA convened a joint meeting of the ICCG and GAC on July 27, 2004, to develop and implement a strategic response to HR 1010. Illinois EPA proposed the following strategic outline of activities to the ICCG and GAC to obtain their input and feedback:

- Develop RTK legislation.
- Form a Contaminant Evaluation Group (CEG).
- Issue Groundwater Contamination Advisories (Act 17.1(g)).
- Develop Environmental Facts On-line (ENFO) Website (SWAP, Drinking Water Watch, remediation sites, et al.,).
- Amend Tiered Approach for Corrective Objectives (TACO) regulations.
- Clean-up site community relations work plan amendments.

- Develop Public and Local Health Department Notices.

RTK Subcommittee - The ICCG and GAC agreed with the strategic outline proposed by Illinois EPA. Moreover, they recommended that a subcommittee of the ICCG, entitled the RTK Subcommittee, be established and that the GAC should continue to be apprised of efforts being conducted. Several ICCG/GAC members volunteered to participate on the Subcommittee. Further, it was recommended that regional priority groundwater protection planning committee representatives and other local stakeholders affected by private well contamination be added to the RTK Subcommittee. Illinois EPA established an RTK Subcommittee comprised of the following:

ICCG RTK Subcommittee Updated August 11, 2005		
Member	**Title**	**Affiliation**
Bill Buscher	Manager, Hydrogeology and Compliance Unit	Illinois EPA
Bonnie Thomson Carter	Forest Preserve President, Lake County Board District #5 Representative	Lake County Board
Rick Cobb	Deputy Manager, Division of Public Water Supplies, Bureau of Water	Illinois EPA
Bob Cowels	Chief, Env. Eng. Section, Div. of Env. Health	IDPH
Dr. George Czapar	Outreach Specialist	University of Illinois - Cooperative Extension and Groundwater Advisory Council
Michael DeSmedt	Senior Sanitarian	DuPage Co., Department of Public Health
Bernadette Dinschel	Citizen	Lisle Citizens Advisory Group
Gary Flentge	Manager, Division of Environmental Health	IDPH
Carol Fuller	Office of Community Relations	Illinois EPA
Kurt Hacke	Citizen	Wauconda
Don Keefer	Chief, Groundwater Section	ISGS
Gary King	Manager, Bureau of Land Div. of Remediation	Illinois EPA
Ray Kristufek	Citizen	Downers Grove
John Liberg	Water Well Driller	GAC and Illinois Association of Groundwater Professionals
Ebony Lynch	Assistant Health Officer	Cook Co., Department of Public Health
Ann Muniz	Chair, Downers Grove Citizens Advisory Group (CAG)	Downers Grove CAG
Kurt Neibergall	Manager, Office of Community Relations	Illinois EPA
Joe O'Connor	Regional Supervisor, W. Chicago Reg. Office Div. of Env. Health	IDPH
Scott Phillips	Deputy Counsel, Division of	Illinois EPA

	Legal Counsel	
Ruth Roth	Groundwater Coordinator, Winnebago County Health Department	Participant in numerous groundwater contamination issues affecting private water supply wells in Winnebago County
LaTrice Porter-Thomas	Environmental Quality Manager	Cook Co., Department of Public Health
Allen Wehrmann	Director, Center for Groundwater Science (CGS)	ISWS

The mission of the RTK Subcommittee was to provide input on improving the method of notification as required under HR 1010. Illinois EPA held a series of meetings and conference calls with the RTK Subcommittee to obtain their input on how to effectively develop a notification process:

- December 9, 2004 - Illinois EPA convened the first RTK Subcommittee meeting in DuPage County to discuss the Subcommittee's mission;
- January 13, 2005 - Illinois EPA convened the second RTK Subcommittee meeting in DuPage County introducing the notification initiative;
- April 15, 2005 - Illinois EPA convened a conference call with the RTK Subcommittee including Cook County representatives to discuss a notification initiative in Cook County; and
- May 31, 2005 - Illinois EPA convened the third RTK Subcommittee meeting in DuPage County finalizing plans to implement the notification initiative.

The RTK Subcommittee citizen representatives reported on input from directly contacting 30-40 Downers Grove citizens to obtain their input on public notice options. The residents contacted indicated that**: "... receiving a notification in the form of an official looking letter similar to what is provided by Vehicle Emissions Testing program was recommended."** Moreover, this research yielded that: **"... the public generally discards post cards."** In addition, **the public is inclined to be more receptive if the notification comes from a local health department more so than from an agency which is not local.** However, the notifications should reference that state and federal agencies are involved with the project. With respect to the print media, a headlined article, not an advertisement, was preferred. The public rarely reads the legal notices and even ads not located in the legal notice section may not read. Utilizing more than one method of notifying potential affected parties will be needed.

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notifying potential affected parties will be needed. In addition, the seriousness of testing should be emphasized.

Illinois EPA recommended an area to the RTK Subcommittee where private wells could potentially be impacted by groundwater contamination in order evaluate the notification procedure recommended above. The RTK Subcommittee concurred with this recommendation and that initiated work by Illinois EPA to implement a notification initiative, including a follow-up workshop.

Approximately 2,400 potential private well owners were notified via a letter and fact sheet from the local county health department. The letter and fact sheet were also translated into Spanish. Approximately 200 homeowners served by private residential wells were advised to have their wells tested for VOCs. In addition, a public availability session and workshop on private well water issues and sampling practices was held on July 26, 2005. Representatives from the local county health department, IDPH, Illinois EPA, and private certified labs were present. Three citizens from the RTK Committee representing Lisle and Downers Grove attended and shared their experiences about dealing with groundwater contamination and the process of working with Illinois EPA and the municipal and county governments to address the issue.

Approximately 70 citizens attended the workshop. After a brief introduction of the RTK issues and pilot notification project, citizens were invited to ask questions of the various agency staff and laboratory personnel about private well sampling and the potential for groundwater contamination that may affect private wells. Residents were given surveys to evaluate the mailing distributed by Illinois EPA and the state and county departments of health. In all, it seemed that residents were appreciative of the information provided, and many said that they plan to have their well water tested or have already done so.

The feedback from this notification and workshop is being used to develop a plan for SB 241/P.A. 94-314. The new law asks Illinois EPA to formalize procedures for notifying the public if the agency is aware of any nearby contamination. See Chapter II, GAC Operations, for more details. Concurrent with obtaining input on ways to improve the notification process, Illinois EPA also began developing and implementing additional strategies to respond to these important RTK issues, as described in the proceeding.

The feedback from this notification and workshop is being used to develop a plan for implementing the new RTK law [SB 241]. The new law asks the Illinois EPA to formalize procedures for notifying the public if the agency is aware of any nearby contamination.

Contaminant Evaluation Group (CEG) - In March 2004, former Illinois EPA Director Cipriano directed Illinois EPA staff to establish an agency-wide CEG. The purpose of this group is to determine new and backlog sites for which groundwater sampling data or modeling demonstrate, or will demonstrate, that Class I groundwater standards will be exceeded in any off-site drinking water system.

Enhanced Notification under 415 ILCS 55/9.1 - Pursuant to the ICCG's Groundwater Contamination Response Strategy and 415 ILCS 55/9.1, Illinois EPA is currently providing

notice to IDPH and local health department(s) any time a VOC is detected above a groundwater or drinking water standard in a CWS well. Further, IDPH and the local health department(s) are required to notify private well users in the area and urge them to sample their wells for VOCs due to the potential for groundwater contamination. Starting in May 2004 Illinois EPA made a policy decision to implement a more stringent notification procedure than required under the foregoing statute. Illinois EPA is now including CWS well contamination greater than the detection level but less than the applicable standard. This enhanced notification procedure is currently being implemented. Since July 2004 Illinois EPA has sent notices to IDPH and local health departments for: Six Oaks Mobile Home Park (Winnebago County); Roanoke (Woodford County); Beardstown (Cass County); Hebron (McHenry County); Edwardsville (Madison County); Hull (Pike County); Princeville (Peoria County); Petersburg (Menard County); Plano (Kendall County); East Peoria (Tazewell County); Mill Creek Public Water District (Adams County); Byron (Ogle County); Island Lake (Lake County); Crystal Lake (McHenry County); Kershaw Mobile Home Park (Henry County); and Union-York Water District (Clark County).

Enhanced Public Notification Using the Internet - In August, Illinois EPA provided a new portal to environmental information on the front end of our homepage via ENFO Online. ENFO currently provides citizens with the following information:

- Drinking Water Watch
- SWAP Site
- Water Quality Map Site
- Consumer Confidence Reports for PWSs
- Enforcement Orders Issued
- Agency Compliance and Enforcement System
- State Response Action Program
- Leaking Underground Storage Tanks
- Redevelopment Assessment Database
- Remediation Sites Map Service
- Site Remediation Program; Solid Waste Permit Activities
- Cleanups in Illinois under the Federal Superfund Program

Further, ENFO also provides links to the following United States Environmental Protection Agency (U.S. EPA) databases: Toxic Release Inventory Explorer; Hazardous Waste Site Enviromapper; Envirofacts; and Enforcement and Compliance History Online.

RTK Legislation (SB 241/ P.A. 94-314) - During August 2004 Illinois EPA and the RTK Subcommittee began brainstorming on the elements of legislation that could be proposed to: obtain administrative order (AO) authority; codify a multi-media evaluation process; enhance Illinois EPA's authority to improve our notice capabilities; and set forth future goals of improving information dissemination and public notice procedures. The law was prompted, in part, by the experience of a group of DuPage County homeowners. One resident learned that her well was polluted with cancer-causing chemicals two years after she moved into the area and waited two more years before she and about 750 others were hooked up to pipes carrying treated Lake Michigan water.

Governor Rod Blagojevich on July 25, 2005, signed SB 241 (Public Act 94-314). The so-called "RTK law" requires Illinois residents to be notified if they live near polluted sites and gives state environmental regulators more power to order polluters to clean up the sites. The law requires those responsible for the pollution to pay for both the cleanup of the sites and the cost of notifying residents that they live near polluted sites. It also gives Illinois EPA the authority to issue "administrative orders" to compel responsible parties to clean up sites or contain hazardous contaminants. Until now, Illinois EPA did not have the administrative authority to issue the orders directly and had to ask the State's Attorney General's office to sue or ask for assistance from federal regulators. This law gives Illinois EPA the long overdue authority needed to order polluters to clean up contamination quickly.

The Illinois EPA and the GAC will work with the public and other members of the regulated community on how residents should be notified about pollution, whether it be through phone calls, community meetings, door-to-door visits, and/or public service announcements.

Section 4. Continue to hold quarterly meetings

The ICCG has met regularly since 1988 to address groundwater protection issues and continues to hold quarterly meetings.

Section 5. Provide liaison for the GAC

The ICCG has continued to assist with coordination associated with the GAC by providing meeting agendas and minutes. The ICCG has also continued to review and make recommendations on groundwater research, data collection, and dissemination programs. The ICCG, as well as its subcommittees and work groups, have helped to provide a cooperative process to develop and implement groundwater protection programs in Illinois.

Section 6. Assist in implementation of the Illinois Generic Management Plan for Pesticides in Groundwater

The Illinois Generic Management Plan for Pesticides in Groundwater targets areas where aquifer materials occur within 50 feet of land surface (Figure 1). These aquifers have been demonstrated to be vulnerable to contamination by pesticides as a result of labeled uses (Goetsch, Bicki and McKenna 1992; Schock and others 1992). In 1995, the Illinois Department of Agriculture (IDA) contracted with the ISGS and the ISWS to construct a statewide dedicated groundwater monitoring well network for use with future pesticide management plans. The monitoring well network is designed to provide statistically reliable estimates on the occurrence of selected pesticides in groundwater within shallow aquifers (depth to the top of aquifer material less than 50 feet below land surface) in areas of corn and soybean production. Occurrence is defined as the presence of a specific pesticide at a concentration above the minimum reporting level. The network was designed to determine the regional impacts of pesticide leaching from non-point sources, not the impacts of site-specific point sources. The network is not a research program, but a tool for the management of pesticides in Illinois. Consequently, the pesticides selected as analytes are those with high use in Illinois and/or were previously detected in groundwater in Illinois or other Midwestern states. Also reflecting the management tool approach is the decision to set minimum reporting levels at a maximum of 5 percent of the groundwater reference value,

but not to expend limited laboratory resources on detecting pesticides at very low concentrations (Table 1). The monitoring network and the IDA's pesticide laboratory operate in compliance with U.S. EPA-approved quality assurance project plans.

The network currently consists of 157 shallow groundwater-monitoring wells located throughout the state (Figure 2). Well depths vary from 10 to 83 feet. Wells are constructed of 2-inch inside diameter PVC well casing. Most wells have a 5-foot long slotted well screen. Each well is located in public rights-of-way adjacent to row-crop fields. All of the wells are installed in areas where aquifer materials occur within 50 feet of land surface. An additional 19 wells were installed in areas of no known aquifer materials within 50 feet and are considered non-target monitoring wells and therefore are excluded from statistical analysis with the primary 157 wells.

Each well in the network is sampled once during a two-year period. The ISGS and ISWS conducted a one-time sampling of the network beginning in the fall of 1998 and sampled the network from September 2000 through June 2001. IDA assumed responsibility for all sampling in July 2001. The IDA will continue to sample the entire network of wells in two-year cycles.

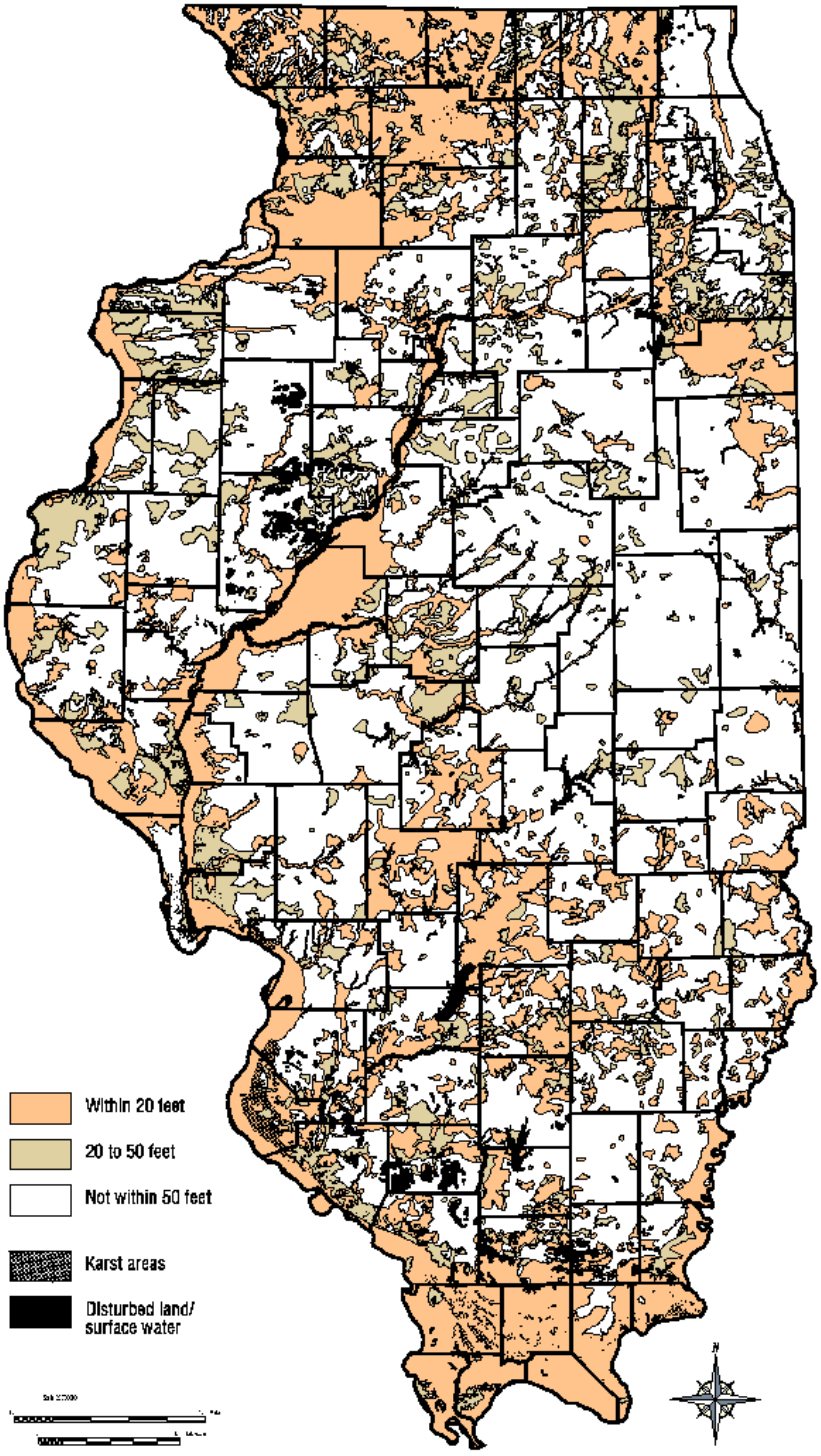

Figure 1. Depth to uppermost aquifer within 50 feet of land surface (Keefer 1995).

Table 1. Minimum reporting levels, action levels and groundwater reference values for analytes. DEA, DIA and DEDIA were added in the 2002-2004 sampling period.

Analyte	Minimum Reporting Level (ug/L)	Action Level (ug/L) [1]	Groundwater Reference Value (ug/L)	Frequency of occurrence 2002-2004 (percent)
acetochlor	0.15	0.2	2_2	0
atrazine	0.15	0.3	3_3	1.4
desethylatrazine (DEA)	0.15	--	--	15.5
desisopropylatrazine (DIA)	0.15	--	--	4.2
desethyldesisopropylatrazine (DEDIA)	0.15	--	--	13.4
bromacil	1.0	9	90_4	0
butylate	1.0	4	40_4	0
metolachlor	1.0	10	100_4	0.7
metribuzin	1.0	20	200_4	0
prometon	1.0	10	100_4	0
simazine	0.4	0.4	4_3	0

1) Action level equals 10 percent of the Groundwater Reference Value. http://www.epa.gov/waterscience/drinking/standards/dwstandards.pdf

2) Calculated on the basis of the Reference Dose, which is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

3) Groundwater Quality Standards for Class I: Potable Resource Groundwater, Illinois Administrative Code Part 620.410.

4) HA: Health Advisory. An estimate of acceptable drinking water levels for a chemical substance based on health effects information; a Health Advisory is not a legally enforceable federal standard, but serves as technical guidance to assist federal, state, and local officials.

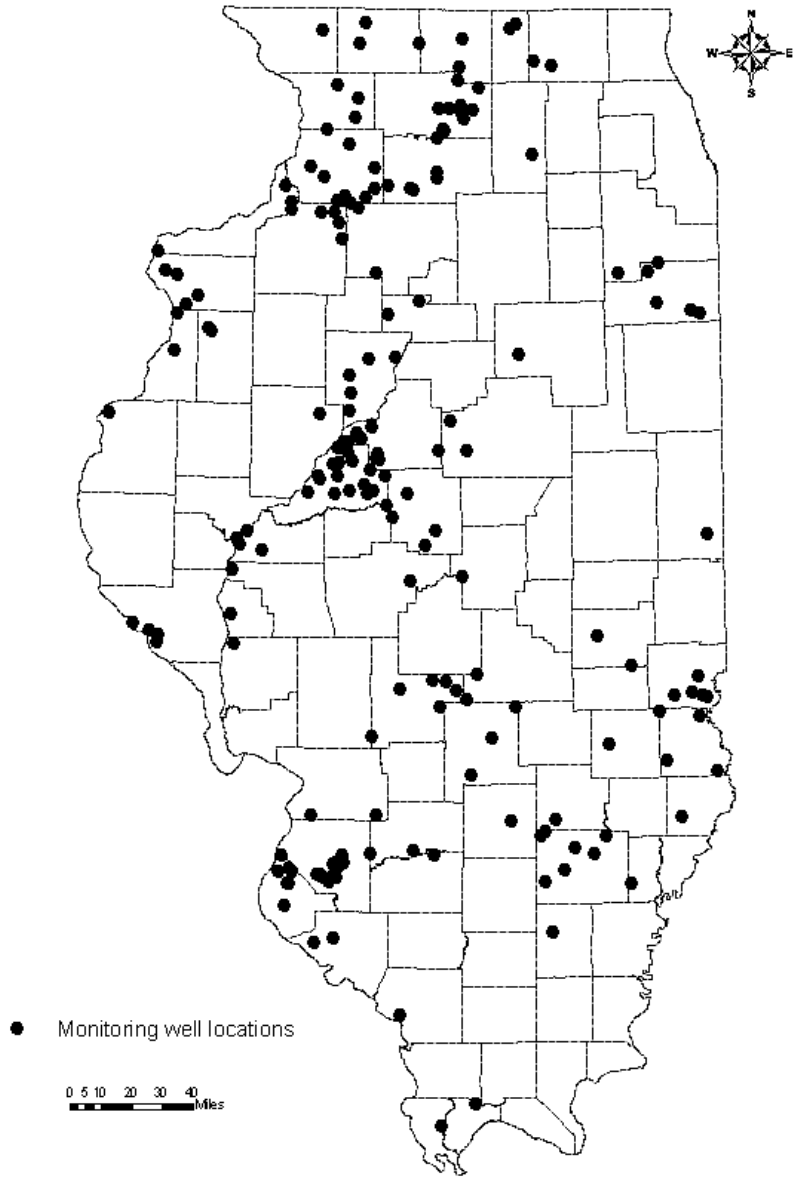

Figure 2. Monitoring well locations.

Monitoring Well Network Sampling Results - Three rounds of sampling of the monitoring wells have been completed. During these periods, analytical detection levels and minimum reporting levels have varied. In order to allow comparison between the sampling periods, the following data on the frequency of occurrence reflect the presence of a pesticide at or above the minimum reporting levels used in the most recent sampling round (2002-2004; see Table 1). The overall frequency of occurrence refers to the presence of any pesticide, or multiple pesticides, from a single groundwater sample. For example, the occurrence of two pesticides present in a single well sample at concentrations above the minimum reporting level is considered a single detection above the minimum reporting level.

From September 1998 through August 1999, samples were collected from 112 network wells and analyzed for the presence of 14 pesticides (Mehnert and others 2001). Results indicate an overall frequency of occurrence of 6.3 percent. Results of the second-round sampling of the network wells (148 samples collected between September 2000 and August 2002) indicate an overall frequency of occurrence of 3.4 percent. Atrazine was detected in three samples and two of those samples had concentrations (0.58 and 0.85 ug/L) above the action level of 0.3 ug/L. Cyanazine, metribuzin and metolachlor were each detected in one sample, but none of those samples had concentrations above levels of concern.

Results of the most recent sampling period (142 samples collected from October 2002 through September 2004) indicate that parent pesticides were detected in 3 of the 142 samples (2.1 percent). Atrazine was detected in two samples, and metolachlor was detected in one sample. None of those samples had concentrations above levels of concern. This most recent sampling period was the first to include the atrazine degradates for analysis. One or more of the atrazine degradation products, (desethylatrazine (DEA), desisopropylatrazine (DIA) and desethyldeisopropyl atrazine (DEDIA), were present above the minimum reporting levels in 18.3 percent of the samples. In the current round of sampling (2004 through 2006), the IDA has added metabolites of the chloroacetanlide herbicides (alachlor, acetochlor and metolachlor) to the list of analytes.

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Future Monitoring - IDA intends to continue to follow the sampling and analysis plan laid out in the generic management plan and the quality assurance project plan for the foreseeable future. If current trends in the occurrence of pesticides continue, some adjustments to the sampling plan may be considered. (References cited in this section are listed in Appendix I.) Illinois EPA has also conducted a cooperative sampling program with the United States Geological Survey (USGS) of herbicides and their transformation products in 117 CWS wells. Transformation products were detected in 34 percent of the wells. See Section 5 of Chapter IV for further details.

Section 7. Review and support the annual groundwater education work plan

The ICCG's Groundwater Education Subcommittee is now defunct, and its future is not known at this time. This is in direct relation to DNR's decision to eliminate the Illinois Groundwater Education Coordinator position, effective October 2004.

Section 8. Evaluate the development of Class III Special Resource Groundwater for Dedicated Nature Preserves

To date, eight Dedicated Nature Preserves (DNPs)—Parker Fen, Boone Creek Fen, Spring Hollow, Lee Miglin Savanna, and Amberin Ash Ridge Nature Preserve located in McHenry County, and Fogelpole Cave, Paulter Nature Preserve, and Stemler Cave Nature Preserve located predominantly in Monroe County—have been designated as having Class III Special Resource

Groundwater. See Chapter V, Section 2 for more discussion. The ISWS and ISGS continue to work on methods to estimate groundwater recharge areas, and a draft report has been prepared that addresses the use of these methods by applying them to 12 DNPs. It is expected that the Illinois Nature Preserve Commission (INPC) will petition Illinois EPA to designate the groundwater recharge areas associated with the 12 additional DNPs as Class III Groundwater.

Section 9. Review regulated recharge area proposals

Effective September 1, 2001, Pleasant Valley Public Water District in Peoria County became the state's first regulated recharge area, a defined area with specific regulations in place to protect vital groundwater resources. The GAC assisted in the adoption of the Pleasant Valley Public Water District regulated recharge area during the 2000 through 2002 reporting period. No additional proposals were received during this reporting period. However, the GAC will assist in future regulated recharge area proposals as they occur.

CHAPTER II. GROUNDWATER ADVISORY COUNCIL OPERATIONS

Section 1. Per the request of the Governor's Office, review and make recommendations regarding groundwater quantity issues for the next legislative session

A comprehensive discussion of groundwater quantity issues is included in Chapter I, Section 2, **"**Assist the GAC in the review and development of recommendations pertaining to groundwater quantity issues." The SWPTF has taken the lead on these initiatives.

Section 2. Conduct policy related meetings

The GAC conducted several policy related meetings over the past two years. The GAC is comprised of nine members who represent public, industrial and local government interests. The IGPA mandates that the council members be appointed by the Governor to serve three-year terms. The current members are:

Bill Compton (Chair)	Business Interest (Caterpillar, Inc.)
Dennis Duffield	Public Water Supply Interest (City of Joliet)
Jack Norman	Environmental Interest (Sierra Club)
George Czapar	Agricultural Interest (University of Illinois – Extension)
Paul McNamara	Local Government Interest (Southwestern Illinois Planning Commission)
Robert Miller	Business Interest (Industry Consultant)
Jeff Wickenkamp	Regional Planning Interest (Northeastern Illinois Planning Comm.)
John Liberg	Water Well Drilling Interest (Illinois Association of Groundwater Professionals)
Robert Kohlhase	Environmental Interest (Farnsworth Group)

As discussed in detail in Chapter I, Section 1, the GAC has provided significant input and on the RTK activities to date. Moreover, Section 25d-3(c) of P.A. 94-314 requires the:

> " … IEPA to consult with the public and appropriate members of the regulated community when determining the appropriate methods of giving notice."

The GAC has taken the lead on following up on this requirement. Illinois EPA and the GAC will work with the public and other members of the regulated community on how residents should be notified about pollution. The GAC held a planning meeting to discuss next steps, prior to the effective date of January 2006, to discuss the next steps of this requirement.

The GAC has also focused on the policy issue of integrating community water system recharge area delineation modeling when establishing cleanup objectives under TACO. Discussions were initiated with business representatives on the Site Remediation Advisory Committee (SRAC). Representatives of SRAC did not want to include these factors into TACO amendments being developed. The GAC concluded that this topic warranted broader discussion. The GAC initially discussed this during their May 3, 2005, meeting. The GAC asked Illinois EPA to develop some additional research information relating contamination between sites and recharge areas.

The GAC resolved on August 17, 2005, to take the lead on facilitating and providing stakeholder input to Illinois EPA on methods of notification required under P.A. 94-314. The GAC is well suited for this task, given its diverse membership and statutory mandate. Moreover, the GAC established an RTK Notification Committee comprised of the GAC members; Illinois EPA representatives; D.K. Hirner, Executive Director, Illinois Environmental Regulatory Group; Anne Muniz, RTK Subcommittee (Downers Grove CAG); Bernadette Dinschell, RTK Subcommittee (Lisle CAG); and Gary Flentge, Director, Environmental Health Division, IDPH.

Section 3. Provide input to programs, plans, regulatory proposals and reports as appropriate

The GAC, with assistance from the Central Groundwater Committee, was instrumental in supporting Illinois EPA's motion to propose maximum setback zone protection for the Marquette Heights CWS wells before the Illinois Pollution Control Board (Board). This was the first Board regulation of such an expanded zone of protection in Illinois. As part of this process, Board hearing dates were held on March 1, 2005, and April 5, 2005, in Pekin and Chicago, Illinois, respectively. The expanded setback zones are intended to help protect the WHPA for Marquette Heights CWS wells from being contaminated. It is anticipated that the maximum setback zone proposal will be adopted by the Board in the near future. For more information on this regulatory proposal, see Chapter VII, Section 1, Central Groundwater Committee.

CHAPTER III. EDUCATION PROGRAM FOR GROUNDWATER

Section 1. Coordinate and conduct a statewide education program with an annual evaluation and work plan involving local, regional and state organizations and agencies. Support the integration of groundwater protection into state and local agency educational programs

After achieving most of the goals set forth in the January 2004 Biennial Comprehensive Status and Self-Assessment Report, DNR re-focused its Groundwater Education Program towards providing wider and more streamlined access to groundwater education materials. DNR now provides groundwater education materials to educators, local organizations and officials, and the general public through a new web-based ordering and distribution system launched in July 2004. All available materials are provided free of charge to educators at Illinois' public and private schools, colleges, and universities. Many of the materials that can be ordered and shipped to schools will also be available as PDFs for direct download in the near future. The online order form can be found at http://dnr.state.il.us/lands/education/. The following groundwater-related titles are currently available on the order form:

Aquatic Resources of Illinois: Booklet contains student lessons and related activities. Targeted Grades: 4-8. Permission to photocopy these pages is granted for use with students in the classroom.

There's More Than One Way to Save Water: Brochure lists tips that can help you save water. Targeted Grades: All.

Science for Society: Brochure explains the functions of DNR's ISWS, the primary agency in Illinois for research and information on surface water, groundwater and the atmosphere.

Gardening in Your Wellhead Protection Area: Brochure lists tips to help you protect drinking water supplies from possible contamination resulting from gardening activities.

Groundwater Protection Education Materials and Services: The brochure lists groundwater education materials available from the DNR.

Illinois Water Well Sealing Coalition: The brochure lists the reasons for sealing abandoned water wells and steps to follow when doing so.

Groundwater and Land Use in the Water Cycle: Produced by the University of Wisconsin Extension and Wisconsin Department of Natural Resources, this colorful poster illustrates how groundwater flows, natural processes, and human impacts.

Groundwater: Illinois' Buried Treasure Education Activity Guide: Thirteen activities and background information are included in this activity guide for teachers, designed to supplement classroom curricula, grades 4 through 12.

Aquatic Illinois CD-ROM: Item not currently available online. Teachers can order item by written request on school letterhead. Please send to IDNR - Education, One Natural Resources Way, Springfield, IL 62702-1271. Requests only accepted from teachers in Illinois schools.

H2O Below: An Activity Guide for Groundwater Study: This activity guide for middle school teachers contains background information and 28 activities relating to groundwater topics.

In addition, DNR offers technical volumes of the Conservation 2000/Critical Trends Watershed Assessments/Area Assessment Reports for most of the roughly 40 designated Ecosystem Partnership areas throughout Illinois.

DNR's Groundwater Education Program is not limited to directly providing educational materials. Other DNR programs, while not directly linked to the Groundwater Education Program, provide education and information development opportunities. DNR's Ecosystems Program integrates the interests and participation of local communities and private, public, and corporate landowners to enhance and protect watersheds through ecosystem-based management. The Ecosystems Program is funded through Conservation 2000 (C2000), a comprehensive long-term approach to protecting and managing Illinois' natural resources. The Ecosystems Program is a voluntary, broad-based incentive program. The Ecosystems Program consists of four components:

- Assessment and Monitoring
- Integrated Technical Assistance
- Ecosystem Project, Planning, and Support Grants
- Ecosystem Interpretation and Education

The Ecosystems Program is made up of Ecosystem Partnerships, which are coalitions of local stakeholders, including private landowners, businesses, scientists, environmental organizations, recreational enthusiasts, and policy makers. They are united by a common interest in the natural resources of their areas' watershed. Partnership designation brings financial and technical support, which is integral in addressing watershed concern. Currently, there are 41 Ecosystem Partnerships covering 84 percent of Illinois. More impressive is the fact that 98 percent of the state's citizens live in an Ecosystem Partnership area. Nearly a half million citizens of all ages have been educated on natural resource protection including the importance of groundwater. Additionally, the Ecosystems Program has provided funding for the development of detailed groundwater management plans to educate policy-makers on the critical issues surrounding groundwater resources in their area.

CHAPTER IV. GROUNDWATER EVALUATION PROGRAM

Section 1. Continue to improve the Source Water Assessment Program Geographic Information System to include more interactive features

Section 1453 of the SDWA required states to develop and implement SWAPs. Illinois EPA established a Source Water Protection Technical and Citizens Advisory Committee to provide guidance in the development of our application. The U.S. EPA provided Illinois with this grant in 1997 and approved Illinois' SWAP on October 28, 1999. The approval also included an 18-month extension for completing the SWAP in May of 2003. Illinois' approved SWAP committed to the development of an Internet GIS for providing source water assessment information to the public as required under Section 1453 of the SDWA.

Section 2. Continue to share Geographic Information System coverages in an electronic format and continue to automate the groundwater resource database for Illinois

The Illinois Natural Resources Geospatial Data Clearinghouse (Illinois Clearinghouse) continues to provide Internet access for no-cost, geographically referenced, digital data and imagery for Illinois. The on-line data holdings are used to support a variety of GIS and remote sensing applications. The Illinois Clearinghouse, http://www.isgs.uiuc.edu/nsdihome/' is a multi-agency effort to make metadata and digital geospatial data about Illinois' natural resources available on the Internet. The ISGS established and maintains the Illinois Clearinghouse, which has been on-line since July 1997. The primary goal of this effort is to foster a climate for the cooperative development of a statewide clearinghouse network in Illinois by promoting the advantages of the National Spatial Data Infrastructure (NSDI), a worldwide effort that promotes and supports digital data access and distribution.

Available data sets (with documentation) include: Digital Raster Graphics (DRG) files, Digital Orthophoto Quarter-quads (DOQ) files, geology, major bedrock aquifers, sand and gravel aquifers, Aquifer Sensitivity to Contamination by Nitrate Leaching, Aquifer Sensitivity to Contamination by Pesticide Leaching, land use, political boundaries, and more. A recent effort involved the scanning of more than 30,000 prints of historic aerial photography from the 1930s/1940s and making the image files available for download via the Illinois Clearinghouse. The historic aerial photography is available for 45 counties in Illinois. Recent efforts for the Illinois Clearinghouse include providing access to a 2005 update of the USGS DOQs for the entire state. These DOQs were collected in the early part of 2005, and a project is in progress to make these images available via the Illinois Clearinghouse. Additional expansion of the historic aerial photography is also being considered.

The Illinois Clearinghouse continues to be used by many people in the state and region. Site use statistics for 2004 indicate that almost 1,000,000 historic aerial photographs were downloaded by users. Many people in Illinois and the country have expressed interest in this historic collection. During 2004, the Illinois Clearinghouse recorded about 4,300,000 hits from 113,500 individual users. During the same period, about 182,500 DOQ files were downloaded from the Illinois Clearinghouse, a rate of more than 300 per day.

During the last year, the ISGS launched ILWATER, a new on-line mapping service that provides access to information about wells drilled in Illinois. Anyone with Internet access can go on-line and access a significant database of well information that has been collected and maintained by the ISGS. An extensive database of geological information and other data from well records is available to the public via an interactive map website. This mapping utility can be accessed on-line at http://www.isgs.uiuc.edu/wwdb/intro.htm. With the Illinois Water Well interactive map, people are able to "point and click" to a location on a map of the state, zoom in and out, define a rectangle to specify a more detailed area, find all the known wells in the area, and select subsets of the well data. By clicking on individual well locations, users can view information about location and ownership of water wells, coal test borings, and engineering test wells. In addition, users can also view information such as total depth and a description of subsurface units (sand, gravel, limestone, etc.), as well as the depth of the top and bottom of each unit. The Illinois Water Well web page is easy to use and features well locations for the entire state displayed with well-known geographic references including highways, county and township boundaries, lakes, municipalities, orthoimagery (very detailed aerial photography), and statewide maps of the aquifers.

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Staff members from the ISGS have received very positive comments about the Illinois Water Well website. The website was launched in late July 2004 and its availability spread by word of mouth throughout the drilling and groundwater communities. During 2004, the ILWATER website recorded about 20,640 visits, or about 1,700 visits per month, and a total of 6,830 unique visitors (about 570 unique users per month) was recorded during this period. In addition, the ILWATER application received a favorable review in the Summer 2004 newsletter of the Illinois Association of Groundwater Professionals (IAGP). The reviewer described many of the details concerning the functionality of the on-line mapping service and added that the website was a "great tool and easy to use!"

Section 3. Continue to conduct groundwater assessments and share the information through regular updates and completed reports

The occurrence, extent, and availability of groundwater resources continue to be of significant interest in several parts of the state. During the 2004 and 2005 reporting period, ISGS and ISWS scientists were very involved with studies pertaining to groundwater resources in several areas of the state, especially northeastern Illinois and the Metro East St. Louis area, as well as the fate and transport of contaminants in shallow groundwater.

Groundwater Databases - The CGS at the ISWS maintains databases on ambient groundwater quality, water use (withdrawals), aquifer hydraulic properties, groundwater levels, and drillers' records for private and public wells in Illinois to provide basic data and information to the general public and to support applied groundwater research activities. These data are integrated

into an Structured Query Language-structured relational database accessible through GWInfo, which is a web-based application that has been developed at the ISWS to provide rapid desktop data access (Foote et al., 2004). All records have spatial coordinates, allowing data to be imported easily into Arc Spatial Database Engine and Arc Internet MapServer. The system has also been integrated with the ISWS Public Service Laboratory in the form of a customized Laboratory Information Management System (LIMS). Modules are currently being developed for providing data, graphs, and maps from research projects, all now being stored in one central system, on the web to the public.

Executive Order Number 5, developed by the GAC, has led to selected sets of the ISWS data, connected to the Illinois EPA SWAP ArcIMS site, being available to local water resource managers. The SWAP-linked data include annual water withdrawals by Illinois communities and self-supplied industries, ambient groundwater quality data, and aquifer hydraulic properties data from aquifer tests performed throughout Illinois over the past 50+ years.

This new data structure/integration has allowed selected sets of the ISWS data to be connected to Illinois EPA SWAP ArcIMS site. The SWAP-linked data include annual water withdrawals from Illinois communities and self-supplied industries, ambient groundwater quality data, and aquifer hydraulic properties data from aquifer tests performed throughout Illinois over the past 50+ years.

The modernization of the CGS databases, which was partially funded by Illinois EPA, has provided an opportunity for collaborative data sharing of groundwater quality data with Illinois EPA, IDPH, and county health departments. A pilot program is now being considered to develop a network with other governmental groups to provide direct access to the shared water quality information among users (Wilson et al., 2004a, b).

Illinois Water Inventory Program (IWIP) - Substantial improvements have been made in IWIP in the last two years, in part through support from Illinois EPA. All major procedures for IWIP have been documented, standardizing all activities. The data-entry interface in Access now has: (1) additional fields to enable retrieval of more types of information; (2) additional safeguards against mis-entering of data; (3) more user-friendly field names; and (4) inclusion of an e-mail field, which enables messages to be sent directly to the facility with a pre-formatted subject line identifying IWIP and the facility name, along with batch e-mail capability. "Canned" queries have been written to retrieve data, especially for CWSs, as needed for in-house research and external uses such as annual groundwater withdrawals for the Army Corps of Engineers Lake Michigan Diversion Accounting Program and yearly water use for the USGS's National Water-Use Information Program. The canned queries also provide the basis for mapping municipal wells and their yearly pumpage on Illinois EPA SWAP ArcIMS website. An updated map of CWSs in relation to major aquifer systems will be published later this year using data retrieved and

The IWIP is the state's inventory of water use and withdrawals. This information is submitted on a voluntary basis. Water use inventory data is crucial to the management and use of water on a statewide basis.

transformed through an Access query (Wehrmann et al., 2005).

"Dead" facilities have been eliminated from the Public-Industrial-Commercial Survey (PICS) database, which underpins the IWIP program by following up on facilities that have not reported in years and finding industries and other facilities that have been shut down. The percentage of yearly returns has increased from around 60 percent to 75 percent due to increased follow-up phone calls to facilities and through standard procedures for filling data gaps from previous years' valid facility reports and Illinois EPA site visits. A Water Use Summary summarizing withdrawals for 2002 (the first since 1995) has been prepared and is currently in editorial review (Hlinka and Bryant, in press).

Proper water resource planning and management requires a firm understanding of water resource availability as well as water use. A comparison of Year 2000 groundwater withdrawals against estimated aquifer potential yields was conducted by the ISWS (Wehrmann et al., 2004). The comparison is presented as a ratio of groundwater use (withdrawals) to groundwater yield (i.e., potential aquifer yield) on a township basis. Geographic information system technology was used to determine township use-to-yield ratios for three aquifer types (sand and gravel, shallow bedrock, and deep bedrock). A high use-to-yield ratio (e.g., >0.9) suggests an area where groundwater availability problems exist or could be impending. The area of influence of a well or well field often may extend beyond the township boundaries in which the pumpage is occurring. In such cases, township aquifer potential yields may appear to be approached or exceeded even though the withdrawal does not exceed total aquifer potential yield. Therefore, the delineation of high groundwater use-to-yield areas by this method should be considered simply as a means for calling attention to areas to prioritize on a statewide basis for water resources planning and management.

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Groundwater in Lee, Whiteside, Bureau, and Henry Counties - Groundwater conditions in Lee, Whiteside, Bureau, and Henry Counties in northwestern Illinois were summarized by the ISWS (Burch, 2004). The report is the culmination of work started in 1991 under the auspices of the Aquifer Assessment Program within the former Department of Energy and Natural Resources. The region encompasses more than 900 square miles in northwestern Illinois, including Rock Falls, Princeton, Amboy, and Annawan. Groundwater provides about 45 million gallons per day (mgd) for summer irrigation and about 3.5 mgd year-round for the area's 45,000 residents.

The study entailed drilling 41 observation wells at 27 sites. Two wells were constructed at most locations: one into the deeper, more groundwater-prolific Sankoty sand aquifer at depths of 85-

359 feet, the other into the shallower Tampico aquifer at a depth of 20 feet. The Sankoty aquifer provides water to most irrigation and municipal systems while the Tampico is a valuable water source for rural private wells.

More than 1,800 groundwater-level measurements were made between 1991 and 1995. Those data show that the two aquifer systems are hydraulically independent, that heavy use of the Sankoty for irrigation does not influence water levels in the overlying Tampico aquifer, and that water levels in the Sankoty historically recover fully over the non-irrigation season. These data also show that groundwater movement in both aquifers is largely down the valley between the Rock and Green Rivers eventually discharging to the Mississippi River, but that a significant portion of the flow in the deeper Sankoty is diverted down the ancient Mississippi valley to the modern Illinois River. Annual estimated recharge to the Tampico aquifer was seven inches but only one inch to the Sankoty aquifer. No significant, regional water quality problems were detected in samples collected from either aquifer, and the quality of samples from both aquifers was generally excellent.

Conference on Water Supply Planning for Northeast Illinois Held - In response to the potential for water supply shortages in the southern Lake Michigan region, the NIPC and the ISWS organized a conference entitled "Straddling the Divide: Water Supply Planning in the Lake Michigan Region," held on February 15-16, 2005, in Chicago, Illinois. The purpose of the conference was to foster a dialogue between engineers, planners, scientists, politicians, and other stakeholders who have a common interest in maintaining the availability of water for the region's communities. The conference was sponsored in part by the Joyce Foundation and the ISWS. Among the more than 200 conference attendees were representatives from municipalities, councils of government, regional planning commissions, state and federal agencies, water resources consulting firms, and universities.

Water Supply Consortium Vision and Mission Statement

Vision - Recognizing that water resources have no political boundaries, the vision of the Southern Lake Michigan Regional Water Supply Consortium is to ensure a sustainable high-quality water supply for future generations throughout the metropolitan region of northeastern Illinois, southeastern Wisconsin, and northwestern Indiana.

Mission - The Southern Lake Michigan Regional Water Supply Consortium mission is to promote a comprehensive regional approach to sustainable water supply planning and management in the greater Chicago metropolitan region, including southeastern Wisconsin and northwestern Indiana. We recognize that comprehensive planning and management must include all water resources, from Lake Michigan to inland surface waters to groundwater. Our mission will address the tri-state region's water supply issues by pursuing the following goals:

- Acquire funding to support the mission of the Consortium.
- Promote water supply data gathering, research, and data analysis.
- Promote legislation at federal, state, and local levels for water supply planning and management.
- Advocate increased water supply education among all stakeholders.
- Create a regional water supply plan and provide support to implement that plan.

Arsenic in Illinois' Aquifers - The ISWS has initiated a number of studies to examine arsenic in aquifers of Illinois, primarily the Mahomet and Glasford aquifers in central Illinois (Holm et al., 2004; 2005; Kirk et al., 2004; Kelly et al., 2005; Kelly, 2005b). In the Mahomet aquifer, the

greatest arsenic concentrations were found in the western part of the aquifer (Tazewell County) and along the buried bedrock walls in the central part of the aquifer (DeWitt, Macon, and Piatt Counties). The Glasford aquifer, which is shallower and much thinner than the Mahomet, had elevated arsenic concentrations throughout its extent. There was considerable spatial heterogeneity in arsenic concentrations in both aquifers. Geochemical conditions appear to be controlling arsenic solubility, with organic carbon apparently playing a key role.

Northeastern Illinois - Regional northeastern Illinois research by the CGS has included studies to investigate anthropogenic changes to groundwater recharge rates and groundwater quality. Meyer (in press) found that the quantity of base-flow in urban, northeastern Illinois streams, an indication of groundwater recharge rates, had not changed as a consequence of urban development, but that the time distribution of base-flow rates had changed, possibly reflecting leakage of imported water from pipe networks. Since water quality in the deep bedrock aquifers of the region could plausibly become more saline under the present regime of heavy withdrawals from these aquifers, Kelly and Meyer (2005) explored available deep bedrock water quality data for trends in dissolved constituents. They found that, while data from most wells showed no trends, groundwater from the two largest pumping centers, Joliet and Aurora, is becoming slightly saltier with time.

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ISWS groundwater research in northeastern Illinois is presently focused on Kane County, which is the subject of a multifaceted, collaborative ISWS-ISGS project scheduled to conclude in 2007. Kelly (2005a, c) collected samples of groundwater from wells open to shallow aquifers (< 250 ft) in Kane County and found higher concentrations of dissolved solids in the eastern, urbanized part of the county. He concluded that the most likely sources of these dissolved constituents are road salt runoff, vehicular exhaust, and industrial discharges. Locke and Meyer (2005) developed potentiometric surface maps of the shallow aquifers of Kane County. Their work is critical to ongoing efforts to develop computer flow models of the aquifers supplying Kane County. Ultimately, the Kane County research efforts will produce groundwater flow models capable of simulating groundwater flow in likely future development scenarios as well as analysis based on this modeling.

The five-year study by the ISGS and ISWS to map and assess the groundwater resources of Kane County advanced during 2004-2005 with the release of an interim report reporting on the geologic investigations (Dey, et al., 2004) and with maps showing the bedrock geology (Dey, et al., 2004 and 2005), major Quaternary aquifers (Dey, et al., 2004 and 2005), geologic cross sections (Dey, et al., 2004), and aquifer sensitivity to contamination (Dey, et al., 2004). Abert et al. (2004) developed a three-dimensional geologic model of Kane County. Sieving (2004) and Sieving et al. (2004) applied the geologic mapping to mapping of the county's groundwater resources. The ISGS is beginning a joint project with the ISWS that will produce similar three-

dimensional hydrogeologic maps of the groundwater resources of Kendall County. The ISGS is studying the susceptibility of the shallow sand and gravel aquifers to contamination from various land uses associated with urban growth in Kane County (Hwang, 2004) and McHenry County (Hwang, et al., 2003). The USGS has completed a local model of the ground-water flow system under Campton Township to assist the township in assessing their resources and for planning development within the township. Field data collection and model simulations are complete. Results of the study will be released by January 2006.

Availability of groundwater resources is of significance in DeKalb County as the demand for water increases to meet the needs of its growing population. Vaiden et al. (2004) described the shallow groundwater resources of the county and concentrated on the sand and gravel deposits within the buried Troy Bedrock Valley.

Metro East St. Louis - The availability of groundwater resources and the sensitivity of aquifers to contamination is of increasing importance in Madison, Monroe, and St. Clair Counties that comprise the Metro East St. Louis area. Mapping the Quaternary deposits establishes the lithostratigraphic framework of these sediments and provides the basis for mapping the extent, thickness, and characteristics of the aquifers within these deposits (Grimley et al., 2004; Smith et al., 2004).

Mahomet Aquifer - The Mahomet aquifer remains a high priority. This major aquifer extends from the Indiana state line to the Illinois River, crossing eastern and central Illinois. Mehnert et al. (2004) described the results of continued investigations of the Mahomet aquifer. Groundwater flow within the aquifer and both the rates and locations of groundwater recharge are not well understood. Studies being conducted at the ISGS are focused on using geochemical techniques to determine the age of the groundwater in Mahomet aquifer, locate major recharge areas, examine the evolution of groundwater geochemistry, and develop a conceptual model to help explain the current geochemical characteristics of water in the Mahomet aquifer. The ISGS, ISWS, USGS/Urbana and DNR/Office of Water Resources continued to serve as technical advisors to the MAC, which has sought funding and support for studying this major source of supply that underlies east-central Illinois. For more information, see the Consortium's website at www.mahometaquiferconsortium.org/.

The ISWS continues to conduct both field and modeling studies of groundwater flow and recharge in the Mahomet aquifer. In April 2003, a 23-day aquifer test was conducted using Decatur's wellfield to study interactions between the aquifer and the Sangamon River in Piatt County. Water levels have been measured in wells completed in the Mahomet aquifer in Champaign, Ford, Iroquois, and Vermilion Counties to better understand groundwater flow directions in the northeastern section of the aquifer. A critical component of this effort is identification of locations where the aquifer interacts with streams and to determine if water is flowing into or out of the aquifer. The ISWS continues to update a groundwater flow model with all of the new information. The model is being used to confirm our conceptual understanding of the flow system and to determine where additional data are needed. Flow budgets computed by the model are being compared to streamflow records of major streams. Future work will focus on the overlying Glasford aquifer and how it supplies water downward into the Mahomet aquifer.

The Imperial Valley area of Illinois, located principally in Mason and southern Tazewell Counties and overlying the confluence of the ancient Mississippi and Mahomet-Teays river systems has also been the subject of study by the ISWS. The sand and gravel deposits left in the confluence area contain an abundant groundwater resource that is heavily used for irrigating row and specialty crops. Over 40 billion gallons of water are used for irrigation in this area annually. With funding from the Imperial Valley Water Authority (IVWA), the ISWS Center for Atmospheric Science (CAS) initiated a precipitation network of 25 raingauges in 1992. The ISWS CGS soon followed with a groundwater level network of 11 observation wells in 1994. That network was expanded to 13 wells in 1996. In 2003, six wells and two stream gauges were added to closely monitor surface water and groundwater responses within the scale of an individual irrigated plot. The purpose of the networks is to collect long-term data to document and assess the impact of groundwater withdrawals for irrigation, particularly during drought periods, and examine the interrelationships of precipitation, irrigation withdrawals, streamflow, and groundwater recharge. Annual reports summarizing the previous year's precipitation observations started in 1994. In 1999 the annual reports began including groundwater level observations. The most recent reports, ISWS Contract Report 2004-01 (Wehrmann et al., 2004) and Contract Report 2005-06 (Wehrmann et al., 2005), mark the tenth and eleventh annual reports. Credit must go to the IVWA for their continuing interest in the collection of scientific data for making management decisions on the use of their groundwater resource.

Techniques - Techniques to improve the collection, analysis, and three-dimensional display of data for groundwater resource assessments continue to be developed. High-resolution seismic reflection in many hydrogeologic settings provides exceptional three-dimensional information for defining the extent, characteristics, and thickness of sand and gravel aquifers within the Quaternary sediments (Pugin et al., 2004a). In addition, the data characterizing the seismic velocities of earth materials that is collected through vertical seismic profiling allow for converting seismic profiles obtained on the land surface (Pugin et al., 2004b) to be converted from time-domain to more useful depth-domain profiles. Geologic mapping is integral to establishing the lithostratigraphic framework that is the basis for mapping aquifers and aquitards, which in turn provides the foundation for assessing groundwater resources and addressing groundwater resource issues. Geologic mapping is focused on the collar counties around Chicago, the Metro East St. Louis area, and southern Illinois. Published maps can be found on the ISGS website at http://www.isgs.uiuc.edu/isgshome/geo-map.htm. The results of geologic mapping of the Quaternary deposits along the Illinois River valley in central Illinois and the interpretation of the depositional history represented by these deposits (McKay et al, 2005) provide the basis for a more detailed study of the variability of the hydraulic characteristics of the Sankoty aquifer and associated aquitards. Development of techniques continues at the ISGS for visualizing geologic data and maps in three dimensions and facilitates the use of the data and the understanding of data interpretations. Keefer et al. (2004) are developing a software

The ISGS released two more publications in its Geoscience Education Series; a series that is intended for a general audience. The first publication is *Illinois Groundwater: A Vital Geologic Resource* (Killey and Larson, 2004); the second one is *Land-Use Decisions and Geology; Getting Past "Out of Sight, Out of Mind"* (Killey and Berg, 2004).

application for visualizing geologic and hydrogeologic data, maps, and models in three dimensions. Hansel et al. (2004) provide an example of using three-dimensional geologic mapping in groundwater resources planning.

Groundwater Quality and Agricultural Chemicals - Recent collaborative work between the ISGS and ISWS has attempted to determine sources and fate of nitrate in groundwater and surface water in Illinois using geochemical data, with an emphasis on the stable isotopes of nitrogen and oxygen (Mehnert, 2004; Panno and Kelly, 2004; Mehnert et al., 2005; Panno et al., in press). The research has been done in a variety of environments, including tile drains and groundwater in row crop areas, the Mississippi and Illinois Rivers and major tributaries, and groundwater in the karst region of southwestern Illinois. In a related study, ISGS, ISWS, and Illinois Natural History Survey researchers collaborated on a study looking at the effect of water quality on the Illinois amphipod, an endangered species found only in the caves of southwestern Illinois (Panno et al., 2004). The ISGS continues to study the effects of the use of agricultural chemicals on groundwater quality and possible sources of ammonium in groundwater (Roy et al., 2003).

Illinois River Basin National Water-Quality Studies - As part of the National Water-Quality Assessment (NAWQA) Program, the USGS is assessing both the Lower and Upper Illinois River Basins (LIRB and UIRB, respectively). The NAWQA studies are designed to be active for four to five years with subsequent minimal data collections for about five to six years. First-cycle high-intensity data collection is complete for both lower and upper NAWQA studies. Copies of a number of reports from either study are available. A summary report of the LIRB first-cycle data collection is available (USGS Circular 1209); a similar summary of the UIRB first-cycle activities (USGS Circular 1230) was completed in December 2003. In 2002 and 2005, a five-well subset of the original Mahomet aquifer network of wells was resampled for suites of pesticides, trace elements, and volatile organic compounds similar to the cycle 1 data collection. Two UIRB land-use groundwater studies were resampled in 2002 and 2005. These were also 5-well subsets of the original networks sampled during cycle 1. The 5-well sample subsets of the Mahomet (LIRB) and two land-use studies (UIRB) will continue to be collected in odd-numbered years. A resampling of the complete Mahomet groundwater network (30 domestic or public-supply wells) is scheduled for 2007. In 2004–05, a new urban land-use network of monitoring wells was installed in the St. Louis metropolitan area as part of the cycle 2 of the LIRB. The complete network of 24 monitor wells (13 in Illinois and 11 in Missouri) in recently developed (since 1980) residential or commercial land cover, plus 2 reference wells, were sampled during July-August 2005. Samples were analyzed for pesticides, VOCs, and trace elements. A large subset of these well samples was also analyzed for sulfur hexafluoride to estimate the date of recharge. A selected subset of 5 wells in this urban land-use network will be sampled again in odd-numbered years.

Section 4. Continue to utilize innovative and cost effective methods to implement statewide groundwater quality monitoring

Ambient Groundwater Monitoring Network - Illinois EPA continues to operate a network of CWS wells consisting of 356 fixed locations. The network is designed to:

- Provide an overview of the groundwater conditions in the CWS wells in Illinois.
- Provide an overview of the groundwater conditions in the major aquifers in Illinois.

- Establish baselines of water quality within the major aquifers in Illinois.
- Identify trends in groundwater quality in the major aquifers in Illinois.
- Evaluate the long-term effectiveness of Clean Water Act and SDWA program activities in protecting groundwater in Illinois.

From the experience gained from prototype networks, Illinois EPA designed the long-term Ambient Groundwater Monitoring Network for community water supply wells. The design of this network was completed after consultation with the USGS, ISGS, and ISWS. Illinois EPA developed a random stratified network intended to represent contamination levels in all active CWS wells. The CWS well network is stratified by depth, aquifer type and the presence of aquifer material within 50 feet of land surface. Additionally, the network is based on a probability of occurrence that will provide a 95 percent statistical confidence in the data with an associated plus or minus five percent precision and accuracy level. In order to randomize the sampling schedule spatially and temporally, 17 random groups of 21 wells, with alternates, were selected from all the active wells in the state. Each of these 17 random groups is a sample period. To further assure maximum temporal randomization within practical constraints, the samples from each sample period are collected over a three-week period.

Network stations have been sampled within a fixed three-week timeframe bi-annually since 1996 (during 1993 thru 1994 and 1994 thru 1995, samples were obtained within a three-week time frame, annually). Water quality parameters include: field pH, field conductivity, field temperature, field specific conductance, field Eh, field pumpage rate, inorganic chemical (IOC) analysis, and VOC analysis.

In 2004, the Ambient Network wells were sampled. The network's 356 wells, shown in Figure 3, were sampled for IOCs and VOCs. In addition, approximately 50 percent were sampled for synthetic organic compounds (SOCs). To maximize resources, "new" wells at the ambient well facilities were also sampled. "New" wells are defined as wells that have been newly drilled or fitted for use or wells that have not been sampled in previous sampling events.

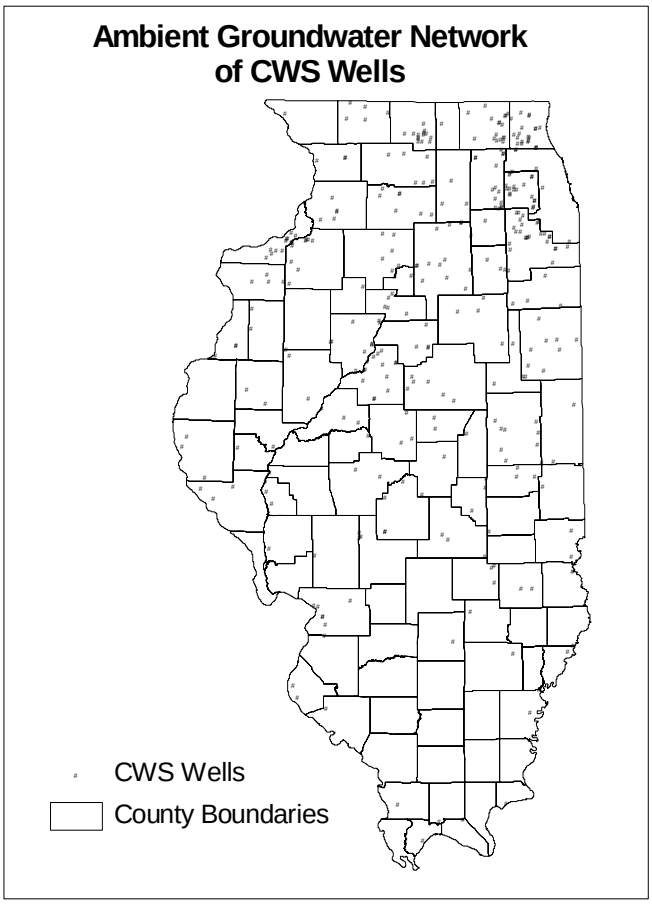


Figure 3

Rotating Monitoring Network - The purpose of the Rotating Monitoring network is to maximize resources and increase groundwater quality monitoring coverage at CWS wells. During the 1997 monitoring cycle, Illinois EPA initiated the program. Due to funding limitations, Illinois EPA was forced to evaluate the CWS Network monitoring frequency. Illinois EPA determined that the primary purposes of the CWS Network could still be realized by reducing the monitoring frequency of the CWS Network to a biennial basis.

Beginning in 1993, Illinois EPA has operated a Pesticide Monitoring Subnetwork of the Ambient Network. Initially, Illinois EPA tested all wells in the network for triazine and alachlor using immunoassay screening methods. However, in the 1998 monitoring cycle Illinois EPA discontinued the use of immunoassay, and the wells were analyzed for SOCs using standard laboratory test methods as documented in Illinois EPA Laboratories Manual (revised 1987). Since the 2000 monitoring cycle, on a rotating basis 50 percent of the network wells are analyzed for SOCs. This rotation will be maintained in the future.

Illinois EPA is currently able to concentrate on specialized monitoring at high priority areas during alternate years. In 1997, monitoring was focused on concerns related to highly susceptible CWS wells. These wells were prioritized because of the detections of organic contaminants in treated water samples obtained during routine monitoring required by the SDWA. During the 1999 monitoring cycle, attention focused on new CWS wells. The 2001 monitoring cycle once again focused on collecting data on new CWS wells and a subset of the Ambient Network for radon and pesticide metabolite analysis. The 2003 monitoring cycle focused on both new wells and wells with detections of organic and inorganic compounds that are found at levels which may be of concern. This included evaluation of wells with historical groundwater contamination issues. In 2003 and 2004, 175 CWSs with detections were evaluated and to date 67 of the highest priority sites have been sampled. Sampling of the remaining supplies continues into 2005. Additionally, the 2005 monitoring cycle is focused on sampling new wells. Illinois EPA intends to maintain this rationale for new and problematic wells in the future.

Section 5. Assess pesticide metabolites and other emerging contaminants of concern

Herbicides in Ground Water Study - Herbicides and their TPS have not been extensively or routinely analyzed for in samples from the source groundwaters supplying the citizens of Illinois through PWSs. The USGS in cooperation with Illinois EPA collected groundwater samples from 117 wells randomly selected from the CWS Network to determine the spatial extent of herbicides and their TPs in groundwater supplied to the public through municipal systems. Table 2 provides a summary of the findings. For further detail, a report describing herbicide distribution and the relation of this distribution to hydrogeology and land and herbicide use has been published in the Journal of American Water Resources Association (Mills and others, 2005). Appendix IV includes recently available USGS publications.

Table 2. Occurrence of herbicides and herbicide transformation products in CWS wells (Modified After USGS, Water Resources Investigations Report 03-4226)

- Micrograms per liter (ug/l)
- NA not applicable
- Analyzed for but not detected: acetchlor sulfynil acetic acid (SAA), alachlor SAA; ametryn, flufenacet, flufenacet ethanesulfunic acid (ESA), flufenacet oxanilic acid (OA), glufosinate, amino methyl phosphonic acid (AMPA), pedimethalin, prometon, prometryn, propazine, and terbutryn; SAA, ESA, and OA are transformation products TP of the associated herbicides; AMPA is the transformation product of glyphosate. The reporting limit for most herbicide compounds was 0.05 ug/l; reporting limit for glyphosate, AMPA, and glufosinate was 0.01 ug/l.
- Class I: Potable Resource Groundwater Standards for atrazine, alachlor, and simazine are 3,2, and 4 respectively.

Herbicide Compound	**Detection Frequency In percent**	**Median Detected concentration, In ug/l**	**Maximum Detected concentration, In ug/l**	**Herbicide application rate in Illinois In 1,000 pounds**	
	2001-02	2001-02	2001-02	1991	2001
Any parent herbicide	4.3	4.3	0.22	NA	NA
Any herbicide or TP	34.2	34.2	7.24	NA	NA
Actetochlor	0	NA	NA	0	8,059
Actetochlor ESA	9.4	0.16	4.18	NA	NA
Actetochlor OA	5.5	0.16	0.25	NA	NA
Alachlor	0	NA	NA	9,400	0
Alachlor ESA	28.2	0.12	2.15	NA	NA
Alachlor OA	6.0	0.09	0.41	NA	NA
Atrazine	3.4	0.06	0.22	10,615	14,143
Deethylatrazine	4.3	0.08	0.21	NA	NA
Deisopropylatrazine	0	NA	NA	NA	NA
Cyanazine	0	NA	NA	4,267	0
Cyanazine amide	0	NA	NA	NA	NA
Dimethenamid	0	NA	NA	0	2,270
Dimethenamid ESA	0	0.05	0.16	NA	NA
Dimethenamid OA	0	NA	NA	NA	NA
Glyphosate	0	NA	NA	381	7,157
Metolachlor	0.9	0.16	0.16	9,277	993
Metolachlor ESA	26.5	0.34	7.24	NA	NA
Metolachlor OA	14.5	0.18	2.95	NA	NA
Metribuzin	0	NA	NA	395	0
Propachlor	0	NA	NA	0	0
Propachlor ESA	1.0	0.10	0.10	NA	NA
Propachlor OA	0	NA	NA	NA	NA
Simazine	0	NA	NA	0	265

Section 6. Continue to implement and improve overall groundwater quality indicators

Quality Assurance/Quality Control Sampling - As previously described, Illinois EPA Groundwater Section regularly samples a network of PWS wells in Illinois to evaluate trends in

ambient groundwater quality. To assist Illinois EPA, the USGS conducts field observations of samplers and an annual quality-assurance review of their sampling program, including calibration of water quality meters, as part of the USGS National Field Quality-Assurance (blind-sample) program.

In 2005, field personnel and their equipment were tested with ninety percent of the results satisfactory. Unsatisfactory results were primarily due to older equipment, which has since been replaced. In addition, latex gloves have been incorporated into the sampling procedure based on recommendations from past quality-assurance reviews. As resources allow, it is anticipated that this quality-assurance review will continue.

CHAPTER V. GROUNDWATER QUALITY STANDARDS AND TECHNOLOGY CONTROL REGULATIONS

Section 1. Evaluate dedicated Nature Preserves for Class III designation

The Board has designated the area contributing groundwater to the following DNPs as Class III: Special Resource Groundwater: Boone Creek Fen, Spring Hollow, Lee Miglin Savanna, Amberin Ash Ridge Nature Preserves, Paulter Nature Preserve, and Stemler Cave Nature Preserve. Under the authority of 35 Ill. Adm. Code 620.230 (the Board's Groundwater Quality Regulation), Class III: Special Resource Groundwater designation can be established for:

The Board has designated the area contributing groundwater to the following DNPs , Boone Creek Fen, Spring Hollow, Lee Miglin Savanna, Amberin Ash Ridge Nature Preserves, Paulter Nature Preserve and Stemler Cave Nature Preserve, as Class III: Special Resource Groundwater.

- Groundwater that is demonstrably unique (e.g. irreplaceable sources of groundwater) and suitable for application of a water quality standard more stringent than the otherwise applicable water quality standard specified.
- Groundwater that is vital for a particularly sensitive ecological system.
- Groundwater contributing to a DNP.

Boone Creek Fen, Spring Hollow, Lee Miglin Savanna, and Amberin Ash Ridge are four privately owned nature areas located in central McHenry County approximately three miles east of the City of Woodstock. In May 2004, Illinois EPA received a request from the Boone Creek Watershed Alliance and the Illinois Nature Preserves Commission (INPC) to designate the groundwater contributing to the four nature areas as Class III: Special Resource Groundwater. All four areas combined equal a total of 88.15 acres and are located in the McHenry quadrangle. The four nature preserves and the groundwater recharge area contributing to the four nature preserves contain a total of approximately 3,227 acres. Illinois EPA completed the review required and found the petition from the DNR to be technically adequate. Illinois EPA published the preliminary listing in the November 2004 Environmental Register, and the 45-day comment period ended with no comments. Illinois EPA published the final designation, which was listed in the February 2005 Environmental Register. This designation would provide a basis for the establishment of planning guidelines and a regulatory framework to protect the groundwater, which is vital to the sensitive ecological system.

Pautler Nature Preserve is located in northeastern Monroe County, Illinois, approximately two and one half miles west of the City of Waterloo. In August 2004, Illinois EPA received a request from the INPC to designate the groundwater contributing to the Pautler Nature Preserve as Class III: Special Resource Groundwater. The dedicated nature preserve is a 3.18-acre tract of land located in the Waterloo quadrangle. The Pautler Nature Preserve contains Pautler Cave. BOW's Groundwater Section completed the review as required and found the petition from DNR to be technically adequate. Illinois EPA published the preliminary listing in the May 2005 Environmental Register. The 45-day comment period ended with no comments, and Illinois EPA published the final designation, which was listed in the August 2005 Environmental

Register. The designation of the area as Class III: Special Resource Groundwater provides a basis for the establishment of planning guidelines and a regulatory framework to protect the groundwater, which is vital to the sensitive ecological system. The Karst Conservancy of Illinois (KCL) purchased the Pautler Nature Preserve. The KCL is a non-profit corporation that is dedicated to conserving karst resources and emphasizes the protection and management of karst environments.

Stemler Cave is located in western St. Clair County, Illinois, approximately three and one half miles west of Millstadt and two miles northeast of Colombia. In August 2004, Illinois EPA received a request from the INPC to designate the groundwater contributing to the Stemler Cave Nature Preserve as Class III: Special Resource Groundwater. The dedicated nature preserve is a 0.88-acre tract of land located in the Waterloo quadrangle. The nature preserve and the contributing groundwater recharge area contain a total of approximately 2,515.19 acres. One third of the recharge area extends into Monroe County. BOW's Groundwater Section completed the review required and found the petition from the DNR to be technically adequate. Illinois EPA published the preliminary listing in the July 2005 Environmental Register. The 45-day comment period ended with no comments, and Illinois EPA published the final designation, which was listed in the August 2005 Environmental Register.

Section 2. Evaluate the need to develop Class III: Special Resource Groundwater Standards

Illinois Natural Area Inventory - The majority (greater than 60 percent) of the recharge area for the Boone Creek Fen, Spring Hollow, Lee Miglin Savanna, and Amberin Ash Ridge nature preserves is low-density residential development and row crops. To date, the groundwater quality does not appear to have been impacted within the recharge area of these nature preserves. Therefore, to maintain groundwater quality, the land use should remain similar to the current land use.

Illinois EPA's most recent contact with the United States Fish and Wildlife Service indicates very little additional research has been undertaken regarding the water quality requirements of the Illinois Cave Amphipod (Gammarus acherondyte) since the last biennial report. There has been a water quality comparison completed by DNR. This study compared the basic water quality data (i.e. nitrate and dissolved oxygen) of Pautler Cave and Stemler Cave nature preserves. Degraded water quality in Stemler Cave may be the cause of the decline of the Illinois Cave Amphipod population. The cave amphipod has not been identified in Stemler Cave since the 1960s, while Pautler Cave has a substantial population. Specific toxicological tests to determine the water quality factors that affect the cave amphipod the most have not been started by the Fish and Wildlife Service. The first step towards beginning toxicological tests is to develop a breeding population of the Illinois Cave Amphipod in the laboratory to preserve the wild population. To date, no funding is available to develop the test population or conduct the testing.

Section 3. Develop proposed groundwater quality standards for emerging contaminants of concern

Illinois EPA continues to evaluate contaminants of concern for inclusion in the 35 Ill. Adm. Code 620. One such constituent is perchlorate. This rocket fuel component has been discovered in Illinois groundwater, and its occurrence in Illinois is being further evaluated. Another constituent that may be considered is ammonia. While ammonia is not a health concern at the concentrations at which it has been reported, the greater health risk is the conversion of ammonia to nitrite and nitrate within the water distribution system of a CWS. In addition, the BOL has evaluated contaminants commonly detected in groundwater in association with solid waste and Resource Conservation and Recovery Activities (RCRA) facilities/sites. Groundwater standards are being developed for approximately 48 contaminants that have been commonly detected in groundwater at these facilities/sites where cleanup objectives have been developed under TACO. Further, Illinois EPA's Toxicity Assessment Unit has been tasked with evaluating health advisory information for pesticide metabolites detected in CWS wells.

Section 4. Continue to implement and integrate the groundwater quality standards into environmental programs

Groundwater quality standards are being considered for use as thresholds for notifications and community relation work plans under the RTK law and regulations under development.

Section 5. Continue to update and amend the groundwater standards to parallel the drinking water standards adopted by U.S. EPA

Four constituents—uranium, radium 226, radium 228 and arsenic—have had new Maximum Contaminant Levels (MCLs) adopted. The Groundwater Section of the BOW will propose amendments to 35 Ill. Adm. Code 620 for the above listed constituents that have been found in Illinois' groundwater. Radium and arsenic occur with some frequency in Illinois' groundwater. Therefore, a groundwater standard amendment consistent with the MCL will be developed. Uranium is not a constituent that has been regularly sampled in the past. Therefore, to determine if uranium has been detected in any groundwater statewide, Illinois EPA will have to coordinate internally, and with other state agencies, to determine if other monitoring programs have detected uranium in groundwater. The MCL for arsenic does not become effective until 2006. Therefore, the Groundwater Section will change the groundwater standard for arsenic at a later date to more closely correspond with the effective date of the MCL.

Section 6. Continue to implement preventive notice and response programs and integrate with environmental programs

The monitoring conducted on CWSs this reporting period was dominated by the new wells subnetwork of the ambient monitoring network. Therefore, new locations that have not been previously evaluated for preventive notice and response programs were not common. The preventive response activities of 35 Ill. Adm. Code 620.305 continue to be evaluated relative to newly sampled wells and locations.

Section 7. Evaluation of activities located proximate to CWS where local groundwater protection management efforts are completed or in progress will be given priority

One de-icing agent storage area proximate to CWS wells has been evaluated for compliance with 35 Ill. Adm. Code 615/616. The community that owns the wells and the de-icing agent storage area is the same. A new covered storage area outside the minimum setback zone of the community wells was constructed, and the old storage area was closed. Illinois EPA has taken no further action at this site.

A setback zone exception petition was filed with the Board for the installation of injection wells within the minimum setback zone of a CWS well. The purpose of the injection wells is to remediate a release of petroleum products. An oxygen-releasing compound and bacteria that will digest the petroleum compounds will be injected through these wells. The Board granted the exception.

Section 8. Evaluation and compliance determinations for activities referred by permit programs will also be given priority

The Groundwater Section continues to provide hydrogeologic expertise to other BOW programs. The Groundwater Section has provided hydrogeologic evaluation and/or compliance determinations for 21 sites from the BOW Industrial Permit and Municipal Permit Units. Ten Mine Pollution Control Program sites have had review and assessment done for new or expanded operations that required additional evaluation. A number of sites previously evaluated continue to require ongoing data review.

Section 9. Continue cooperation between Illinois EPA and IDPH to provide statewide education seminars on the implementation of the technology control and groundwater standards regulations

Illinois EPA and IDPH continue to coordinate on opportunities that have been more site-specific or focused on areas where groundwater has been impacted and have worked cooperatively to address contamination of private water system wells in these areas. These efforts have included meeting with county health officials to discuss groundwater contamination problems and to coordinate the sampling of private wells.

Groundwater monitoring was completed at private wells located near the Exelon Company's Dresden (Grundy County) and Braidwood (Will County) generation plants. Exelon sampled the private wells adjacent to their facilities at Dresden and Braidwood. These samples were spilt for analysis with the Illinois Emergency Management Agency-Department of Nuclear Safety (IEMA-DNS). IDPH provided sample results to the owners of private wells sampled at these locations, along with toxicologists' explanations of potential health effects to those homeowners with the detections.

There were no detections of tritium above the lower level detection limit of 200 picocuries per liter (PiCu/L) in any off-site private wells sampled at the Dresden plant, with the exception of three wells. The results showed statistically significant concentrations above background but below the groundwater standard of 20,000 PiCu/L. Exelon has been characterizing the

groundwater contamination on-site and off-site to determine the extent of contamination and the migration pathways by which the off-site wells were contaminated. This was accomplished by installing multi-level monitoring wells on-site and off-site. Exelon also continues to sample the off-site private wells. In addition, they have also conducted monitoring of their existing on-site wells and storm sewers. Moreover, Exelon has developed a three-dimensional characterization of the geology; delineated the tritium plume extent; developed a map showing water level elevations in the aquifer and determined the direction of groundwater flow; performed groundwater flow and solute transport modeling to predict the fate of the contamination; and developed a theory on the probable mechanism by which the off-site wells became contaminated. Currently, Exelon is developing a remediation plan pursuant to the groundwater management zone (GMZ) provisions in 35 Ill. Adm. Code 620.250.

At the Braidwood plant, private wells were sampled for tritium and petroleum constituents. There were no detections of tritium above the lower level detection limit of 200 PiCu/L, and there were no detections of petroleum constituents in any off-site private wells near the Braidwood plant. Exelon is investigating tritium in groundwater at the Braidwood plant.

In addition, groundwater monitoring was completed at private wells located near petroleum transmission lines in Lomax (Henderson County). Low levels of diesel-related petroleum constituents were detected in one private well. A violation notification letter was sent to BP/Amoco, the owner of the pipeline near the private well. BP/Amoco is doing further private well sampling in the area.

Illinois EPA, IDPH, and the Lake County Health Department have been involved with the Wauconda/Hillcrest Subdivision Superfund site and in providing private well users with a safe source of water. Hillcrest Subdivision residents are experiencing low-level vinyl chloride contamination in private water wells (81 out of 120 homes in tests completed in January of 2004). Illinois EPA and IDPH have been working closely with U.S. EPA, the lead government agency, to provide access to a community water system for these residents. Assistance for providing a community water system has been provided through Illinois EPA's revolving loan fund program.

CHAPTER VI. WELLHEAD PROTECTION PROGRAM

Section 1. Continue to publish wellhead protection and assessment data at http://www.epa.state.il.us/water/groundwater/source-water-quality-program.html

Illinois EPA has implemented a SWAP to assist with wellhead and watershed protection of public drinking water supplies. The 1996 amendments to the federal SDWA established several programs that will help water suppliers continue to provide safe, adequate, and affordable water to their customers. As required by these amendments, Illinois EPA, in cooperation with water utilities and other stakeholders, has developed, and the U.S. EPA has approved, Illinois' SWAP. The purpose of SWAP is to:

- Identify areas that supply drinking water to the public.
- Inventory potential sources of contamination.
- Determine the susceptibility of the source water to contamination.
- Inform the public of the assessment results.

More than 11 million people in Illinois rely on PWSs for drinking water. Assessments have been conducted for all PWSs in Illinois, including approximately 1,800 CWSs. In addition, more than 4,100 non-community water supplies have been assessed. Illinois SWAP activities were divided into the following areas: (1) community surface water supplies; (2) non-community surface water supplies; (3) Great Lakes supplies (Lake Michigan); community groundwater supplies; (4) non-community groundwater supplies; and (5) mixed ground and surface water CWSs.

The SWAP, implemented by Illinois EPA, will help communities make important decisions about how to protect their drinking water. By working to ensure safe drinking water supplies, the health and economy of the community, as well as the preservation of natural resources, will be greatly improved. In addition, investment in drinking water treatment will be sustained for a longer time period.

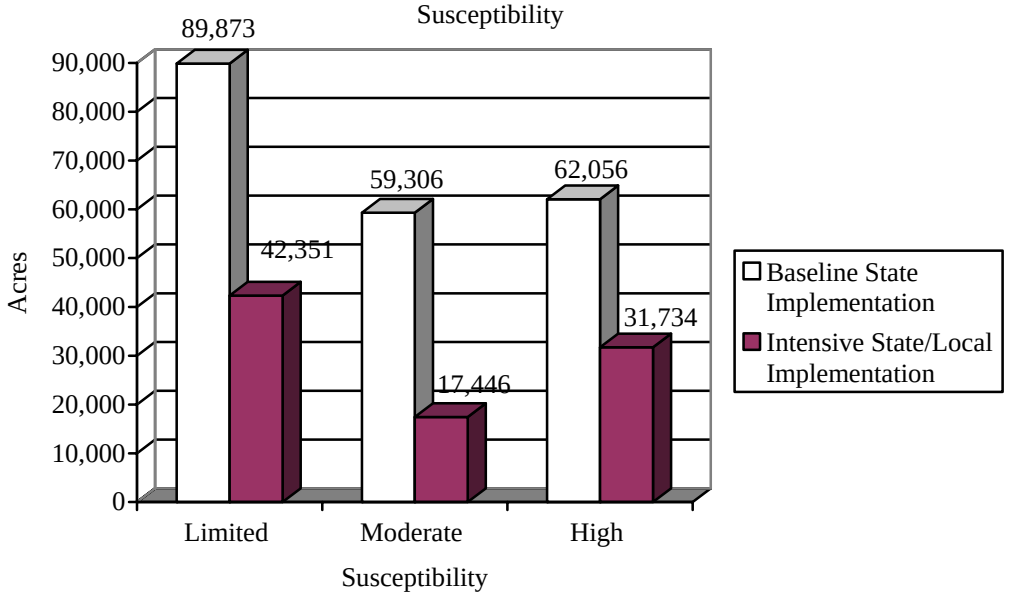
Communities, whether using groundwater or surface water, should take an active role in the assessment of their drinking water supplies. To view a summary version of the Source Water Assessments, individuals can access the following Internet site: http://www.epa.state.il.us/cgi-bin/wp/swap-fact-sheets.pl. For PWSs, this summary information describes pertinent sub-sections of each completed assessment including: importance of source water; susceptibility to contamination determination; source water quality; and documentation/recommendation of source water protection efforts. However, summaries of source water protection efforts have not been documented for non-community water supplies. It should be noted that these source water assessment summaries are presented in strict compliance with Illinois EPA's security policy on the release of sensitive information. Therefore, all locational data and maps pertaining to wells, aquifers, and/or surface water intakes have been removed.

Section 2. Increase the percentage of intensive groundwater protection management for Community Water Supply Wells

The Groundwater Section is continuing to use the source water database, which is a measurement tool used to assist the U.S. EPA Office of Ground Water and Drinking Water in

collecting SWAP information (Figure 4). Based upon the preliminary data acquired to this point, 3,456 SWAP areas representing 7,251 PWS wells and 209 PWS surface water intakes were evaluated. These areas make up approximately 3.95 million acres of the state's 36.1 million total acres. Roughly three million of these acres represent high susceptibility SWAP areas associated with surface water sources.

Figure 4. CWS Groundwater Protection Area Management Status by Susceptibility



Through the source water assessment and WHPP, Illinois EPA identified 16,354 potential sources of contamination, of which 1,163 are considered threatening. The most prevalent potential source grouping was land disposal activities (2,953 sites), and the most threatening potential source grouping was chemical/petroleum processing/storage (255 sites) facilities.

Section 3. Develop and implement source protection criteria to use in the planning, construction and location of new community water supplies

In the past two years, there have been approximately 114 new CWS wells permitted; of these, 32 were unconfined and 82 were confined. Illinois EPA continues to implement procedures to assist in the protection of these new wells. The overall goal is to promote the location of new CWS wells in areas with a low potential for groundwater contamination and to encourage management practices that will minimize the potential for future contamination. As outreach efforts continue, Illinois EPA acquires the necessary hydrogeologic information from CWSs adding new wells to their drinking water system. The information is then utilized to delineate source water protection areas for new wells that utilize unconfined aquifers. Upon completion of these delineations, Illinois EPA provides technical support to CWSs wishing to initiate protection programs, including maximum setback zones, overlay zoning, pollution prevention (P2), and other groundwater BMPs.

Moreover, Section 602.115 of the Board regulations requires that the criteria in rules for the design, maintenance, and operation of PWS facilities shall be revised from time to time to reflect current engineering judgment and advances in the "state of the art." The state of the art has advanced significantly during the past 30 years with respect to tools available to delineate the source of drinking water for a community. Hydrogeologic analysis capability has been substantially improved with: new high-speed desktop computers; groundwater modeling software; three-dimensional geologic visualization software; GIS software; and Internet-accessible data. Accordingly, Illinois EPA has initiated the revision of the Board regulations to improve SWAP planning methods used.

Section 601.101 of the Board regulations, pertaining to CWS, requires that: "Each water supply should take their raw water from the **best available source** which is economically reasonable and technically possible.

Section 4. Continue integration and implementation of the WHPP under SDWA new alternative monitoring program

Illinois EPA continues to encourage local WHPA management through the incentives provided by the SDWA vulnerability waiver program. Under the WHPP, a WHPA is defined and the potential sources of groundwater contamination are inventoried within this area. Following these steps, local stakeholders are involved in developing and implementing WHPA management plans. Given the natural geologic protection and/or management plans in these WHPAs, the vulnerability to contamination can be reduced or eliminated. To date, approximately 516 CWSs have received a full or partial monitoring waiver through Illinois EPA's endorsement of their WHPA management/protection plans.

Section 5. Finish the delineation of recharge areas for CWSs using reasonably available information

Illinois EPA has delineated the five-year recharge areas of CWS wells utilizing unconfined aquifer systems. These delineated recharge areas take into account the significant changes in the dynamic groundwater flow systems produced by CWS wells. The velocity of groundwater is increased when a CWS well field is operational. Groundwater velocity is by far the most important factor in controlling solute (contaminant) transport under most circumstances. Thus, both the ASTM standard for RBCA guidance (E2081 pp. 1196, and 1259) and the *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water* (pp. 2, 44,

The velocity of groundwater is increased when a CWS well field is operational. Groundwater velocity is by far the most important factor in controlling solute (contaminant) transport under most circumstances. Thus, both the ASTM standard for RBCA guidance, and the *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water*, published by the National Risk Management Research Laboratory of the U.S. EPA, indicates that: "Understanding the flow field in the subsurface is essential for a technically justified evaluation of an MNA remedial option: therefore, use of this protocol is not appropriate for evaluating MNA sites where the contaminant flow field cannot be determined with a reasonable degree of certainty."

52, B-29, C2-7, C-2-8 and C2-9), published by the National Risk Management Research Laboratory of the U.S. EPA, indicates that:

> "Understanding the flow field in the subsurface is essential for a technically justified evaluation of an monitored natural attenuation (MNA) remedial option: therefore, use of this protocol is not appropriate for evaluating MNA sites where the contaminant flow field cannot be determined with a reasonable degree of certainty." (Emphasis added)

If the larger velocity is not accounted for, cleanup objectives derived from a contaminant transport model may not be protective of private, semi-private, non-CWS, and CWS wells located in these areas. Thus, CWS recharge area modeling would help meet the ASTM (RBCA) standard and the U.S. EPA Protocol.

Historically, completion of these delineations has focused on CWSs located within Illinois' Priority Groundwater Protection Planning Regions, and under a vulnerability monitoring waiver program as allowed by the SDWA to encourage groundwater protection program implementation. All unconfined supplies for which reasonably available data exists have had their delineations completed (see Appendix V). The total number of facilities with completed delineations is 223 representing 823 wells. In addition, in conjunction with SWAP and with the assistance of the IRWA, potential source inventories within the recharge areas have been completed. Coordination and technical assistance from the IRWA has also been provided to establish local teams for development of local groundwater protection programs. Further evaluation of available hydrogeologic data for other unconfined CWSs is being conducted to determine the recharge area delineation potential for these supplies. New CWS wells continue to be evaluated and their recharge areas delineated as they are brought on-line. Updated delineations have been completed for 31 new wells at previously delineated facilities.

Section 6. Modify CWS water well construction permit application procedures to include collection of information on potential sources and routes, well logs, pumping tests and chemical analyses

Illinois EPA continues to promote wellhead protection by providing a copy of an informational pamphlet entitled "Wellhead Protection for New CWS Wells" to each facility making application for a new well. The purpose of this brochure is to encourage CWSs to obtain the data needed to take proactive steps to protect their source of water. By protecting their water source the CWS is able to protect the money invested in new well construction. The brochure explains the benefits of protecting new wells from certain nearby high-risk activities and contains steps for the CWS to follow during the well permit procedure. The new well data will be used by Illinois EPA to delineate recharge areas and provide technical assistance for establishing maximum setback zones and other protection programs. In addition, see Section 3 above.

CHAPTER VII. REGIONAL GROUNDWATER PROTECTION PLANNING PROGRAM

Section 1. Current committee flexibility should be maintained while assisting with conducting and supporting both new and follow-up efforts of encouraging local and regional groundwater protection programs

Illinois EPA is the primary agency responsible for implementing this groundwater protection goal. Illinois EPA continues to work very closely with the regional planning committees to establish groundwater protection programs at the local level; however, these programs are very time consuming and significant work is needed in this area. Although each region has specific priorities and areas of concern, their general mission statements all have common goals and objectives.

GOALS -

1. Provide education materials and programs regarding general groundwater protection.
2. Promote the use of groundwater protection tools to county and other local units of government that implement groundwater protection programs throughout the region.
3. Assist the state jurisdictions in accomplishing specific regional groundwater protection programs.
4. Provide a forum for the development of recommendations that address committee recognized regional protection needs.

Section 17.2 of the IGPA requires Illinois EPA to establish a regional groundwater protection planning program. Illinois EPA utilized recharge area mapping (completed in 1990 by the Illinois Department of Energy and Natural Resources), groundwater pumpage data, population affected, water supply characteristics, solid waste planning efforts, and other factors to select the four existing priority groundwater protection planning regions. A committee is appointed for each region by Illinois EPA Director and includes a cross-section of representatives from the region including: counties and municipal officials; owners or operators of PWSs which use groundwater; at least three members of the general public who have an interest in groundwater protection; and Illinois EPA and other state agencies, as appropriate. The Northern and Central Groundwater Protection Planning Committees were first established in 1991, followed shortly thereafter by the Southern Groundwater Protection Committee in 1992. The Northeastern Groundwater Protection Planning Committee was initially appointed in 1995 and then amended to include DuPage County in 2001.

OBJECTIVES -

1. Maintain an on-going general education subcommittee to work with citizen groups, schools, governing agencies, and other interested parties on the importance of groundwater protection.
2. Promote the use of voluntary best management and P2 programs for businesses and residences located within groundwater recharge areas.
3. Work with county, municipal, and other special units of government to implement groundwater protection tools such as local zoning, maximum setback zones, technology control regulations, and defining recharge areas.

The Groundwater Section continues to coordinate with the regional groundwater protection planning committees to implement programs and assist with targeting local contacts and interest groups. Most of the regional committees have adopted specific mission goals and objective statements to advocate groundwater protection practices and procedures to municipal, county, state, and other local units of government throughout their respective regions. These goals and objectives are useful in the prioritization and development of local groundwater protection programs, many of which are described in this chapter.

During the past two years, Illinois EPA and members of the Priority Groundwater Protection Planning Committees have met with local stakeholders to encourage the development of groundwater protection programs and to implement activities to protect CWS recharge areas. The following information provides a summary of community programs that the regional committees have targeted for groundwater protection efforts.

STRATEGIES -

1. Act as a catalyst for implementation of groundwater protection tools including presentations or meeting with local officials and businesses.
2. Conduct groundwater protection and education workshops for the general public or target audiences.
3. Focus on educating middle school teachers on the importance of incorporating groundwater science into their curricula.
4. Perform an annual self-evaluation review of program effectiveness.

Northern Groundwater Protection Planning Region (Winnebago, Boone, and Mc Henry Counties) - The Northern Groundwater Protection Planning Committee has assessed their efforts, and the following provides a summary of these actions:

Loves Park PWD - For the fourth consecutive summer, the City of Loves Park and members of the Northern Groundwater Committee collaborated on a well-sealing program for residents in the five-year capture zone for Loves Park PWD Well #1. A student intern went door-to-door helping residents determine whether they had abandoned wells on their properties. Over 330 homes were visited, with 91 abandoned driven point wells identified. A private well contractor and the Winnebago County Health Department sealed these 91 driven point wells using materials available from the reduced-cost bentonite program developed through the Northern Groundwater Committee. Over 215 abandoned wells have been properly sealed since the program began in 2002. Additional wells were closed in Winnebago, Boone, and McHenry Counties for 11 private individuals through the same reduced-cost bentonite program. The Loves Park Drinking Water Protection Program aids in educating residents about groundwater. Word of mouth and positive media attention have helped the well sealing program gain respect and recognition throughout the community.

Boone County Planning and Zoning Committee - Members of the Northern Groundwater Committee have met with officials from the Boone County Planning and Zoning Committee to share ideas on how the committee can assist them with incorporating groundwater protection concerns and planning and zoning issues. The Planning and Zoning Committee has requested additional well-specific information (i.e., minimum/maximum setback zones, CWS five-year recharge area delineations) that can also be provided to the county zoning department to increase

their awareness of this vital resource. This information can then be generated electronically to assist in emergency response procedures and current/future land-use planning decisions that may impact groundwater quality or quantity. In addition, IRWA's Source Water Protection Specialist has assisted many CWSs in the county in developing source water protection contingency plans for emergency preparedness and informed them of the overall Winnebago County Source Water Protection Program. As a result, each CWS received a copy of this document, which includes emergency contacts, phone numbers, and resource materials available to each CWS in Boone County.

McHenry County "Groundwater Resources Management Plan" - The geology of McHenry County is made up of many sand and gravel, limestone, and sandstone formations. These aquifers serve as the source of all of McHenry County's drinking water. As the population grows, the demand for water is rising, the potential for contaminating aquifers increases, and wastewater disposal becomes more difficult. This combination of factors makes it essential for McHenry County to develop a Groundwater Resources Management Plan that addresses the complete cycle of source, use, disposal and reuse. Effective, economical options are being devised that reflect the needs of the interested public, municipalities, and officials of McHenry County. The scope of the plan was previously developed with the input of county and municipal officials, environmental groups, development-oriented organizations, interested businesses, citizens, and members of the Northern Groundwater Protection Committee in active discussions of the issues so that a plan could be created that would receive wide support. The goal is to put together a plan that is a useful tool for balancing supplies and demands and reducing the potential of groundwater contamination. The Groundwater Resources Management Framework literally provides the structure by which the county may plan for the future. More information can be found at: http://www.mchenryh2o.com/.

Northeastern Groundwater Protection Planning Region (Kane, Kendall, DuPage, Will, and Kankakee counties) - The Northeastern Groundwater Protection Planning Committee has assessed their efforts, and the following provides a summary of these actions:

Plano - The City of Plano continues to work with the Northeastern Committee and Illinois EPA to enhance their local WHPP. Over the past several years, these initiatives have included: a graduate level P2 intern who completed a project at the Plano Molding Company, a plastic-resin injection molding processor; implementing procedures to comply with 35 Ill. Adm. Code 615 Subpart L: De-Icing Storage and Handling Units (these regulations are intended to minimize the risk posed by existing de-icing, or road salt, storage areas located within well setback zones); and to raise public awareness, road signs were posted along state highways intersecting the city's CWS well recharge areas. Most recently, the city has drilled two new CWS wells (wells #7 and #8) and is in the process of evaluating the need for maximum setback zones for these wells. The new wells utilize an unconfined aquifer and have recently had the five-year recharge area delineated by Illinois EPA. In addition, members of the Northeastern Committee have approached the city about participation in the Groundwater Foundation's nationally recognized Groundwater Guardian Program.

Kane County Water Resources Study - The Kane County Water Resources Study was initiated in 2002 by using the services and expertise of the ISWS and the ISGS. The planned five-year study

consists of the development of a conceptual model of the geology and hydrogeology of Kane County, the compilation of a comprehensive database of digital geologic and hydrogeologic information for the county, the design of a three-dimensional numerical model of the aquifers below the county, and the creation of detailed geologic maps and cross sections of the subsurface geology of the county. The interim results of the study were published in a report, along with a series of maps and drawings in May 2004. The report indicated that significant progress has been achieved in understanding the complex nature of the groundwater resources of the county. This information will be used for planning and management purposes upon the completion of the study in 2007. Members of the Northeastern Committee and the communities of Kane County are participating in the study through review of monthly study updates provided by the ISWS and ISGS as well as attendance at biannual update meetings. Through this participation the communities of Kane County provide input to the study, inquire as to the status of the various aspects of the study, and provide updates on water supply planning, development, and management activities in the county to the researchers for inclusion in the study. See chapter IV, section 3 of this document for more information about the Kane County water resources study.

Central Groundwater Protection Planning Region (Peoria, Tazewell, Woodford and Mason counties) - The Central Groundwater Protection Planning Committee has assessed their efforts, and the following provides a summary of these actions:

Central Region Groundwater Protection Program Video(s) - In an effort to promote groundwater protection, education, and the functions of the Central Groundwater Committee, a short video was developed under contract with CDG Video's Inc. The purpose of this 10-minute video is to promote the activities and functions of the Central Groundwater Committee, while also providing a basic understanding of groundwater science and the importance of this resource to the area. Furthermore, a concept was developed to use this "general" video as part one of a multi-part series. Subsequent videos would highlight groundwater protection activities within a specific community and could be used for classroom presentations, city council meetings, or to promote economic development. To date, this effort has lead to community-specific videos being completed for Pleasant Valley PWD, Illinois American Water Company-Pekin, and the City of Peoria Heights. Efforts are currently under way to document the vital importance of groundwater resources in the Imperial Valley area of the Central Groundwater Region. The fourth video in this series will highlight the environmental sensitivity of the Imperial Valley, groundwater uses for irrigation, industrial and drinking water purposes, and supplying water to a state fish hatchery and Sand Ridge State Forest.

Furthermore, members of the Central Committee's Education Subcommittee are developing a supplemental curriculum for teaching fourth through eighth grade students about groundwater. The purpose of providing the supplemental curriculum materials (i.e., Power Point presentation, text, and sample quiz) would be such that teachers can modify/alter and use at their own discretion in order to fit different teaching styles and help accommodate available time for presenting various groundwater topics. All four videos will be provided as part of the supplemental curriculum materials and may be presented or shown entirely or in segments to accommodate allotted time for class. The Central Groundwater Committee would like for teachers to be informed as to how this package can be obtained for use in the classroom, as well as help them understand how the different videos in the program came about and how they can

be used to promote groundwater protection and education.

Mahomet Aquifer Consortium (MAC) - The MAC, formed in November 1998, has as its mission: "To further study the Mahomet aquifer on a regional basis and to develop a plan for the management of this valuable resource," with a focus on development of a better conceptual understanding of the Mahomet aquifer groundwater system. The aquifer is a valuable resource and those with an interest in the aquifer, either because they use groundwater from the aquifer or because they are interested in utilizing the aquifer in the future, came together to discuss ways to study it in a comprehensive manner. The MAC has members from water authorities, water companies, local, county, state, and federal government, professional groups, and members of the Central Groundwater Committee. The goal of the MAC is to study the aquifer so that, in the future, informed decisions can be made about meeting future water demand as populations increase and extreme weather events occur. A better understanding of the Mahomet aquifer will provide a mechanism to identify and resolve water quality issues that may threaten the aquifer. It will also provide the knowledge necessary to allow for the proper management of the aquifer using science, not litigation. The MAC continues to seek funding for completing the scientific investigations necessary for understanding groundwater flow and availability in the aquifer system. The MAC has an active website, www.MahometAquiferConsortium.org, that has information about meetings, educational materials, and research completed in the Mahomet aquifer region. The MAC has meetings bi-monthly with an invited speaker at each who updates the consortium on relevant research and timely issues related to the Mahomet aquifer. See chapter IV, section 3 of this document for more information on on-going studies of the Mahomet aquifer.

Marquette Heights Maximum Setback Zone Regulatory Proposal - Although numerous CWSs around the state have adopted maximum setback zones under their local authority, this is the first Board regulation of such an expanded zone of protection in Illinois. With assistance from the Central Groundwater Committee, the Board accepted Illinois EPA's motion to propose maximum setback zone protection for the Marquette Heights CWS wells. As part of this process, Board hearing dates were set for March 1, 2005, and April 5, 2005, in Pekin and Chicago, Illinois, respectively. During these hearings there was no opposition, but there was supporting testimony provided by the mayor of Marquette Heights. The maximum setback zone(s) will prohibit new potential primary sources of groundwater contamination from locating in this area. In addition, maximum setback zone(s) expand the area of applicability for the Board's existing Technology Control regulations (35 Ill. Adm. Code 615/616) for existing and new activities located within setback zones and regulated recharge areas. The expanded zone is intended to help protect the WHPA from being contaminated. It is anticipated that the maximum setback zone proposal for the Marquette Heights CWS will be adopted in the near future.

Southern Groundwater Protection Planning Committee (Madison, Monroe, St. Clair. and Randolph counties) - The Southern Groundwater Protection Planning Committee has assessed their efforts, and the following provides a summary of these actions:

East Alton - The Southern Groundwater Committee continues to assist the Village of East Alton in groundwater protection activities as it relates to the contamination of one of East Alton's CWS wells. With assistance from Illinois EPA, IRWA and the Southern Committee, the village has

implemented groundwater protection measures including evaluating the need to establish a maximum setback zone ordinance for their CWS wells, developing contingency planning procedures to protect their water supply from future problems, and a stenciling project for storm water drains. In addition, members of the Southern Committee continue to encourage the village to maintain their active participation in the Groundwater Foundation's nationally recognized Groundwater Guardian Program.

Well Sealing Campaign - The Southern Groundwater Committee continued their purchase of bentonite to assist in the sealing of private water wells in conjunction with the Water Well Abandonment Program launched by the IDA and Madison County SWCD. The materials are provided at no cost to program participants in the four-county region for as long as supplies last. There is an emphasis placed on the abandoned wells within the immediate proximity of CWS wells. In addition, the use of the bentonite is also available for sinkhole stabilization projects, which in turn benefit both surface and groundwater quality within portions of the karst-terrain area of southwestern Illinois.

Well Screening Effort - The Southern Groundwater Committee recently purchased immunoassay kits to test for the occurrence of pesticides in private well water. The program targets farmers and rural homeowners that live in areas that are predominately agricultural land. The program is slated to start in the early spring of 2006 when farmers are planting and fertilizing and will continue during the harvest season. Private well water samples will be screened for triazines (of which atrazine is a common form) using immunoassay-testing methods. Atrazine is a widely used herbicide used in the control of grasses and broadleaf weeds in crops. It is anticipated that testing for nitrate, coliform, and the preceding pesticides will give most homeowners the ability to know more about their source of drinking water. In addition, the Madison County Health Department will be running the test, and the committee will be recording and storing the results as they are completed.

Section 2. Continue to implement and integrate the WHPP elements into protecting the regional groundwater sources for public water supply wells

Illinois EPA is the primary agency responsible for developing and implementing this program. To date, Illinois EPA has had some success related to the establishment of this activity. However, there is still much to be done.

The regional groundwater protection process has resulted in successful local coordination and outreach efforts that have benefited both private citizens and businesses in these high priority areas of the state (e.g., P2 interns, groundwater protection field days, well sealing demonstrations, etc.). Cooperative efforts with entities such as the Groundwater Guardian Program have assisted the regional groundwater protection process in Illinois by providing national attention and recognition to CWSs developing groundwater protection programs. Illinois EPA continues to promote the Groundwater Foundation's "Groundwater Guardian Affiliate" Program. Illinois EPA works with each of the four Priority Groundwater Protection Planning Regions to become active Groundwater Guardian Affiliates and to commit to a series of "result-oriented services." These result-oriented services include working with communities within their respective regions to implement local source water protection programs and become

Groundwater Guardian Communities.

Other activities conducted by the Regional Groundwater Protection Planning Committees to support both new and follow-up efforts of encouraging local and regional groundwater protection programs are summarized below:

Northern Groundwater Protection Planning Committee - The Northern Committee accomplished a number of tasks over the past two years. The committee has identified two main goals, groundwater education and local government technical assistance, which includes sealing of improperly abandoned wells in all three counties.

Durand Elementary School Field Day - The Northern Groundwater Protection Planning Committee hosted a Groundwater Protection Field Day at the Durand Elementary School on May 5, 2005. Approximately 140 students, grades 4-6, circulated among six outdoor activity stations and learned about their drinking water from area professionals. The six stations included a well-drilling rig, a soil probe truck, the Enviroscape® model demonstration, storm water run-off/management issues, a groundwater sand-flow model demonstration, and water testing for your drinking water.

Youth Groundwater Festival - The 11th annual Youth Groundwater Festival was held March 9-10, 2005, at Rock Valley College. Nearly 700 fourth and fifth grade students from Winnebago County attended the free-of-charge festival. Donations from area municipal water departments, Winnebago County Health Department, Burpee Museum of Natural History, Rock Valley College, League of Women Voters, Retired Senior and Volunteer Services (RSVP), and the Northern Groundwater Committee provided funding for this event. Approximately 90 people volunteered to help put on the Youth Groundwater Festival, including members of the Northern Committee, area educators, two high school science departments, and various environmental agencies and groups.

Northeastern Groundwater Protection Planning Committee - The Northeastern Committee has accomplished a number of tasks over the past two years. The main focus of the committee has been to promote a groundwater education curriculum for school districts within the region and developing a water well sealing program.

Abandoned Well Sealing Program - The Northeastern Groundwater Committee has initiated a well sealing program to promote and accelerate the proper abandonment of inactive water supply wells. Well Abandonment Guidelines and a tracking spreadsheet have also been developed to facilitate the implementation of this program. In addition, 250 brochures have been printed and distributed to each of the county health departments to assist in promoting this effort. Furthermore, the Northeastern Committee has provided each county health department with up to $300 to promote/publish the well sealing program. A few health departments have used the funding to promote the well sealing program along with free/reduced prices for a well sealing permit (generally a permit costs $100) as part of an “Earth Day” event. The well sealing program involves the purchase of large amounts of bentonite (at a reduced cost) and providing it to private well owners at the reduced price (or free of charge) to seal their well. Any monies collected are used to purchase additional bentonite such that the program becomes self-

supporting. The committee also maintains an adequate inventory of bentonite at each county health department so that materials are available as needed. Once fully implemented, the tracking spreadsheet should be able to provide minimal statistics to document the success of this program on a county-by-county level. To date, progress has been somewhat slower than anticipated, but recent activities/brochure should help to promote this program.

Kane County Middle School Teacher Training Workshop - Fifteen Kane County teachers participated in this one-day workshop held at the Red Oaks Nature Center operated by the Kane County Park District. The workshop was conducted for professional credit as part of the Kane County Regional Office of Education Institute Day, where teachers had their choice of dozens of professional development opportunities. The workshop announcement emphasized participating teachers would receive over $250 worth of materials for teaching groundwater. The Northeastern Groundwater Committee, Kane County Health Department, Kane County Regional Office of Education, and the Kane County Forest Preserve District were the principal sponsoring partners, with the financial aspects resting on the first two sponsors.

Source Water Issues in Kankakee County - Surface and Groundwater Interaction Program – The Northeastern Groundwater Committee sponsored a training program entitled: "Source Water Issues in Kankakee County- Surface and Groundwater Interaction" held at the University of Illinois Extension Office on May 14, 2004, in Bourbonnais, Illinois. Over 50 individuals attended this program. Water operators and environmental health professionals were well represented, along with local government officials, state advisors, and well drillers. Topics discussed were: The Kankakee County Water Budget; Adequacy of The Kankakee River as a Drinking Water Supply, Septic Impact on Water Quality Surface Discharges/NPDES; Bentonite Demonstration; and Abandoned Well Sealing. The program ended with a field demonstration of a local abandoned well sealing. A total of 4.5 hours of training credits were pre-approved for Public Water Supply Operators, Licensed Environmental Health Practitioners, and State Sanitarians.

Groundwater Education Lending Libraries- For the most part, this effort is on going throughout the year. This is due, in part, to the continual effort of the Northeastern Groundwater Committee to refresh/purchase additional groundwater education materials to keep the lending libraries up to date. Currently, the two available lending libraries that the Northeastern Committee has are housed at the Kendall County Health Department. The committee is in the process of evaluating different outreach methods to inform middle school teachers and the public about the availability of these lending libraries. Members of the committee are also in the process of developing an inventory of the groundwater education materials such that we can provide this information to the press, monthly newsletters, public service announcements, and other media outreach mechanisms.

Central Groundwater Protection Planning Committee - The Central Committee has accomplished a number of activities over the past two years. These activities can be broadly categorized as: public education efforts and promotion of local government/business technical assistance programs.

2004 and 2005 Clean Water Celebration - The Clean Water Celebration began as a cooperative effort in 1992 between the Sun Foundation and the Rivers Project. The largest event of its kind

in the world, the Clean Water Celebration is a two-day workshop for students, teachers, and the public held each spring at the Peoria Civic Center in Peoria, Illinois. The Clean Water Celebration incorporates a variety of programs for students combining the arts and sciences and has grown each year to become a truly unique educational experience. Members of the Central Groundwater Committee participated in both the 2004 and 2005 events by manning a booth on behalf of Tazewell County Health Department. Members of the Central Groundwater Committee provided information on how citizens can help protect the source water protection areas of public water supplies through education and outreach efforts. Approximately 2,000 Illinois students participated in the 12th Annual Clean Water Celebration, held on March 20-21, 2005. Sixty-seven schools and over 50 environmental organizations and businesses exhibited on a wide range of topics from zebra mussels and wildlife of the wetlands to recycling and water treatment. Members of the Central Groundwater Committee continue to support the Clean Water Celebration by volunteering to serve on the navigating committee, helping to staff learning sessions, and providing financial support to help defray transportation expenses for school districts within the region.

Tri-County Green Matters Program - A consortium of local and state government agencies, including the Tazewell and Woodford County Health Departments, Peoria County Solid Waste Management Department, Illinois Waste Management and Research Center, and the Central Committee, are sponsoring the Tri-County Green Matters Program. The Green Matters Program is a voluntary effort that provides recognition to area businesses, institutions, local governments, and others that are leaders in environmental stewardship. The goal of this program is to encourage greater environmental performance in such areas as waste reduction, energy efficiency, and resource management and use. Businesses participating in the Green Matters Program can benefit in a number of ways, including: profit from reduced waste disposal costs; increased efficiency; enhanced image with the public and their employees; receive local recognition for their environmental efforts; and get free technical assistance on a variety of environmental topics. For more information regarding this program, see: www.tchd.net/greenmatters/tricountygreenmatters.

Low-Cost Pesticide Screening for Private Well Owners - The Central Groundwater Protection Planning Committee, in conjunction with the Tazewell County Health Department, continues to offer pesticide screening and bacteriological/nitrate testing for rural residents of Mason, Peoria, Tazewell, and Woodford Counties. Bi-annual screenings are completed for triazines (of which atrazine is a common form) using immunoassay-screening methods. The presence of this herbicide in a water supply well could be due to leaching, accidental spill, or improper storage. This program provides a low-cost alternative to assist private well owners within the region to become more aware of non-point pollution risk(s) that exist in rural, highly agricultural areas. When pesticide screening is offered, free bacteriological and nitrate screening samples will also offered.

Southern Groundwater Protection Planning Committee - The Southern Committee has accomplished a number of tasks over the past two years. These activities can be broadly categorized as public education efforts in karst terrains and promotion within the region of a water well sealing program.

Water Stewardship Project - For the third consecutive year, the Southern Groundwater Committee has co-sponsored a Water Stewardship Project. This year's event involved 35 fifth-grade teachers and more than 1,000 fifth-grade students at Lewis and Clark Community College in Godfrey, Illinois, on May 6, 2005. This was preceded by a May 2, 2005, teacher-training workshop that helped prepare the teachers to facilitate the information of the project. The objectives of the Water Stewardship Festival were to promote general knowledge about water ecology and environmental education; inform students and educators about resources available at the state and regional level which support clean water; educate students about the science of water quality and water ecology; and promote knowledge about the relationship of water quality and health among humans.

Groundwater Protection Field Day - On May 26, 2005, over 50 participants attended a Southern Groundwater Protection Field Day held at the Henry White Experimental Farm in St. Clair County. The field day focused on groundwater protection, with specific emphasis placed on urban development within rural areas. This event provided an overview of the current local initiatives to protect groundwater utilizing new technologies in septic and limiting the amount of run-off in an area plagued with storm water issues. The event was capped with the sealing of a water well by a licensed water well driller.

Groundwater Lending Library - The Southern Groundwater Committee has an on-going goal of encouraging local stakeholders to become more aware and active in groundwater protection strategies throughout the southern region. To this end, an informational campaign continues to collect and develop materials regarding groundwater protection and education programs to be utilized by various governmental and local agencies. As part of the lending library, the committee has incorporated a display board that can be used by members and loaned to various local agencies to support groundwater protection/educational outreach efforts at area conferences, community functions, and county fairs.

The Southern Committee Networking Survey - The Southern Groundwater Committee determined a need for a networking survey that would be used as a "who-to-call" directory. The survey is a collection of names, employers, and job titles for all the current members and advisors of the Southern Committee. This directory was provided to every committee member with the intent that when an issue arises in a specific field of expertise, that a committee member would be able to utilize the directory to find the best resource or person to address these issues.

CHAPTER VIII. NON-COMMUNITY AND PRIVATE WELL PROGRAM

Section 1. Continue to implement the WHPP, and assist with implementing the technology control and groundwater quality standards regulations

The IDPH has primary responsibility for surveillance of approximately 4,075 Non-Community Public Water Supplies (NCPWS) in Illinois, which serve a population of approximately 552,500 citizens. These non-community systems include: (1) non-transient, non-community public water supplies (NTNCPWS) that serve 25 or more of the same non-residents at least 180 days out of the year and include facilities such as day care centers, schools, and factories; and (2) transient non-community public water supplies (TNCPWS) that serve 25 or more different non-residents at least 60 days out of the year and include facilities such as campgrounds, restaurants, and highway rest areas.

Inspections are performed on all NCPWS at least once every two years. At the time of the inspection, the area surrounding the wellhead is inspected for sources of contamination. Permits for new construction, modification, or an extension of existing NCPWS will continue to be required.

Section 2. Complete the source water assessments of all NCPWs

IDPH has essentially completed source water assessments of all NCPWSs and will continue these assessments for all new NCPWS, as required by amendments to the SDWA. Approximately 3,633 water wells and 22 surface water sources serve as the sources of water to these systems. These wells and surface water sources were identified and evaluated as to their vulnerability to potential contamination from sources such as sewage systems, abandoned wells, buried fuel tanks, and chemical storage areas. The vulnerability assessments conducted in the past were confined to an area within a 200-foot radius around the well. The amendments expanded the radius to 1,000 feet.

NCPWS wells were digitized from registered aerial photographs which have had well location(s) drafted onto them. During the field survey for the well, potential sources of contamination within 1000 feet were identified and drafted onto the photograph as well. Each site was described on a standardized coding form and then entered into Illinois EPA's database.

This project brought together resources from IDOT, Illinois EPA, local health departments, and IDPH. IDOT provided aerial photographic maps of the area surrounding each supply, and Illinois EPA entered the data into a GIS data system. This project began in 1998 and took three years to assess supplies that were listed as active at that time. Federal funding through U.S. EPA supported this effort. Local health departments were compensated from this fund for conducting the assessments. IDPH regional staff conducted assessments at supplies that are either licensed by the department or located in counties where there are no local health departments. IDPH utilized the data collected from the source water assessments to write a susceptibility assessment for each supply, taking into consideration land use, previous sampling data, and geological data to complete the reports. The susceptibility report determined from the information if the supply is susceptible to contamination. Following completion, the department submitted copies of these

reports to Illinois EPA and the water supply.

Section 3. Continue GIS coverage for all new NCPWSs

The digitizing of all existing NCPWS wells has been completed. This was accomplished by taking aerial photographs, which were drafted with well locations from field surveys, and registering them against the county road coverage. Once registered in real world coordinates, the photos were displayed, and the well location was digitized into a statewide coverage from its drafted location on the photograph. The process of digitizing all new NCPWS wells will continue.

Section 4. Continue certification training of NTNCPWS operators

In accordance with amendments to the federal SDWA and recent U.S. EPA drinking water regulations, all NTNCPWS must be operated by personnel who have completed training approved by the IDPH. There are approximately 450 NTNCPWS that require certified operators. Operators of these systems were initially certified during 2002. They are to be re-certified every three years by attending a training session approved by IDPH that addresses new technology and new drinking water regulations. IDPH is making plans for the first recertification to begin toward the end of 2005.

During 2004 and 2005, the Water Quality Association offered twenty-two classes for operator certification. The Water Quality Association developed the curriculum that was approved by the department and plans to keep the curriculum up-to-date for future training classes. Through these classes, 498 individuals have become IDPH-certified operators. There are currently 31 operators who are certified through Illinois EPA. Through a grant from U.S EPA, IDPH reimbursed operators for costs associated with taking the class. The grant will also be used to reimburse certified operators for their renewal classes.

Section 5. Continue to inspect and perform laboratory analyses on water samples collected from NCPWSs

Under the authority of Section 9 of the IGPA, IDPH has primary responsibility for the inspection of all NCPWS, performed at least once every two years. At the time of these inspections, the area surrounding the wellhead is inspected for sources of contamination.

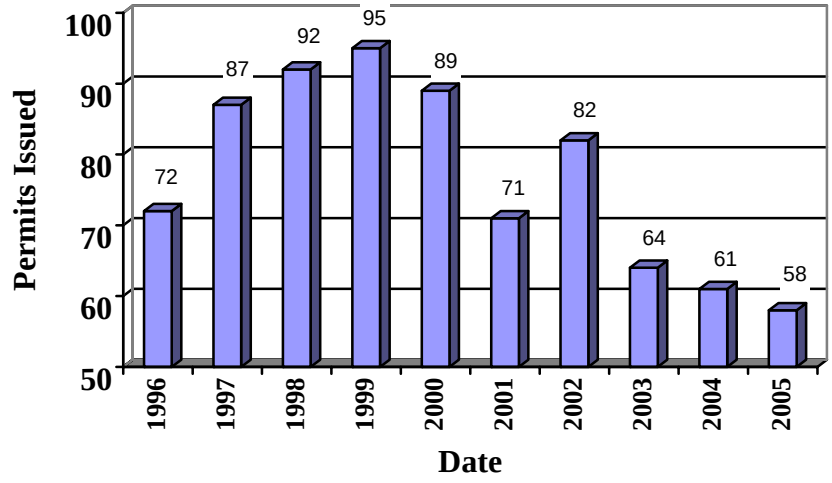
Water samples are collected from all NCPWSs and tested by certified laboratories for the presence of coliform bacteria and nitrate concentration. All NCPWSs with groundwater as the source and serving less than 1,000 are sampled quarterly the first year for coliform bacteria. Thereafter, the frequency of coliform bacteria testing is based on the population a particular supply serves. With surface water as the source, NCPWSs are sampled for coliform bacteria twice each month. NCPWSs serving populations less than 1,000 must be tested at least once per year. For populations greater than 1,000, the sample frequency is the same as for CWSs. As a minimum, all NCPWSs are tested for nitrate concentration once every year.

Of the 4,075 NCPWSs, 450 are NTNCPWS. A NTNCPWS is one that serves the same 25 or more individuals at least six months a year, such as schools and workplaces (about half serve schools). In addition to coliform bacteria and nitrate/nitrite concentration, water from these supplies is tested for approximately 70 contaminants, including VOCs, SOCs, and IOCs. Testing for arsenic will begin on these supplies in 2006. The testing for these contaminants falls in line with the requirements of the SDWA.

Section 6. Continue to issue permits for the construction, modification or extension of existing NCPWSs

During 2004 and 2005, IDPH issued approximately 119 permits for the construction, modification, or an extension of an existing NCPWS. Eighty-two permits were issued to construct new water systems, and the remaining 37 permits were issued to alter or extend existing systems. Since 1996, the number of permits issued increased annually and peaked during 1999 (Figure 5). From 2000-2005, there has been a gradual decline with one anomaly, 2002, where there was an increase of 11 permits over the previous year.

Figure 5. Permits Issued to Construct, Alter or Extend a NCPWS

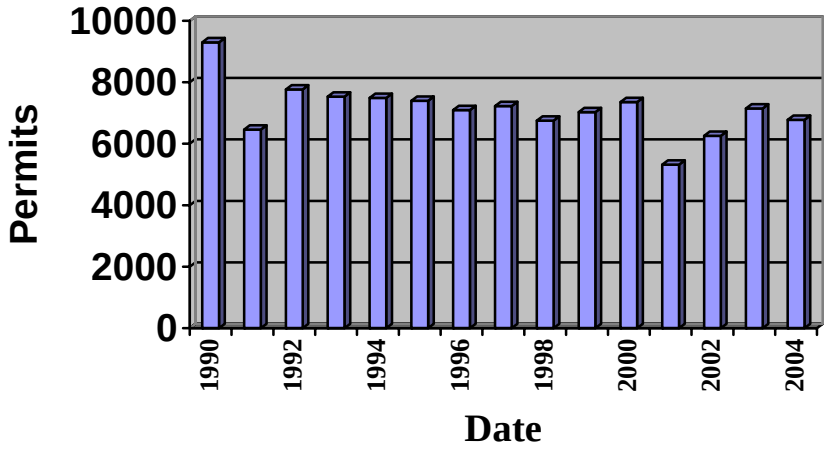


Section 7. Continue the issuance of permits for all types of water wells with the exception of CWS wells

During the last two years, IDPH and local health departments issued approximately 7,000 permits to construct private, semi-private, non-community, and non-potable water wells annually. Figure 6 illustrates the number of water wells permitted during 1990-2004. All new wells are inspected to ensure that location and construction specifications have been met in accordance with the requirements of the Illinois Water Well Construction and Pump Installation

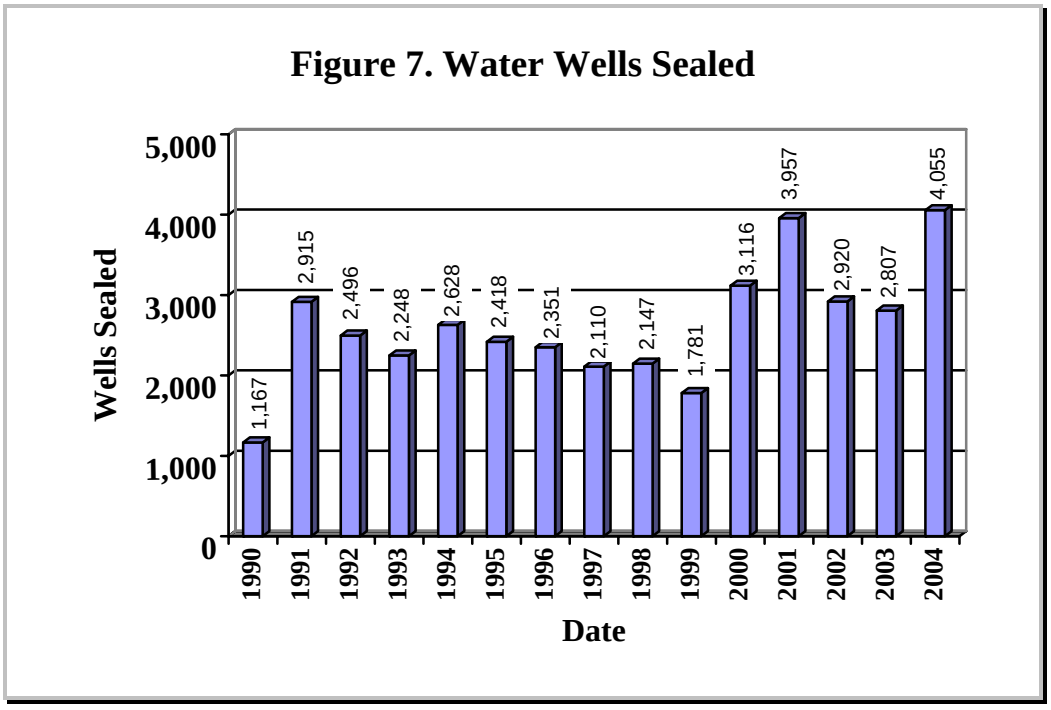
Codes. In accordance with the IGPA, all new wells must be located at least 200 feet away from all primary and secondary sources of contamination and all potential routes. Additionally, water samples from new wells are tested by certified laboratories for the presence of coliform bacteria and nitrate concentration.

Figure 6. Water Well Construction Permits Issued



Of major significance was the increase in the number of abandoned wells that were sealed. During the year 2004, approximately 4,055 abandoned wells were sealed. This is an increase of 1,241, or 44 percent, over the number of wells sealed in 2003 when 2,890 wells were sealed. This is the highest number and the largest increase in the number of wells sealed since the IGPA became effective on September 24, 1987. Local health departments and IDPH inspect the sealing of abandoned wells to ensure they are properly sealed in accordance with the Illinois Water Well Construction Code.

Figure 7 illustrates the number of water wells sealed during 1990-2002.



Section 8. Continue providing continuing education training sessions for licensed water well and pump installation contractors

The Water Well and Pump Installation Contractor's License Act requires all licensed water well drillers and pump installation contractors to attend a six-hour continuing education session every two years. In order to renew a license, a contractor must provide proof of attendance of such training, such as a certificate from the organization that sponsored the training.

Plumbers who install or repair water well pumps and pumping equipment must be licensed as a pump installation contractor and attend a continuing education session every two years. However, plumbers are not required to take the water well pump installation contractor's license examination or to pay the license fee. They are only required to make application for the license.

The training sessions, which must be approved by IDPH, are intended to increase a contractor's knowledge by providing new industry information and updates, as well as to allow health officials to bring current problems to the attention of the industry. Topics for the sessions include constant pressure pumping systems, power line safety, well cleaning and disinfection, using GPS technology, well construction and pump installation codes, water sampling procedures, applications for variable speed pumps, well chlorinators, monitoring wells, down-hole video camera surveys, well drilling rig maintenance, water system design, and safety. Approximately 320 water well contractors and 850 water well pump installation contractors licensed by the IDPH are required to attend these training sessions. Thirteen training sessions were held throughout the state during 2004-2005. All sessions, with the exception of one, were

conducted through the IAGP.

Section 9. Continue to conduct training sessions pertaining to both the NCPWS and private water programs for local health department and IDPH water program staff

Water program staff from 90 local health departments and IDPH attended 34 water program training sessions throughout the state. Thirteen of the sessions coincided with the above sessions for licensed water well and pump installation contractors. The IAGP provided seven sessions pertaining to common methods used in water well construction in Illinois, the fundamentals of proper water system design, and basic requirements of the Illinois Water Well Construction Code. As part of its annual and chapter education conferences, the Illinois Environmental Health Association sponsored five sessions with topics pertaining to ground source heat pump systems, water well construction data storage and retrieval, geologic mapping data, groundwater quality data, and boil orders. IDPH, U.S. EPA, Regional Groundwater Protection Planning Committees, and local health departments sponsored the remaining nine sessions with topics pertaining to inspecting non-community public water systems, sealing abandoned wells, interpretation of geologic mapping, water quality and water well construction data, conducting sanitary surveys of water systems, collecting water samples, groundwater protection, construction of closed loop well systems, and down-hole video camera surveys. The sessions were approved by IDPH as meeting the annual water program training requirement for local health department water program staff under the Local Health Protection Grant Rules (77 Ill. Adm. Code 615).

Section 10. Implementation of Public Notification for Private Water Supply Potential Contamination

Amended by Public Act 92-652, effective July 11, 2002, the IGPA requires Illinois EPA to notify IDPH, unless notification is already provided, of the discovery of a VOC in excess of a groundwater standard or MCL. Within 60 days of receipt of this notice, the department, in coordination with the local health department, shall notify the owners of any private, semi-private, or non-community public water system within a potentially affected area of concern of the need to test their water systems for possible contamination. The notice shall be provided by means of local media and shall be published for three consecutive weeks. It also requires Illinois EPA to notify the unit of local government affected to take any action that it deems appropriate, such as informing any homeowner who potentially could be adversely affected, within a reasonable time after notification by Illinois EPA.

Upon receipt of notification from Illinois EPA of the discovery of a VOC in excess of the MCL or a groundwater standard in a particular area, IDPH notifies the appropriate local health department in writing. The notification explains the legal background for the requirement to provide notification of actual or potential contamination as specified through Section 9.1 of the IGPA. In this notice, IDPH requests the local health department to notify any owners of private or semi-private water systems of which they are aware within the potentially affected area that a VOC in excess of standards has been detected and of the need for owners to test their water systems for possible contamination. The public notice must be made within 30 days after informing the local health department of the contamination.

The essential elements of the public notice:

- Identify the contaminant(s) of concern.
- Delineate the area of contamination based on the information provided by Illinois EPA. This can be accomplished by one of several methods (e.g. specifying the area of a contamination plume or listing the public roads encompassing the area of contamination).
- Inform the water system owner of the need to test the system for possible contamination;
- State that a list of certified laboratories is available upon request.
- State that fact sheets pertaining to the contaminant are available upon request.
- Provide IDPH or local health department's contact person.

From July of 2002 through December of 2004, IDPH and local health departments processed 30 public notices of such contamination.

Section 11. Finalize conversion of the IDPH database onto the state Safe Drinking Water Information System

IDPH contracted with SAIC, the company that developed Safe Drinking Water Information System (SDWIS), to convert the old database to SDWIS. IDPH is now using SDWIS as its sole database and has uploaded historical data. All new inventory, sampling, and violation data is being imputed into SDWIS. Compliance will be run through SDWIS starting in February of 2006.

CHAPTER IX. GROUNDWATER QUALITY PROTECTION RECOMMENDATIONS AND FUTURE DIRECTIONS

The following groundwater protection efforts recommended for the next two years are based on the results of the self-assessment and environmental indicators presented in this report. In some tasks, the priority may be shifted due to funding constraints. The overall groundwater quality protection indicator shows that the overall progress of implementing the IGPA continues to be adequate. However, proactive groundwater protection measures for new CWS wells need to be improved. In addition, efforts and resources should continue to focus on critical regional recharge areas supporting unconfined CWS wells.

ICCG Operations

- Assist the GAC in the review and development of recommendations pertaining to groundwater quality and quantity issues.
- Initiate a policy discussion regarding prevention versus remediation.
- Continue the policy discussion concerning the integration of WHPAs with TACO.
- Develop a strategy to address the increasing trend of VOC contamination in CWS wells.
- Initiate discussion of a strategy to address pesticide metabolites.
- Continue to enhance coordination between Illinois EPA BOW and BOL remediation programs.
- Continue to review and update the Implementation Plan and Regulatory Agenda.
- Work with the GAC and Regional Groundwater Protection Committees to sponsor a Groundwater Protection Policy Forum.
- Continue to hold quarterly meetings.
- Provide liaison for the GAC.
- Enhance Web-based educational materials.
- Assist in implementation of the Illinois Generic Management Plan for Pesticides in Groundwater.
- Evaluate the development of Class III: Special Resource Groundwater for DNPs.
- Review regulated recharge area proposals.

GAC Operations

- Review and make recommendations regarding groundwater issues.
- Conduct policy related meetings.
- Provide input to programs, plans, regulatory proposals and reports as appropriate.

Education Program for Groundwater Protection

- Continue to develop and improve the Web-based information ordering and distribution system.
- Integrate groundwater education efforts into other state environmental planning

and protection programs.
- Work toward enhancing the groundwater protection education resources on a priority basis.

Groundwater Evaluation Program

- Evaluate causes and potential sources of increasing VOC trend.
- Work toward supporting the IWIP.
- Continue to improve the SWAP GIS to include more interactive features.
- Continue to share GIS coverages in an electronic format and continue to automate the groundwater resource database for Illinois.
- Continue to conduct groundwater assessments and share the information through regular updates and completed reports.
- Continue to utilize innovative and cost effective methods to implement statewide groundwater quality monitoring.
- Continue assessing and evaluating emerging contaminants of concern.
- Continue to implement and improve overall groundwater quality indicators.

RTK Initiatives

- Obtain input from the GAC on notice methods and associated rules.
- Continue to issue CWS well-centric notices in coordination with IDPH.
- Implement the evaluation and notification requirements under the RTK law.
- Assist in the development and proposal of RTK cost recovery, well survey, and community relation work plan rules.
- Assist with training IDPH and local health departments on RTK and use of the Internet GIS.

Groundwater Quality Standards and Technology Control Regulations

- Evaluate the need to develop Class III: Special Resource Groundwater Standards.
- Evaluate DNPs for Class III designation.
- Continue to develop proposed groundwater quality standards for emerging contaminants of concern and contaminants detected in groundwater.
- Continue to implement and integrate the groundwater quality standards into environmental programs.
- Continue to update and amend the groundwater standards to parallel the drinking water standards adopted by U.S. EPA.
- Continue to implement preventive notice and response programs and integrate with environmental programs.
- Continue to implement the technology control regulations and improve a database for tracking and evaluating compliance data.
- Evaluation of activities located proximate to CWS where local groundwater protection management efforts are completed or in progress will be given priority.

- Evaluation and compliance determinations for activities referred by permit programs will also be given priority.
- Continue cooperation between Illinois EPA and IDPH on the implementation of the technology control and groundwater standards regulations.

Wellhead Protection Program

- Continue the discussion with the GAC and other stakeholders regarding the integration of WHPAs as a factor in TACO.
- Develop new Illinois EPA source water protection criteria and regulations.
- Continue integration of Illinois EPA's Groundwater and Field Operation Sections' programs for providing technical assistance in source water protection and engineering evaluations (sanitary surveys).
- Continue to publish wellhead protection and assessment data at http://www.epa.state.il.us/water/groundwater/source-water-quality-program.html.
- Increase the percentage of intensive groundwater protection management for CWS Wells.
- Develop and implement source protection criteria to use in the planning, construction, and location of new CWSs.
- Continue integration and implementation of the WHPP under the SDWA alternative monitoring program.
- Continue the delineation of recharge areas for CWSs using reasonably available information.
- Continue to modify CWS water well construction permit application procedures to include collection of information on potential sources and routes, well logs, pumping tests, and chemical analyses.
- Efforts to expand the Illinois Water Well Decommissioning Program should also be evaluated.
- Promote the new Source Water Protection Plan Guidance.

Regional Groundwater Protection Planning Program

- Current committee flexibility should be maintained while assisting with conducting and supporting both new and follow-up efforts of encouraging local and regional groundwater protection programs.

Non-Community and Private Well Program

- Continue to implement the WHPP and assist with implementing the technology control and groundwater quality standards regulations.
- Continue the source water assessments for new NCPWSs.
- Continue certification training of NTNCPWS operators.
- Continue to inspect and perform laboratory analyses on water samples collected from NCPWSs.
- Continue to issue permits for the construction, modification, or extension of

existing NCPWSs.

- Continue the issuance of permits for all types of water wells with the exception of CWS wells.
- Continue to update the Illinois Water Well and Pump Installation Codes to reflect new technology, industry, and public health standards.
- Continue supporting education training sessions for licensed water well and pump installation contractors.
- Continue to conduct training sessions pertaining to both the NCPWS and private-water program for local health department and IDPH water program staff.
- Continue conversion of the IDPH database onto the SDWIS.

Appendix I:

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Appendix II:

Groundwater and Related Publications by the Illinois State Geological Survey and Illinois State Water Survey for 2004 & 2005

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Appendix III:

Water Supply Planning and Management Projects for the Illinois State Water Survey
related to implementation of the
DNR Integrated Water Quantity Planning and Management Program

See http://www.sws.uiuc.edu/docs/iwqpm/ for the full report.

ISWS Statewide Planning and Management

Water supply web site - The Illinois State Water Survey (ISWS) maintains a website for water supply information at http://www.sws.uiuc.edu/docs/wsfaq/. The website is intended to be the primary support site in the state for water supply information and includes a "hot button" to receive public input and comments specific to water planning issues.

Climate studies - Studies of climate variability and change have been a core research area for many decades. Three specific research thrusts are (1) the frequency and intensity of extreme precipitation events which have exhibited considerable temporal variability will be compared to natural variations; (2) past and projected fluctuations in Lake Michigan levels and the associated economic impacts and legal problems; and (3) the threat to future water supplies due to potential natural and human-induced climate changes.

Planning for a worst-case drought - We can better prepare for the next major drought by studying the occurrence of historical droughts over the longest available climatological and hydrologic records and quantifying the precipitation deficits that can be expected in the future. These data can be translated into reduced water availability in lakes, reservoirs, rivers, and shallow aquifers, and to increased water demand. The ISWS is preparing the drought scenarios with which water supply managers can evaluate the capacity of their water systems and, if necessary, identify alternative water supplies (if problems exist) with appropriate levels of risk and cost.

Drought planning for small public water systems in the Midwest - Many western states have experienced widespread and severe economic and environmental impacts of "worst-case" droughts in recent years and have recognized from these experiences the importance of improved water supply planning and management, including drought preparedness. However, it is probable that many system managers in the Midwest Technology Assistance Center (MTAC) region have not evaluated their capability to meet water demand during major droughts, nor have in place adequate plans to deal with such emergencies. The goal of this project is to review the status of drought planning, methodologies suitable for drought planning, and adequacy of databases and analytical tools needed for drought planning by small public water systems in the MTAC region.

Planning, developing and maintaining a groundwater supply: a brochure for small communities in the Midwest - For decades, the ISWS has provided expertise to Illinois communities seeking to secure dependable water supplies. This history of experience provides a

number of practical guidelines for communities to follow to understand, maintain, and expand their groundwater supplies. This is particularly true for small communities that generally do not have the ability to retain full-time staff devoted to maintaining or expanding current water sources or finding new water sources. In 1981 and 1983, ISWS groundwater scientists organized groundwater workshops to teach engineering consultants, water operators, and drillers about the groundwater resources of the state, techniques for well and aquifer test analysis, well and well field design, and groundwater development planning. With partial funding from MTAC, the workshop notes are being expanded into a useful booklet for small communities across the Midwest (using Illinois principally for examples). Such a booklet can provide needed background information on the steps to take to secure a new groundwater supply and will provide a basic understanding of groundwater concepts so that community leaders can communicate intelligently with their constituency and the people they hire to undertake the task of supply development. The primary client is assumed to be small municipalities in the Midwest, although development of industrial and irrigation supplies and even larger municipal supplies will be similar. Topics will include preliminary planning (projecting water demand), groundwater exploration, well/aquifer testing, and well maintenance.

Illinois Water Inventory Program (IWIP) - Documentation of annual water withdrawals (water use) for all of Illinois began in 1978 under a cooperative agreement with the United States Geological Survey (USGS). Fiscal support by the USGS ended in 1991, but the IWIP continues under the general oversight of the ISWS Center for Groundwater Science (CGS). Surface water and groundwater withdrawal data are collected annually by voluntary submission of a form tailored to each (known) major water user in the state. For more information, see http://www.sws.uiuc.edu/gws/gwinfo.asp.

Adequacy of surface water supply systems - An update of the 1989 study "Adequacy of Illinois Surface Water Supply Systems to Meet Future Demands" is addressing water supply issues in central and southern Illinois. The development of the Illinois Streamflow Assessment Model (ILSAM) (http://gismaps.sws.uiuc.edu/ilsam/) provides the framework needed for updating the basic hydrologic information. An extension of these models for determining reservoir yield is envisioned. Each public water supply system will be contacted to obtain information on current facilities, water use, service areas, and plans for dealing with water supply shortages, if any.

Instream flow assessment - Defining instream flow needs for aquatic ecosystems, navigation, and recreation is crucial to determining the availability of surface water resources during drought conditions. Although instream demands must often be defined by biologists, determination of protected flow levels must also be based on hydrologic considerations, such as how much water is available, how often, and at what times of the year. Additional considerations, particularly in the collar counties in northeastern Illinois, are the joint maintenance of the water supply and instream uses of streams under the influence of wastewater discharges that accompany urban/suburban development. The ISWS is in a unique position to conduct such studies to analyze the hydrologic aspects of protected flow.

Arsenic in Illinois groundwater - The U.S. EPA lowered the maximum contaminant level for arsenic in drinking water from 50 ug/L to 10 ug/L to be effective by 2006. The Illinois EPA

estimates that approximately 50 utilities that use groundwater may be out of compliance without additional treatment. Thousands of private wells likely exceed this health-based standard. To address this issue, the ISWS provides free arsenic analysis of water samples and is continuing research on the occurrence and distribution of arsenic in community, non-community, and private wells in Illinois and potential arsenic removal treatment alternatives. Recently completed reports include *Arsenic Geochemistry and Distribution in the Mahomet Aquifer, Illinois* (http://www.wmrc.uiuc.edu/main_sections/info_services/library_docs/RR/RR-107.pdf), *Arsenic in Illinois Groundwater: Implications for Non-Community Public Water Supplies* (http://mtac.sws.uiuc.edu/mtacdocs/finalreports/IDPH_Final_Report.pdf), and *Arsenic Removal in Water Treatment Facilities: Survey of Geochemical Factors and Pilot Plant Experiments* (http://mtac.sws.uiuc.edu/mtacdocs/finalreports/ArsenicTreatmentMTACFinalReport.pdf.) A final report entitled *Development of Low-Cost Treatment Options for Arsenic Removal in Water Treatment Facilities* will be published in 2005. A summary of arsenic-related information can be found on the CGS page at: (http://www.sws.uiuc.edu/gws/arsenic/).

Aquifer testing for water supplies in Illinois - One of the most unique services provided by the ISWS is conducting aquifer tests for communities and large facilities to provide estimates of well and aquifer yield. Testing typically consists of pumping a well at a constant rate over a pumping period of 3 to 24 hours and measuring the groundwater level decline in the pumped well and nearby observation wells, if available. (http://www.sws.uiuc.edu/gws/gwinfo.asp).

Water well record keeping - A long-term effort at the ISWS involves archival of construction reports for all water wells drilled in Illinois. Data on the construction reports includes well location, owner, driller, depth of well, well yield, water level when the well was drilled, and geologic formations penetrated. While historical water well data are known to be incomplete, the ISWS possesses records for over 300,000 water wells drilled in Illinois since the turn of the 20th Century. Data archival now includes a digital scan of the original water well construction report. The ISWS receives numerous calls from the public on a daily basis for copies of records or for interpretation of information contained on these records (http://www.sws.uiuc.edu/data/gwdb/).

Groundwater level observation network - The ISWS maintains various networks of observation wells for groundwater level monitoring (http://www.sws.uiuc.edu/gws/gwinfo.asp). One statewide network of about 20 wells is used to evaluate long-term trends in the water table, data which can provide a link between climate conditions and shallow groundwater levels, part of the Water & Atmospheric Resources Monitoring (WARM) Program (http://www.sws.uiuc.edu/warm/). These data and views of water level hydrographs will be available online in 2005. Other networks are used to provide periodic glimpses of aquifer conditions as a result of groundwater development. For example, water levels in approximately 400 wells completed in the deep bedrock aquifer are measured en-mass every five years. Results of the last measurement of deep wells in 2000, *A Comparison of Potentiometric Surfaces for the Cambrian-Ordovician Aquifers of Northeastern Illinois, 1995 and 2000,* can be found at: http://www.sws.uiuc.edu/pubdoc/DCS/ISWSDCS2002-02.pdf.

Increasing access to groundwater data - A cooperative effort between the ISWS and the Illinois EPA is enhancing access to three important ISWS-maintained statewide databases on

groundwater quality, aquifer hydraulic properties, and water use in Illinois. An ISWS Internet Map Server (IMS) site has been developed to improve internal accessibility to the databases. Water use and groundwater quality are now available on the ISWS IMS (and the Illinois EPA Source Water Assessment Program) sites. Aquifer hydraulic properties will be on the sites in 2005. Improved data access allows users to map specified data, view the map, print information, and download specified data for further analysis.

ISWS Regional Studies

Southern Lake Michigan Water Supply Consortium - The ISWS is working closely with the Northeastern Illinois Planning Commission (NIPC), representatives from local, state, and federal agencies, professional organizations, universities, and the business community to establish an organizational structure, process, and detailed plan for water supply planning around southern Lake Michigan. Components of planning include education, outreach, scientific studies, and funding. With support from the Joyce Foundation, a water supply conference entitled *Straddling the Divide: Water Supply Planning in the Lake Michigan Region* will be held in February 2005. The conference proceedings are available at:
http://www.nipc.org/environment/slmrwsc/conferences/program.htm.

Chicago area rain gauge network - The Cook County Precipitation Network is a 25-site rain gauge array operated year-round since 1989 by the ISWS for the United States Army Corp of Engineers. The network is located in the Lake Michigan and Des Plaines River watersheds of Cook County and is laid out in a grid with a spacing of approximately 10 km between gauges. The primary purpose of the network is to produce consistent, accurate data for Lake Michigan diversion accounting. The volume of water diverted from Lake Michigan into the State of Illinois is monitored to ensure that the diversion does not exceed a long-term average as imposed by a 1967 U.S. Supreme Court Order, as updated in 1980.

Water use planning and management for the Fox River - Two current ISWS projects that will play a crucial role in water use planning and management for the Fox River are the water quality evaluation of the Fox River being conducted for the Fox River Study Group and the water resource evaluation study for Kane County. The ILSAM for the Fox River will serve as a basis for the interactive surface water accounting model for Kane County. The customized model will include enhanced post processing of generated flow data and advanced modeling options that will allow users to assess hydrologic impacts of various future scenarios of water use development. Water quality constraints will be incorporated into the surface water accounting and availability model. These studies will need to be expanded for developing a water supply management plan for the entire Fox River region.

Assessment of water resources availability for Kane County - The ISWS and Illinois State Geological Survey (ISGS) are conducting studies to provide technical support for management and protection of water resources in Kane County. The objectives are to help preserve groundwater availability, protect quality, provide a basis for formulating policy and management strategies, and also provide baseline data and a framework for future studies. This past year, the ISWS created potentiometric surface maps depicting groundwater elevations in various shallow aquifers in Kane County. An assessment of shallow groundwater quality, based on water

samples collected from 75 shallow aquifer wells and a review of recent historical data in the ISWS water quality database, was also completed. These data will provide baseline information for identification of potential future changes in groundwater levels and quality from increased withdrawals, land-use changes, or climate change. Preliminary reports on potentiometric surface mapping and groundwater quality will be available in April 2005. (http://www.sws.uiuc.edu/gws/neilproj.asp)

Groundwater modeling in northeastern Illinois - Groundwater modeling activities for northeastern Illinois continue to advance. Activities completed include creation of an interstate geological framework, an interstate database of historical water withdrawals by aquifer, and an aquifer hydraulic database for a regional three-dimensional computer model from the aquifers' deepest layers of pre-Cambrian bedrock to the land surface. Models will be used to estimate recharge rates, leakage between aquifers, and aquifer responses to increased aquifer development and assess aquifer yields, assess surface water/groundwater interactions, evaluate alternative management scenarios, and establish a framework for future modeling studies. Current modeling efforts are principally focused on a regional model of the deep bedrock aquifer system and a high-resolution model of shallow aquifers in Kane County. The shallow aquifer model is based on three-dimensional geologic maps for Kane County and townships immediately surrounding the county. Both models are in calibration phases; predictive modeling from the regional model is expected before the end of 2005.

Mahomet aquifer and the Mahomet Aquifer Consortium - The Mahomet Aquifer Consortium (MAC) is a grass-roots, not-for-profit organization whose goal is to manage the Mahomet aquifer which is the major groundwater resource for east-central Illinois. Withdrawals in 1995 for municipal use are estimated at over 30 million gallons per day (mgd). Withdrawals for irrigation, principally in Mason and Tazewell Counties (the Havana Lowlands area), put usage well over 100 mgd. Long-term observations of groundwater levels at Champaign show a decline in artesian head of nearly 50 feet since 1950, as a result of increasing water demand in the Champaign-Urbana area. Projections suggest that by 2020 population in the Mahomet aquifer region may increase by 100,000 people. Illinois State Water Survey and ISGS scientists serve as technical advisers to the consortium. In 2004, ISWS scientists measured water levels in over 50 wells in Champaign and Vermilion Counties to better define the potentiometric surface within and north of the Champaign-Urbana cone of depression. These data will be useful for making improvements to and calibrating the ISWS' digital flow model of the aquifer. The intent of modeling is to examine the effects of increased development and to provide insight on development alternatives (http://www.sws.uiuc.edu/gws/mahomet.asp).

Modeling aquifer heterogeneity: National Center for Supercomputing Applications (NCSA) Fellowship - Fractured dolomite aquifers are one of a series of bedrock aquifers that are part of the drinking water supply for the greater Chicago area. Groundwater flow and contaminant transport in fractured rock systems are notoriously difficult to characterize because the features conducting flow do not necessarily fill the available volume that porous media (e.g., sand and gravel) typically do. With support from the NCSA and Sandia Laboratories, research is continuing on the characterization of these aquifers through the advanced analysis of simulated hydraulic and tracer tests. The goal is to determine the relationship between the flow dimension

inferred from hydraulic tests, stochastic models of heterogeneous transmissivity, and the behavior of tracer tests and thus identify plausible models of aquifer heterogeneity.

Water levels, precipitation, and recharge in the Imperial Valley: Mason & Tazewell Counties - The ISWS has operated a network of rain gauges in Mason and Tazewell Counties since August 1992 and also established a network of groundwater observation wells in the Mason-Tazewell area in 1994 that is monitored by the Imperial Valley Water Authority. The purpose of these networks is to collect long-term data to determine the impact of groundwater withdrawals in dry periods and during the growing season, and the rate at which the aquifer recharges. Precipitation is recorded continuously at 20 rain gauges. Groundwater levels are measured each month at 13 observation wells. The database from these networks consists of eleven years of precipitation data and nine years of groundwater observations. Six new observation wells were added in 2003 at an irrigation field site near Easton to observe the interaction of precipitation, groundwater levels, stream discharge, and irrigation. A field trip to the site was conducted for the MAC in July 2004. The most recent publication of data for 2002-03 can be seen at: http://www.sws.uiuc.edu/pubdoc/CR/ISWSCR2004-01.pdf.

Groundwater conditions of the principal aquifers of Lee, Whiteside, Bureau, and Henry Counties, Illinois - This report on the aquifers often associated with the Green and Rock River Lowlands was published in 2004. The region encompasses more than 900 square miles in northwestern Illinois, including Rock Falls, Princeton, Amboy, and Annawan. Groundwater provides about 45 mgd for summer irrigation and about 3.5 mgd year-round for the area's 45,000 residents. The study entailed drilling 41 observation wells at 27 sites and the collection of over 1,800 groundwater level measurements between 1991 and 1995. The data show that the two aquifer systems, a shallow water-table aquifer (the Tampico aquifer) and a deeper artesian aquifer (the Sankoty aquifer), are hydraulically independent, that heavy use of the Sankoty for irrigation does not influence water levels in the overlying Tampico aquifer, and that water levels in the Sankoty historically recover fully over the non-irrigation season. These data also show that groundwater movement in both aquifers is largely down the valley between the Rock and Green Rivers eventually discharging to the Mississippi River, but that a significant portion of the flow in the deeper Sankoty is diverted down the ancient Mississippi valley to the modern Illinois River. Annual estimated recharge to the Tampico aquifer was 7 inches but only 1 inch to the Sankoty aquifer. The final report can be found at:
http://www.sws.uiuc.edu/pubdoc/DCS/ISWSDCS2004-01.pdf.

ISWS Statewide Education and Outreach

"Water Choices": an educational tool - Water Choices is an educational computer program developed as an aid in teaching concepts of water resources. It presents the student with a hypothetical stream-wetland-aquifer system and calculates the impacts of management decisions on a wetland, streamflow, and groundwater levels. Water Choices is distributed with scenarios that illustrate specific water resources concepts, including Moderate Development, Predevelopment, Climate Change, and Competitive Usage scenarios. Water Choices was developed under a grant from the Illinois State Board of Higher Education.

Water Supply Planning and Management Projects for the Illinois State Geological Survey
related to implementation of the
DNR Integrated Water Quantity Planning and Management Program

ISGS Statewide Planning and Management

Cross references of well logs among state agencies - Well logs are the basis for groundwater investigations. To facilitate cross-referencing between water well databases at the ISGS, ISWS, Illinois Department of Public Health (IDPH), and Illinois Environmental Protection Agency (Illinois EPA), the ISGS entered API well identification numbers for more than 6,000 community water supply wells to the IDPH, Illinois EPA, and ISWS databases. During this project, valuable locational data also were added to the ISGS database. This effort was completed in 2004.

National Resources Geospatial Data Clearinghouse - The Illinois Natural Resources Geospatial Data Clearinghouse (Illinois Clearinghouse) continues to provide Internet access for no-cost, geographically referenced, digital data and imagery for Illinois. The online data holdings are used to support a variety of GIS and remote sensing applications. The Illinois Clearinghouse, http://www.isgs.uiuc.edu/nsdihome/, is a multi-agency effort to make metadata and digital geospatial data about Illinois' natural resources available on the Internet. The ISGS established and maintains the Illinois Clearinghouse, which has been online since July 1997. The primary goal of this effort is to foster a climate for the cooperative development of a statewide clearinghouse network in Illinois by promoting the advantages of the National Spatial Data Infrastructure (NSDI), a worldwide effort that promotes and supports digital data access and distribution. Available data sets (with documentation) include: Digital Raster Graphics (DRG) files, Digital Orthophoto Quarter-quads (DOQ) files, geology, major bedrock aquifers, sand and gravel aquifers, Aquifer Sensitivity to Contamination by Nitrate Leaching, Aquifer Sensitivity to Contamination by Pesticide Leaching, land use, political boundaries, and more. A recent effort involved the scanning of more than 30,000 prints of historic aerial photography from the 1930s/1940s and making the image files available for download via the Illinois Clearinghouse. The historic aerial photography is available for 45 counties in Illinois. Recent efforts for the Illinois Clearinghouse include providing access to a 2005 update of the United States Geological Survey (USGS) DOQs for the entire state. These DOQs were collected in the early part of 2005, and a project is in-progress to make these images available via the Illinois Clearinghouse. Additional expansion of the historic aerial photography is also being considered. The Illinois Clearinghouse continues to attract considerable attention, and download rates increase every month. During 2004, the Illinois Clearinghouse recorded about 4,300,000 hits from 113,500 individual users. Site-use statistics indicate that almost 1,000,000 historic aerial photographs and about 182,500 DOQ files were downloaded during 2004. The DOQs were downloaded at a rate of more than 300 per day. The Illinois Clearinghouse can be accessed at http://www.isgs.uiuc.edu/nsdihome/ISGSindex.html.

ArcIMS Application to Access ISGS Well Data - During 2004 the ISGS launched ILWATER, an online mapping service accessed through the ISGS home page (http://www.isgs.uiuc.edu/) that allows easy access to ISGS's extensive database of records for water wells and other related

borings. Visitors to the site can use the map to zoom in to a location and see what records are available. By clicking on an individual well spot, information about the location, ownership, type of well, elevation, and total depth of the well can be viewed in tabular form. Clicking on the specific well identifier (API number) in the table brings up a copy of the water well record that includes the driller's description of the character of the geological materials penetrated by the well as well as details about the construction and performance of the well (if recorded). The location and ownership information ("header" data) for about 286,000 water wells, engineering borings, coal tests, oil and gas tests, and stratigraphic control are available through the new online query system. About 204,000 of these wells have geological information recorded in the database; for those not yet entered into the database, paper records are available. Alternatively, on another page, you can query the database by section, township and range to get a listing of all wells in a section. Geological and other data on about 190,000 oil and gas production and exploration wells can be accessed through a separate system. Users can also view information about highways, county and township boundaries, lakes, municipalities, orthoimagery (very detailed aerial photography), and statewide maps of the aquifers. Although much work remains to make both digital databases complete, ISGS staff members have received very positive comments about the Illinois Water Well website. The website was launched in late July 2004, and its availability spread by word of mouth throughout the drilling and groundwater communities. During 2004, the ILWATER website recorded about 20,640 visits, or about 1,700 visits per month, and a total of 6,830 unique visitors (about 570 unique users per month) was recorded during this period. In addition, the ILWATER application received a favorable review in the Summer 2004 newsletter of the Illinois Association of Groundwater Professionals. The reviewer described many of the details concerning the functionality of the online mapping service and added that the website was a "great tool and easy to use!"

Climate studies - The ISGS continues to use various techniques to study long-term climate variability and change in Illinois and the Midwest. These studies include organic matter found in cave sediments (Panno et al., 2004), rhizolith isotopes during the last glaciation (Wang et al., 2004), and tree rings (Panyushkina et al., 2004). Buried soils found in an exposure near Collinsville in Madison County are being studied in order to provide important insight on climate change from approximately 12,000 to 25,000 years ago. Calcified rootlets found in buried soils are being isotopically examined to better understand the response of carbon cycles to short-term climate variations. These studies of past, long-term climate variability and change should help provide understanding of the potential for future climate variability.

Technique development for improved mapping - Techniques to improve data collection, analysis, and three-dimensional display continue to be developed. High-resolution seismic reflection in many hydrogeologic settings provides exceptional three-dimensional information for defining the extent, characteristics, and thickness of sand and gravel aquifers within the Quaternary sediments (Pugin et al., 2004a). Recent advances in data collection, summarized at http://www.isgs.uiuc.edu/geologicm/g_m19.htm, allow for more efficient data collection. Data characterizing the seismic velocities of earth materials that is collected through vertical seismic profiling allows for converting seismic profiles obtained on the land surface (Pugin et al., 2004b) to be converted from time-domain to more useful depth-domain profiles. Geologic mapping is integral to establishing the lithostratigraphic framework that is the basis for mapping aquifers and aquitards, which in turn provides the foundation for assessing groundwater resources and

addressing groundwater resource issues. Geologic mapping is focused on the collar counties around Chicago, the metro East St. Louis area, and southern Illinois. Published maps can be found on the ISGS website at http://www.isgs.uiuc.edu/isgshome/geo-map.htm. The results of geologic mapping of the Quaternary deposits along the Illinois River valley in central Illinois and the interpretation of the depositional history represented by these deposits (McKay et al, 2005) provide the basis for a more detailed study of the variability of the hydraulic characteristics of the Sankoty aquifer and associated aquitards. Development of techniques continues at the ISGS for visualizing geologic data and maps in three dimensions that facilitate the use of the data and the understanding of data interpretations. Keefer et al. (2004) are developing a software application for visualizing geologic and hydrogeologic data, maps, and models in three dimensions. Hansel et al. (2004) provide an example of using three-dimensional geologic mapping in groundwater resources planning. ISGS continues to evaluate different approaches for including uncertainty in geologic maps.

Effects of agriculture on groundwater - The ISGS and ISWS have continued studying the environmental effects of agriculture, including pesticides in shallow groundwater, swine manure pits, the application of swine manure as a fertilizer, and nitrogen in the shallow groundwater of an agricultural watershed. A report on the Statewide Pesticide Monitoring Network is currently in final review and should be published within a year. The ISGS continues to study nitrogen and phosphorous in the shallow groundwater within an agricultural watershed (Mehnert, 2004; Mehnert et al., 2005), the impacts from agriculture on karst terrains (Panno and Kelly, 2004, Panno et al., 2004), and possible sources of ammonium in groundwater (Roy et al., 2003).

ISGS Regional Studies

Mapping of groundwater resources - ISGS scientists have been involved with mapping groundwater resources and studying the fate and transport of contaminants in shallow groundwater. *Groundwater Geology DeKalb County, with Emphasis on the Troy Bedrock Valley*, described in chapter IV above, was published in 2004. Additional efforts are underway to map the groundwater resources and aquifer sensitivity of McHenry and Lake Counties (http://www.isgs.uiuc.edu/geologicm/g_m9.htm) and the Metro East St. Louis area (see Grimley et al., 2004; Smith et al., 2004, http://www.isgs.uiuc.edu/geologicm/g_m13.htm). A joint study with the ISWS of the groundwater resources of Kendall County was begun in 2005. Three formalized, eighteen preliminary geologic maps (mainly surficial geology, bedrock geology and drift thickness), a map of aquifer sensitivity to contamination, and a three-dimensional geologic model of Kane County were published in 2004. These maps are the basis for detailed mapping of the extent, thickness, and characteristics of aquifers in Kane County. Additionally, the ISGS has an active program to help municipalities find groundwater through surface geophysical exploration techniques. In 2004, the Clark-Edgar Rural Water District, the City of Paris, and the Village of Gifford were among the municipalities contracting for this service; all found the water they needed.

Southern Lake Michigan Water Supply Consortium - The ISGS is a member of the technical committee to the consortium. See above under ISWS studies.

Assessment of water resources availability for Kane County - The ISGS shares responsibility with ISWS for this project. The ISGS completed the preliminary geologic mapping in 2004 and published *Kane County Water Resources Investigations: Interim Report on Geologic Investigations* by William S. Dey, B. Brandon Curry, John C. Sieving, Alec M. Davis, and Curt C. Abert, 75 p. ISGS Open file series 2004-9. This publication is available on CD-ROM for $13.00 or online at http://www.isgs.uiuc.edu/servs/pubs/new-pdfs/ofs/2004/ofs2004_09.pdf. Several of the large-scale maps are available separately. Hydraulic conductivity values of Quaternary sediments in Kane County were obtained from the Illinois EPA. These values were derived at a total of 108 sites in Kane County. These values, which are being matched to their respective lithostratigraphic units, will be useful in characterizing hydraulic properties for the groundwater flow model.

Mahomet aquifer and the Mahomet Aquifer Consortium - The ISGS, ISWS, USGS/Urbana, and DNR/Office of Water Resources continued to serve as technical advisors for the MAC (http://www.mahometaquiferconsortium.org/), which has sought funding and support to study the aquifer underlying east-central Illinois. Studying the Mahomet aquifer remains a high priority. Mehnert et al. (2004) described the results of continued investigations of the Mahomet aquifer. Groundwater flow within the aquifer and both the rates and locations of groundwater recharge are not well understood. Studies being conducted at the ISGS are focused on using geochemical techniques to determine the age of the groundwater in Mahomet aquifer, locate major recharge areas, examine the evolution of groundwater geochemistry, and develop a conceptual model to help explain the current geochemical characteristics of water in the Mahomet aquifer.

The ISGS continues to study the effects of the use of agricultural chemicals on groundwater quality, including nitrogen and phosphorous in the shallow groundwater within an agricultural watershed (Mehnert, 2004; Mehnert et al., 2005), the impacts from agriculture on karst terrains (Panno and Kelly, 2004, Panno et al., 2004), and possible sources of ammonium in groundwater (Roy et al., 2003).

Groundwater Resources and Peaker Power Plants in Illinois - The ISGS is assessing the demand for water by peaker plants with respect to the occurrence of water resources and the demands from domestic, municipal, commercial, industrial, and agricultural uses. The report should be completed in 2005.

ISGS Statewide Education and Outreach

Geoscience Education Series publications - Two publications, *Illinois Groundwater: A Vital Geologic Resource* and *Land-Use Decisions and Geology; Getting Past "Out of Sight, Out of Mind,"* were developed as part of the ISGS Geoscience Education Series that provides the citizens of Illinois with a better understanding of their state's groundwater resources and the need to protect them. Ordering information for these publications can be found at:**.** http://www.isgs.uiuc.edu/isgshome/new_pubs/new-pubs.htm

Appendix IV:

Groundwater and Related Publications by the United States Geological Survey

Cutshaw and others, 2005, Water Resources Data—Illinois, Water Year 2004 (Includes historical data): U.S. Geological Survey Water-Data Report IL-04, CDROM.

Groschen and others, 2000, Water Quality in the lower Illinois River Basin, Illinois, 1995-98 U.S. Geological Survey Circular 1209, 36 p.

Groschen and others, 2004, Water Quality in the Upper Illinois River Basin, Illinois, Indiana, and Wisconsin, 1999-2001: U.S. Geological Survey Circular 1230, 32 p.

Kay, R.T., 2000, Geology, hydrology, and ground-water quality of the Galena-Platteville aquifer in the vicinity of the Parson's Hardware Superfund site, Belvidere, Illinois: U.S. Geological Survey Water-Resources Investigations Report 00-4152, 34 p.

Kay and others, 2002, Use of isotopes to identify sources of ground water, estimate ground-water-flow rates, and assess aquifer vulnerability in the Calumet region of northwestern Indiana and northeastern Illinois: U.S. Geological Survey Water-Resources Investigations Report 02-4213, 60 p.

Kay and others, 2003, Concentrations of polynuclear aromatic hydrocarbons and inorganic constituents in ambient surface soils, Chicago, Illinois: 2001-02: Morrow, W.S., 2003, Anthropogenic constituents in shallow ground water in the upper Illinois River Basin: U.S. Geological Survey Water-Resources Investigations Report 03-4105, 79 p.

Kay and others, 2004, A cross-site comparison of methods used for hydrogeologic characterization of the Galena-Platteville aquifer in Illinois and Wisconsin, with examples from selected Superfund sites: U.S. Geological Survey Scientific Investigations Report 2004-5136, 241 p.

Mills, P.C. and Kay, R.T., 2003, Hydrogeologic and Ground-Water-Quality Data for Belvidere, Illinois, and Vicinity, 2001-02, U.S. Geological Survey Open-File Report 03-206, 49 p.

Mills and McMillan, 2004, Herbicides and their transformation products in source-water aquifers tapped by public-supply wells in Illinois, 2001-01: U.S. Geological Survey Water-Resources Investigations Report 03-4226, 57 p.

Mills and others, 2002, Hydrogeology and simulation of ground-water flow in the aquifers underlying Belvidere, Illinois: U.S. Geological Survey Water-Resources Investigations Report 01-4100, 103 p.

Mills and others, 2002, Delineation of the Troy Bedrock Valley and particle-tracking analysis of ground-water flow underlying Belvidere, Illinois: Morrow, W.S., 2003, Anthropogenic

constituents in shallow ground water in the upper Illinois River Basin: U.S. Geological Survey Water-Resources Investigations Report 02-4062, 46 p.

Mills and others, 2005, Herbicides and degradates in shallow aquifers of Illinois: spatial and temporal trends: Journal of the American Water Resources Association, June 2005, p. 537-547.

Morrow, W.S., 2003, Anthropogenic constituents in shallow ground water in the upper Illinois River Basin: U.S. Geological Survey Water-Resources Investigations Report 02-4293, 34 p.

Robl and others, Water Resources Data—Illinois, Water Year 2002: U.S. Geological Survey Water-Data Report IL-02, CDROM.

Warner, K.L., 2001, Arsenic in glacial drift aquifers and the implication for drinking water—lower Illinois River basin, Ground Water, v. 39, no. 3, p. 433-442.

Warner and others, 2003, Arsenic in Illinois ground water—community and private supplies: U.S. Geological Survey Water-Resources Investigations Report 03-4103, 12 p.

Appendix V:

Additional Reports Developed by or for the Illinois EPA

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