# *Illinois Groundwater Protection Program*

***Biennial Comprehensive Status and Self-Assessment Report***

*January 1998*

*Prepared by the Interagency Coordinating Committee on Groundwater*

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The Honorable Jim Edgar
Governor
State of Illinois

The Honorable Members
of 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 (P.A. 85-0863). This is the fifth biennial report of the Interagency Coordinating Committee on Groundwater. The report has been streamlined down to a single volume report from the previous two volume report to simplify the review process. This report is intended to provide a policy perspective on groundwater protection in Illinois including a comprehensive status and assessment of the program.

The Act created a comprehensive, prevention-based policy focused on beneficial uses of groundwater and preventing degradation. As shown in the attached 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 organized in the general order of the Future Directions of the 1996 Biennial Report. The report also includes several figures and tables to help document our progress.

Sincerely,

Mary A. Gade
Director

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## ACRONYM GLOSSARY

| | |
|---|---|
| Act | Illinois Environmental Protection Act |
| AFRAP | Agrichemical Facility Response Action Program |
| BMP | Best Management Practices |
| BOL | Bureau of Land |
| BOW | Bureau of Water |
| CAS | Compliance Assurance Section |
| CDC | Centers for Disease Control and Prevention |
| CSGWPP | Comprehensive State Groundwater Protection Program |
| CWS | Community Water Supply |
| DNR | Department of Natural Resources |
| EPTF | Environmental Protection Trust Fund |
| GAC | Groundwater Advisory Council |
| GIS | Geographic Information System |
| GMZ | Groundwater Management Zone |
| HWRIC | Hazardous Waste Research and Information Center |
| IAWC | Illinois American Water Company |
| ICCG | Interagency Coordinating Committee on Groundwater |
| IDNS | Illinois Department of Nuclear Safety |
| IDOA | Illinois Department of Agriculture |
| IDPH | Illinois Department of Public Health |
| Illinois EPA | Illinois Environmental Protection Agency |
| IGA | Illinois Groundwater Association |
| IGPA | Illinois Groundwater Protection Act |
| IPCB | Illinois Pollution Control Board |
| ISGS | Illinois State Geological Survey |
| ISWS | Illinois State Water Survey |
| JCAR | Joint Committee on Administrative Rules |
| MCL | Maximum Contaminant Level |
| MHC | Minimal Hazard Certification |
| NPDES | National Pollution Discharge Elimination System |
| NPL | National Priorities List |
| NPS | Non-Point Source |
| NRCS | Natural Resources Conservation Service |
| OSFM | Office of the State Fire Marshal |
| P2 | Pollution Prevention |
| ppb | parts per billion |
| ppm | parts per million |
| PWD | Public Water District |

| | |
|---|---|
| RCRA | Resource Conservation Recovery Act |
| SCS | Soil Conservation Service |
| SDWA | Safe Drinking Water Act |
| SEGIP | State Environmental Goals and Indicators Project |
| SIU | Southern Illinois University |
| SMCL | Secondary Maximum Contaminant Levels |
| SMP | State Pesticide Management Plan |
| SOC | Synthetic Organic Chemical |
| SOP | Standard Operating Procedure |
| TARP | Tunnel and Reservoir Project |
| TCE | Trichloroethylene |
| UICES | University of Illinois Cooperative Extension Service |
| U.S. EPA | United States Environmental Protection Agency |
| U.S. GS | United States Geological Survey |
| USDA | United States Department of Agriculture |
| VOC | Volatile Organic Chemical |
| WHPP | Wellhead Protection Program |

## EXECUTIVE SUMMARY

The Illinois Groundwater Protection Act (IGPA) (P.A. 85-0863, 1987) responds to the need to manage groundwater quality by emphasizing a prevention oriented process. The IGPA is a comprehensive law which relies upon a state and local partnership. Although the IGPA is directed toward protection of groundwater as a natural and public resource, special provisions target drinking water wells. The IGPA responds to the need to protect groundwater quality and establishes a unified groundwater protection program, by:

- Setting a groundwater protection policy;
- Enhancing cooperation;
- Establishing water well protection zones;
- Providing for surveys, mapping and assessments;
- Establishing authority for recharge area protection;
- Requiring groundwater quality standards; and
- Requiring technology control regulations.

The groundwater policy sets the framework for management of groundwater as a vital resource. The law focuses upon uses of the resource and establishes statewide protection measures directed toward potable water wells. In addition, local governments and citizens are provided an opportunity to perform an important role for groundwater protection in Illinois.

In 1991 the United States Environmental Protection Agency (U.S. EPA) published a new strategy entitled *Protecting the Nation's Ground Water: EPA's Strategy for the 1990s*, which introduced the federal concept of Comprehensive State Ground Water Protection Programs (CSGWPPs). In 1993, the U.S. EPA provided the states with Final Guidance on the CSGWPP. Under this program the federal government will enter into a new partnership in which the states have the "lead role" for groundwater protection. The intent of the CSGWPP is to provide a flexible working relationship between U.S. EPA, the states, and local governments to achieve a more efficient and comprehensive approach to protecting groundwater resources. One of the incentives for participating in this process is that if the Illinois program is determined to be comprehensive then the state can negotiate changes at the federal level.

> On July 29,1997, U.S. EPA fully endorsed Illinois' Core CSGWPP. Illinois is one of seven states in the nation to receive this endorsement. In response to the CSGWPP endorsement the Illinois EPA received a grant from U.S. EPA to better integrate watershed and groundwater geographic information systems.

The Interagency Coordinating Committee on Groundwater (ICCG) has evaluated the previous IGPA Biennial Reports, and has streamlined a two volume report down to one volume. This executive summary is intended to provide a policy perspective on groundwater protection in Illinois. The rest of the report is intended to provide a comprehensive status and self assessment of the program. In addition, Appendix 1 provides a bibliography of publications to assist with groundwater protection, completed during this time period. Appendix 2 provides a bibliography of research completed during this reporting period to support groundwater protection. Appendixes 3 and 4 provide a summary of WHPPs in priority groundwater protection planning regions and throughout the state.

## What Groundwater Means to Illinois

4.1 million people use groundwater as a source of public water supply

1,195 CWS (3,397 wells) utilize groundwater in the state

Approximately 95 percent of 11.5 million people in Illinois rely on public water supplies as a source of drinking water. About 4.1 million people use groundwater as a source of public water supply. There are 6,252 public water supply (PWS) systems in the state, of which 5,534 are groundwater dependent. There are 1,826 Community Water Supply (CWS) systems in the state, of which 1,195 are groundwater dependent. There are approximately 4,446 non-community groundwater dependent systems that serve schools, restaurants, parks and other businesses. Further, it is estimated that approximately 400,000 residences in Illinois are served by their own private wells.

Protecting this vital resource is critical to ensure potable water for current and future generations. Protecting our groundwater resource is also essential to avoid economic repercussions that are a result of groundwater contamination. This biennial report to the Governor and General Assembly presents an overview regarding Illinois' reliance on groundwater resources, the growing problems of groundwater contamination, potential sources of future adverse impacts to groundwaters, and preventive approaches being taken to protect groundwater.

## Cost of Groundwater Contamination

The cost of groundwater contamination is significant. In contrast, the cost of implementing a local groundwater protection program can be off-set in relation to the costs of contamination. For example, Illinois communities saved $15 million in laboratory fees by implementing local groundwater protection programs. These programs reduced the vulnerabilty of the participating CWS's source water which subsequently allowed them to reduce monitoring. Therefore, the vulnerable CWSs discussed in this executive summary would all benefit from establishing protection programs in recharge areas that extend beyond the minimum setback zones established under the IGPA. Groundwater protection in these areas could be achieved by applying certain design and/or operating practices for new potential sources of contamination. In addition, certain best management practices (BMPs) could be established for nonpoint sources of contamination.

- 35.5 percent of the CWS wells using unconfined aquifers have already been adversely impacted by groundwater contamination from volatile organic compounds (VOCs),synthetic organic compounds (SOCs), or nitrates
- 10 percent of the CWS wells using confined aquifers have already been adversely impacted by groundwater contamination from VOCs, SOCs, or nitrates
- 3:1 ratio between detections in unconfined versus confined aquifer system wells
- approximately 79 percent of the recharge area acres that support unconfined aquifer wells are threatened by potential contamination sources

Pollution prevention (P2) is another method that companies have utilized to protect these critical resource areas in relation to new and existing potential contamination sources. Pollution prevention involves reviewing the use of all hazardous and liquid chemicals in plant or company processes, and when possible, adjusting the process to replace hazardous with non-hazardous materials. Several communities developing recharge area protection programs have utilized pollution prevention interns supplied by the Illinois Environmental Protection Agency (Illinois EPA), and co-sponsored by the Regional Groundwater Protection Planning Committees to assist small businesses.

## Program Summary - 1996 through 1997

Illinois has made progress in implementing groundwater protection programs by the adoption of groundwater standards, and establishing minimum setback zones. Well site survey reports have been completed, automated, and provided to the majority of the 1,195 public water supplies using groundwater in Illinois. These reports assist in generating needed information that local governments use in adopting minimum and maximum setback zone ordinances. A total of 94 community water supplies, representing 294 wells, have or are in the process of adopting maximum setback zones.

- supplemental protection (maximum setback zones) percentage of acres protected increased from 1.89 percent in 1996 to 4.56 percent in 1997 (3,100 to 7,400 acres)
- 30 communities within the four Priority Groundwater Protection Planning regions, representing multiple wells, have established or are awaiting final approval of maximum setback zone ordinances
- Illinois EPA has not fully utilized its authority to propose maximum setback zones where local action has not been taken
- a draft maximum setback zone regulation has been developed

In the last Biennial Report, it was recommended that the Illinois EPA more fully utilize the authority provided under Section 14.3 of the Illinois Environmental Protection Act to develop and propose maximum setback zone regulations to the Illinois Pollution Control Board (Board). During the past two years, the Illinois EPA has been completing the development of a data management system that will tie multiple data sets together to allow for the use of multiple factors to prioritize maximum setback zone regulatory development. This system has been developed and queries were done to select high priority community water supplies. This list was provided to the Illinois Rural Water Association (IRWA) Groundwater Technician to assist him in providing maximum setback zone technical assistance. A draft maximum setback zone regulation has been developed to target multiple community water supply wells in a high priority area. It is anticipated that these will be proposed to the Board in either late 1997 or early 1998.

- 386 CWSs (912 wells) utilize aquifers that are unconfined
- 222 of the CWS wells utilizing unconfined aquifers have mapped recharge areas
- the land surface expression for an average 5 year recharge period is approximately 111 acres per well (this area ranged from a minimum of 0.35 to 717 acres in size)

However, a great deal of work needs to be done to establish addition maximum setback zones in the areas of greatest need. The Regional Groundwater Protection Planning Committees have made very good

progress, and continue to receive national recognition for their efforts. The Illinois EPA received its first petition from a regional planning committee to develop a regulated recharge area in Illinois. The Illinois EPA has developed a rule-making proposal to submit to the Board in late 1997 or early 1998.

A great deal of work remains to be done to protect the 166,700 recharge area acres of vulnerable critical potable resource groundwater utilized by CWSs, as illustrated in Table 1. This qualitative and quantitative assessment of groundwater protection progress relative to the protection of one of the state's most critical resources indicates the following:

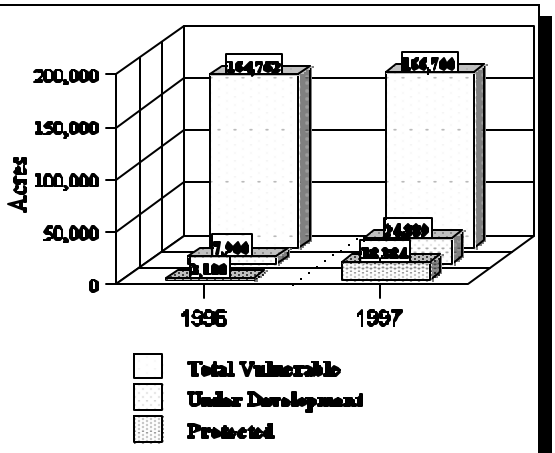


Table 1. Groundwater Protection Progress

- 26 percent of the recharge area acres that support CWS unconfined aquifer wells have baseline, supplemental, and full recharge area protection in place or under development and
- source water protection programs under development increased from 4.81 percent in 1996 to 14.94 percent (acres protected) in 1997 (7,900 to 24,339 acres). This increase is primarily attributed to the monetary incentive program developed by the Illinois EPA and the Illinois Municipal League to provide laboratory fee cost savings. These cost savings were provided by implementing wellhead protection programs to reduce groundwater vulnerability.

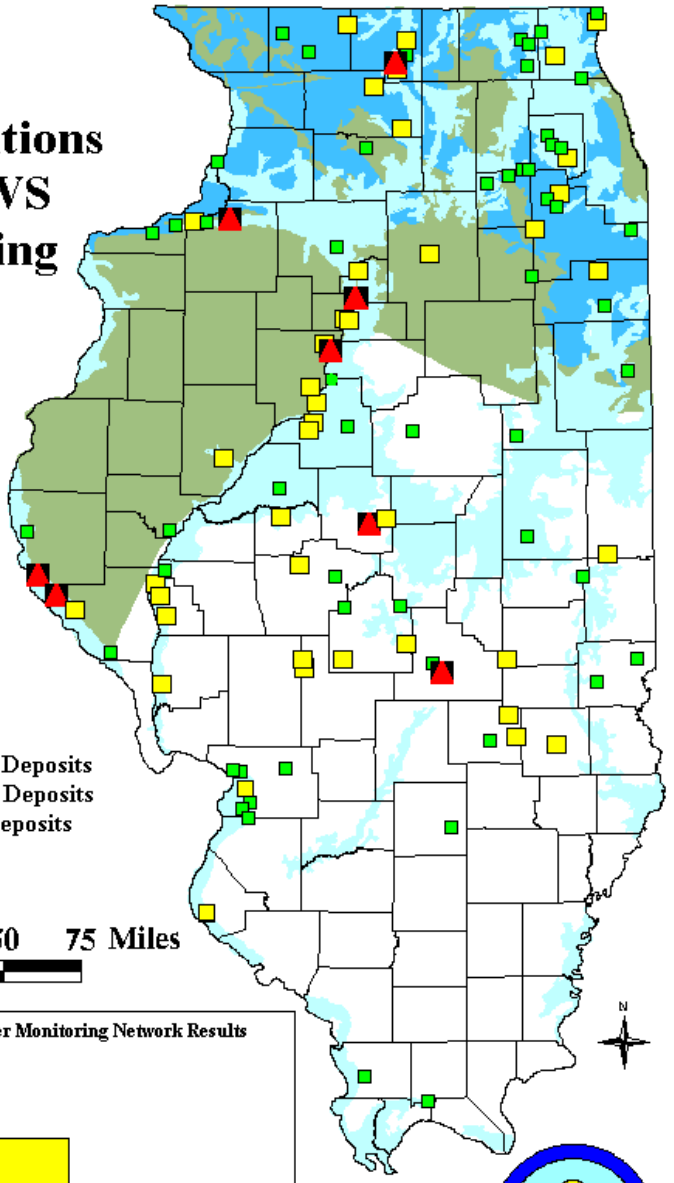
All of these costs have a potential to adversely affect local economic development. The CWS of Illinois that have been impacted by groundwater contamination have incurred some or all of these costs. Figure 1 illustrates the vulnerable water supplies which are monitored as part of Illinois' Ambient Monitoring Network of Community Water Supply Wells. Of the vulnerable wells monitored, slightly more than one-third have already been impacted by contaminants resulting from human activity.

The pollution of groundwater can have wide-ranging economic implications to communities and businesses. Groundwater contamination can produce the following adverse economic hardships:

- devalued real estate;
- diminished home sales or commercial real estate sales;
- loss to the tax base;
- consulting and legal fees;
- increased maintenance costs;
- deterioration in drinking water quality and quantity;
- increased health risks;
- waterborne disease outbreaks; and

# Figure 1.

## Groundwater Conditions in Unconfined CWS Ambient Monitoring Network Wells for 1993-1995

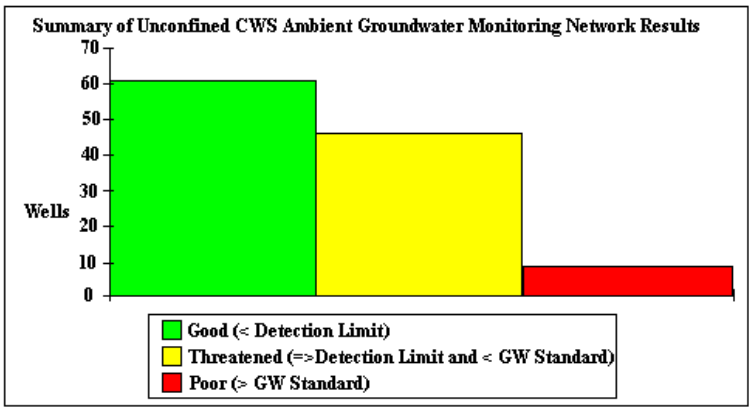


**Legend**

- Good
- Threatened
- Poor
- County Boundaries
- Principal Sand and Gravel Deposits
- Principal Shallow Bedrock Deposits
- Principal Deep Bedrodk Deposits

25 0 25 50 75 Miles

N




Illinois EPA

As illustrated in Table 1 and Figure 1, there is a greater need to develop enhanced source water protection programs through voluntary efforts. By establishing local groundwater protection programs in community well recharge area(s), a community may focus its management efforts, avoid excessive management and regulation in areas that do not contribute to the wells, and avoid spending time and funds on protecting non-critical areas. This type of prevention program has allowed the state to provide waivers to reduce the CWS monitoring required under the Safe Drinking Water Act (SDWA).

The IGPA provided setback zones and surveys of potential sources and routes of contamination for CWSs. It also authorized large communities served by groundwater to conduct "groundwater protection needs assessments." A groundwater protection needs assessment defines the critical recharge area(s), identifies the existing potential contamination sources and/or potential routes located in this area, and also relates this information to the existing land use zoning. An assessment also evaluates the water supply contingency plans in the event of contamination incidents. The combination of this data will allow for the application of a balanced management plan for the protection of these groundwater resources.

From the pilot groundwater protection needs assessments that have been completed, the Illinois EPA, ISWS, and Illinois State Geological Survey (ISGS) have developed a *Groundwater Protection Needs Assessment Guidance Document*. The IRWA and others are continuing to use this document to provide technical assistance to communities. The IRWA held workshops during this period that focused on needs assessments and protection programs. Since the guidance has been developed several communities have utilized it to conduct comprehensive assessments.

Communities need to incorporate regional groundwater protection concerns as a key component of planning and zoning issues, since zoning is frequently a blueprint of growth. However, as described in previous reports, resources are needed in the form of financial assistance or other incentive programs from the state or federal government. These resources are needed to assist in performing groundwater protection needs assessments and to make local wellhead protection programs truly effective. The Illinois EPA has initiated pilots in the Central and Northern Priority Groundwater Protection Planning Regions to assist with performing recharge area delineations and develop protection programs. This assistance needs to continue and be expanded such that the resources available from the state are leveraged to protect these critical resource groundwaters. In addition, the resources provided under the newly re-authorized SDWA of 1996 for conducting source water assessments will greatly assist in the areas of need. In the long run, a local technical assistance program could lead to cost savings and economic growth for many companies and communities. The companies and the community must have an uncontaminated source of drinking water to remain economically viable. Continued and better collaboration with the Clean Break Program, and P2 technical assistance, would assist the Regional Planning Committees in advocating community based groundwater protection programs for CWSs.

## 1998 Through 2000 Recommendations

The last IGPA Biennial Report recommended that the Illinois EPA should develop a prioritization process to determine areas with the greatest need for the development of maximum setback zone proposals. The effort to prioritize and develop maximum setback zone proposals will be continued.

In addition, a state management plan for the protection of groundwater from agricultural chemicals needs to be finalized to encourage the voluntary protection of critical potable resource groundwaters. The Illinois EPA will continue to conduct four pilot demonstration projects to work with stakeholders to establish voluntary agricultural P2 approaches in delineated CWS well recharge areas. Further, there is a continued need for establishing prevention programs and targeted cleanup/restoration of other groundwater contaminant sources or routes within these high priority water resource areas of the state.

Illinois EPA will continue to work with the Natural Resource Conservation Service, Soil and Water Conservation Districts, and other local stakeholders to establish conservation reserve programs for agricultural cropland located within the delineated recharge areas of CWS. The Illinois EPA should continue to work with the Illinois Department of Agriculture (IDOA), Illinois Association of Soil and Water Conservation Districts, and the County Soil and Water Association Districts to implement Farm-A-Syst in targeted aquifer protection areas.

Statewide technical assistance to communities will be expanded to include the delineation of recharge areas and conducting source inventories within these areas. Over the next 3.5 year period, one-hundred and fourteen CWSs using groundwater from unconfined aquifers will have their recharge areas delineated, and the potential sources of groundwater contamination will be inventoried. Coordination and technical assistance from the IRWA will also be continued to establish local teams for development local groundwater protection programs. This will complete work for the existing wells with reasonably available data needed to do delineations. In addition, new well permit requirements will be established to implement wellhead protection prior to operation of a new CWS well.

Wellhead assessments for non-community water supply wells will be greatly expanded during the next 3.5 years, and source water assessment data for CWS and non-CWS wells will be published on the Agency's Internet homepage for greater public access. The Illinois Department of Public Health (IDPH) will also continue to improve the design and construction techniques for potable water supply wells, based on the research findings of the Illinois Association of Groundwater Professionals.

During the next two years, the environmental goal of this program will be to increase the number of recharge areas with full protection programs established or under development, 15 percent by the year 2000 as compared to 1995. Since this goal has almost been attained, the Illinois EPA will re-evaluated it under the Environmental Performance Partnership Agreement with U.S. EPA during 1998.

Illinois will work on the development of a vision for a fully integrated CSGWPP with U. S. EPA and other

groundwater-related programs to achieve greater flexibility, as well as continue to work toward improvements in groundwater protection using a targeted resource-based approach. Under this vision, areas of needed flexibility from U.S. EPA will be evaluated and described to advance quality improvements toward a fully integrated CSGWPP. Given U.S. EPA's ability to provide flexibility for certain requirements, program enhancements could include negotiation with other Illinois EPA Bureaus and Divisions to provide inspections that include, P2 technical assistance for small businesses located in high priority wellhead protection areas. Illinois EPA also received a CSGWPP grant from U.S. EPA to expand the Illinois EPA's customized Environmental Systems Research Institute's ArcView® 2 application. This grant will leverage our ability to perform source water assessment and delineation activities pursuant to Section 1453 of the SDWA by accelerating and enhancing the level and availability of resources for this effort.

The Department of Natural Resources (DNR) should continue to develop and implement an aggressive groundwater education and research program.

## BIENNIAL COMPREHENSIVE STATUS AND SELF-ASSESSMENT REPORT

## INTRODUCTION AND BACKGROUND

The ICCG evaluated the previous biennial reports, and determined that a more streamlined, performance based report is needed. Hence, the intended purpose of this report is two fold. First, the report is intended to provide a comprehensive status report on the implementation of the IGPA. Secondly, the report is intended to provide a self-assessment of program initiatives in relation to the goals and objectives of the program recommended in the 1996 IGPA Biennial Report. Additionally, this report is intended to provide environmental and programmatic indicators to help measure and demonstrate program performance.

The current report has been organized according to the following recommended goals:

ICCG operations;
Groundwater Advisory Council (GAC) operations;
Groundwater protection education program;
Groundwater evaluation program;
Groundwater quality standards and technology control regulations;
Wellhead protection program (WHPP);
Regional groundwater protection planning program; and
Non-community and private well program.

## CHAPTER I. INTERAGENCY COORDINATING COMMITTEE ON GROUNDWATER OPERATIONS

### Section 1. Continue to review and update the Implementation Plan and Regulatory Agenda

The IGPA required the creation of the ICCG. The Committee is chaired by the Director of the Illinois EPA or designee and has members from 10 state agencies/departments which 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 Committee:

ENVIRONMENTAL PROTECTION AGENCY - (Chair) *Roger Kanerva, designee*
DEPARTMENT OF NATURAL RESOURCES - *Dave Baker, designee*
    OFFICE OF WATER RESOURCES - *Gary Clark, designee*
    OFFICE OF MINES AND MINERALS - *Dan Wheeler, designee*
DEPARTMENT OF PUBLIC HEALTH - *Dave Antonacci, designee*
OFFICE OF STATE FIRE MARSHAL - *Jim McCaslin*
DEPARTMENT OF AGRICULTURE - *Warren Goetsch, designee*
EMERGENCY MANAGEMENT AGENCY - *Jan Horton, designee*
DEPARTMENT OF COMMERCE AND COMMUNITY AFFAIRS - *Stewart Schrodt, designee*
DEPARTMENT OF NUCLEAR SAFETY - *Dave Ed, designee*

In addition, John R. Washburn represents the Illinois Department of Transportation's Division of Highways on the ICCG.

**Section 2. Continue to hold quarterly meetings**

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

**Section 3. Provide liaison for the GAC**

The ICCG has continued to assist with coordination associated with the GAC by providing Committee meeting agendas and minutes. The ICCG has also continued to review and make recommendations on groundwater research and data collection and dissemination programs. The Committee has had success in coordinating and assisting in many aspects of the groundwater protection program.

The ICCG as well as its subcommittees and work groups have helped to provide a cooperative process to develop and implement programs.

**Section 4. Assist the Agency with the endorsement of Illinois Groundwater Protection Program in relation to U.S. EPA's Comprehensive State Groundwater Protection Program core adequacy criteria**

The ICCG reviewed and provided input on the U.S. EPA's Comprehensive State Groundwater Protection Program (CSGWPP). The process for developing a CSGWPP was initiated by conducting a self-assessment of the state's programs in relation to the six strategic activities and the core program adequacy criteria. The Illinois EPA worked with the ICCG and GAC to prepare a self-assessment. The ICCG voted to continue pursuing a CSGWPP at the core level. The self-assessment was submitted in October 1993 to U.S. EPA Region V for their review. On April 15, 1994, U.S. EPA Region V's comments were received by the Illinois EPA. On June 30, 1995, a draft Core CSGWPP application was submitted for U.S. EPA Ground Water Protection Branch review prior to official submission to the regional administrator. On September 8, 1995, the U.S. EPA Ground Water Protection Branch provided comments back to the Illinois EPA Groundwater Section. Illinois EPA submitted its official application to U.S. EPA Region V on August 8, 1996. On July 29,1997, U.S. EPA fully endorsed Illinois' Core CSGWPP. Illinois is one of seven states in the nation to receive this endorsement. In response to the CSGWPP endorsement the Illinois EPA received a grant from U.S. EPA to better integrate watershed and groundwater geographic information systems.

**Section 5. Oversee, review and provide input to the preparation and implementation of a State Pesticide Management Plan (SMP)**

As part of our cooperative efforts with the Illinois Department of Agriculture, the Illinois EPA participated in two roundtables. The first was a national roundtable in August 1996, held in Alexandria, Virginia. The second was a Region V roundtable, held at the U.S. EPA Regional Offices in Chicago, Illinois, in January 1997.

**Section 6. Continue and expand the effort of providing technical assistance (CWS well recharge area delineation and P2 alternatives) to the regional groundwater protection planning committees**

The activity is reported under Chapter VI Section 5.

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

The ICCG's Education Subcommittee continues to be active in implementing statewide groundwater educational efforts and has worked with the four Groundwater Protection Planning Committees to establish local groundwater education programs. The Education Subcommittee conducts a program which addresses groundwater-related topics to educate the general public, business, agriculture, government, and private water supply owners, users and operators. The ICCG reviews and provides input on the Groundwater Education Work Plan. The Education Subcommittee is chaired by the DNR. The ICCG formally adopted the state fiscal year 1998 groundwater protection education program at its August 19, 1997 meeting.

## CHAPTER II. GROUNDWATER ADVISORY COUNCIL OPERATIONS

**Section 1. Sponsor a regulatory development session in cooperation with the ICCG and Illinois EPA on the Pleasant Valley PWD regulated recharge area proposal**

The Groundwater Advisory Council (GAC) in cooperation with the Illinois EPA and the Central Groundwater Protection Planning Committee, sponsored the ***Pleasant Valley Public Water District Regulated Recharge Area Development Workshop*** in June 1996. The workshop was designed to facilitate input, and to provide information regarding proposed management options for Pleasant Valley PWD. The workshop proved to be successful with a statewide representation of attendees who generated a variety of questions and comments. Their input has been used to develop the regulation being proposed to the Board in late 1997 or early 1998.

**Section 2. Conduct policy related meetings**

The GAC conducted several policy-related meetings over the past two years. The GAC is composed of nine members that represent public, industry and local governments. The IGPA mandates that the Council members are appointed by the governor to serve three years terms. The current members are as follows:

*Caterpillar*
Bill Compton

*Northern IL Water Corp.*
Duane Cole

*Business and Professional People for the Public Interest*
Robert Jones

*Potash and Phosphate Institute*
Dr. Harold Reetz

*City of Edwardsville*
Paul McNamara

*Sunstrand*
Robert J. Miller

*South Central IL Regional Planning & Development Commission*
Fred W. Walker

*IL Assn. Of Groundwater Professionals*
John D. Liberg

*Farnsworth & Wylie*
Robert C. Kohlhase

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

The GAC provided input on the new Tiered Approach to Cleanup Objectives and Brownfield regulation. As previously mentioned, the GAC had an active role in sponsoring the workshop on the Pleasant Valley PWD regulated recharge area proposal. In cooperation with the ICCG, the GAC reviewed the CSGWPP, SMP and Livestock Waste Management Act.

## CHAPTER III. EDUCATION PROGRAM FOR GROUNDWATER PROTECTION

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

The education Program for Groundwater Protection has continued to be very successful in this two year period. The achievements of this integrated, cross-disciplinary, cross-agency, and cross-jurisdictional program appear to be based on several factors.

- The annual work plan is developed after careful evaluation and planning by representatives of several agencies and associations. It is divided into sections dealing with the general public, private well-owners, public officials and water professionals, the business community, and Illinois teachers.

- The widespread participation of the following groups through the work plan was documented in the 1995 Groundwater Education Survey:

  24 professional, environmental, trade and governmental associations;
  91 local health departments;
  numerous counties, municipalities and water districts;
  98 soil and water conservation districts;
  10 post-secondary educational institutions;
  14 units of state government;
  5 units of federal government;
  4 regional groundwater committees and their education sub-committees;
  thousands of Illinois teachers; and
  hundreds of local businesses and industries.

- The adaptable nature of the annual work plan allows for new initiatives with the collaboration of agencies and associations. Examples include the well disinfection research and education program (conducted primarily by the Illinois Association of Groundwater Professionals using DNR grant funds), introduction of Illinois Farm-A-Syst (IDOA working through local soil and water conservation districts and local health departments through an Illinois EPA grant), the Middle School Groundwater Education Project (Southern Illinois University at Edwardsville through a W.K. Kellogg Foundation grant), and the groundwater technical assistance program for water departments (IRWA through a grant from U.S. EPA).

- The IGPA provides a sound framework for cross-jurisdictional cooperation and coordination. The ICCG (and its education subcommittee), the GAC, and especially the four regional groundwater protection planning committees (and their education subcommittees) provide a sound mechanism for identifying and implementing local educational programs.

- Continued press coverage of water quality problems and cleanups is keeping groundwater in the public eye. Adults, particularly those with children and water wells, appear to be genuinely concerned about water quality, wellhead protection methods, and well maintenance recommendations.

**Section 2. Support regional groundwater protection committees with special education programs based on regional needs. Increase emphasis on community programs for wellhead protection;**

In this two year period, state agencies have supported four priority regional groundwater protection planning committees with a variety of educational support for their identified regional educational needs. There have been seven groundwater protection field days, six Farm-A-Syst pilot demonstrations, four training sessions for door to door surveyors and exhibits at many fairs and field events. The Illinois Middle School Groundwater Education Project has reached hundreds of teachers and tens of thousands of students in three groundwater protection regions. Teachers are teamed with county and local water professionals for support. (see next section)

Since the cooperative program between IDOT and Illinois EPA was established to post recharge area road signs, numerous postings have been accomplished. These road signs demarcate where state or interstate routes enter or leave these sensitive source water protection areas. The need for accompanying community education was addressed in a preliminary way by providing a packet of information and suggestions for each community with state signage. Very few of these communities have implemented a specific program, but three have been featured as "shining-star" communities at the annual conference of the Illinois Municipal League. Finally, there have been four training sessions for volunteers who have gone door-to-door making educational contacts in delineated community capture zones. These were conducted in the Northern and Northeastern regional groundwater areas. Community groundwater protection will be featured in the 1998 Groundwater Protection Month promotion.

**SECTION 3. Through educational institutions and organizations, curriculum projects, and teacher workshops, integrate groundwater principles and groundwater protection into the curriculum for grades 3 - 12;**

During this two year reporting period, much progress has been made. About 800 copies of "Buried Treasure: Education Activity Guide" were distributed to teachers through workshops or on request. This second to twelfth grade activity guide was developed and later revised by the Environmental Education Association of Illinois. It contains teacher-friendly educational materials and activities related to Illinois groundwater.

About 700 teachers were trained by the Middle School Groundwater Project. Selected teachers in the three priority regional areas received water testing kits for student use, education kits, H20 Below, An Activity Guide for Groundwater Study and groundwater flow models. Three teacher-coordinators in these areas provided local water liaisons and support for participating teachers. Most groundwater flow models were donated by local businesses and civic organizations. Professional evaluation of the project has shown very positive results.

The Illinois DNR has become the state sponsor of Project WET (Water Education for Teachers) and assigned a staff person to coordinate facilitator and teacher training. This comprehensive national water project integrates groundwater into the school curriculum.

**Section 4. Community wellhead protection education. As groundwater recharge maps become available for community water supplies, provide educational assistance in developing community well protection education programs;**

The IRWA's program of technical assistance to small community water supplies was greatly bolstered by the hiring of a groundwater technician. This position has provided great support to many communities in developing their wellhead protection programs. Also, the Community Groundwater Education Collaboration of 17 persons from eight organizations was developed to support community based education programs. A packet was developed which lists agency and association staff available to help, provides suggestions for starting up a local committee, and makes suggestions for educational initiatives relating to road signs. The Collaboration envisions startup of a community-based educational process following the development, and review by the local governing board, of the capture zone maps for a community's wells.

The Collaboration packet was distributed by Illinois EPA to all communities with completed capture zone mapping. Several communities have developed educational programs based on the packet and their unique community features. In several cases where the capture zone is in a residential area, volunteers have been recruited to conduct door-to-door information campaigns.

**SECTION 5. Target private well owners for educational programs, involving licensed water well contractors, local health departments, and other organizations. These programs will address well abandonment, disinfection, testing, operation and maintenance methods;**

Educational programs for private well owners have been expanded especially through local meetings sponsored by local health offices, soil and water conservation districts, local well drillers, and farm organizations. Educational programs on well sealing have been particularly popular.

Working through soil and water conservation districts, the IDOA with Illinois EPA financial assistance has promoted the Illinois Farm-A-Syst program, which encourages farmers to review and act on factors influencing their groundwater quality. The most successful events have been field events on host farms with water testing kits available for participants. Other participation incentives are being considered as well.

Groundwater protection exhibits and workshops were staffed for 20 days at the two Illinois State Fairs. Private well owners with children were the primary audience and they collected bulletins and advice related to their specific water well concerns or problems.

The Illinois Association of Groundwater Professionals through a contract with DNR researched and developed improved well disinfection methods and conducted training sessions for well drilllers and health officials.

The Cooperative Extension Service is committed to developing new bulletins on operation and maintenance of wells and sealing abandoned wells.

Eighty agriculture teachers received groundwater flow models, training in groundwater protection, and community support contacts. It is envisioned that agriculture teachers and chapters of the Future Farmers of America will be heavily involved in groundwater sampling, testing, training, and protection. The Facilitating Coordination in Agricultural Education Program secured funding for this initiative.

**Section 6. Maintain an easily readable and useful newsletter and closely related electronic bulletin board for communication with newsletter editors, communicators, water professionals, committee persons, educators, and agency representatives with groundwater protection interests. Secure interesting articles from these clients for publication;**

The Groundwater Gazette has been reduced from a monthly newsletter to quarterly due to reduced budget for groundwater education within DNR. The Gazette is mailed to about 800 persons and is available on the Internet. Articles in this two year period have focused on agency and association initiatives for groundwater protection.

**Section 7. Secure educational funding to expand the Illinois Middle School Groundwater Education Project to new state selected regional groundwater planning areas.**

Although three different grant proposals were developed and submitted, the pilot in the Kane County area was developed with existing funding through the Kane County Regional Office of Education. Teachers and students in this pilot are supporting the identification of potential sources and routes of contamination in delineated CWS well recharge areas. County and municipal agencies are identified and will be key supporters of the cooperating teachers.

## CHAPTER IV. GROUNDWATER EVALUATION PROGRAM

### Section 1. Cooperate on sponsoring Groundwater Protection Needs Assessment workshops

The Illinois EPA and the IRWA are primarily responsible for completing this effort. The Illinois EPA has participated in a total of three IRWA training workshops throughout the reporting period. One of the main topics discussed at these workshops focused on promoting the "Guidance Document

for Groundwater Protection Needs Assessments." Participants of the rural water workshops were provided with copies of the Guidance Document. This document provides a framework and technical foundation for guiding communities, counties, and private consultants through a process of determining the need for groundwater protection beyond the baseline provided by the statewide application of minimum and maximum setback zones. In addition, hundreds of these documents have been requested and distributed to the following people and associations:

Owners and operators of municipal groundwater supplies with a population of 5,000 persons or greater;
Regional Groundwater Protection Planning Committee members;
American Planning Association members throughout the country;
County and regional Planning Associations; and
Consultants, engineers, local planning and zoning officials and members of the general public as requested.

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

The departments and agencies primarily responsible for this activity are under DNR and include ISWS and ISGS. Good coordination has occurred in this area. The past two years have witnessed a dramatic increase in the use of Geographic Information System (GIS) technology at Illinois EPA. Much of this increase is directly attributable to the acquisition of multiple digital GIS data sets from the ISGS and ISWS. These digital GIS data sets include geological information, CWS well locations, and basic geographic reference data such as roads, railroads, and hydrography. This information has been used by Illinois EPA for hydrogeologic investigations, planning efforts, and the production of recharge area delineation maps.

In addition to acquiring GIS data, the Illinois EPA has also provided GIS data to other federal, state, and local groups. A number of GIS data sets pertaining to the Ambient Groundwater Monitoring Network were provided to the ISGS. Additionally, 22 recharge area delineation coverages were provided to U.S. EPA Region V for use in a federal water quality study being prepared by the United States Geological Survey (U.S.G.S.). Lastly, a copy of the recharge area coverage for Edwardsville was provided to the Southwestern Illinois Planning Commission for inclusion into their county zoning database.

Several initiatives have been undertaken by the ISGS to update and expand the GIS database supportive of groundwater investigations. Particular emphasis has been on improving existing regional coverages of aquifers and identifying pertinent data points (key stratigraphic control borings) that help delineate aquifers. More work, however, must be done to delineate aquifers at larger scales, particularly non-major aquifers (<100,000 g.p.d.) deeper than 50 feet.

A statewide reassessment of the aerial extent of shallow aquifers and non-aquifer materials within 50 feet of the surface and also major glacial drift and bedrock aquifers within 300 feet of the surface was conducted as part of an effort to locate a low-level radioactive waste disposal facility in Illinois. A new automated version of the Stack-unit Map of Illinois to a Depth of 50 Feet is a product of this effort. Entry of water well data into the GIS database is well underway. Data for Piatt, DeWitt, and parts

of Tazewell County were entered under projects funded by local governments. A Water Inventory and Aquifer Assessment project resulted in the entry of data for DeKalb County. Data from 44 counties were entered for the low-level radioactive waste facility siting project. Thus, during this biennium, water well data for half of the state's counties entered the automated data base.

Two efforts, one in McHenry County and the other in the Champaign 30x60-minute Quadrangle (extends from Champaign-Urbana in the southeast to Bloomington-Normal in the northwest) have mapped/re-mapped aquifers, identified key stratigraphic borings, and have placed (or will place) all information in an electronic format. The McHenry County study was funded through the Hazardous Waste Research Fund, Water Inventory and Aquifer Assessment Funds and the McHenry County Board of Health. The investigation has identified upwards of four glacial drift aquifers. Structure contour maps (elevation of surfaces) and isopachous maps (thicknesses) of each aquifer were produced. Stack-unit maps to a depth of 100 feet were constructed for the entire county at a scale of 1:100,000 and for each of the 15 topographic quadrangles in the county (1:24,000-scale). An aquifer contamination potential map will be derived from the above data. In addition, hundreds of water wells, engineering borings, and test boring locations were automated.

An ISGS contract report to McHenry County was released that identifies and describes in detail those borings (key stratigraphic control borings) with geologic information and laboratory data that contribute most to an understanding of the geology of the county.

The Champaign Quadrangle study, done in cooperation with the U.S.G.S., is similar in scope to the McHenry County project. However, it covers a considerably larger area and is less detailed. The main emphasis has been to construct structure contour and isopachous maps of aquifers and other 'bundles' of geologic materials as well as to identify key stratigraphic borings, at least one per township, in the region. The key feature being mapped is the Mahomet Aquifer. All data have been automated and electronically produced maps of individual surfaces and data locations have been preliminarily produced.

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

The departments and agencies responsible for these activities include ISGS, ISWS, Illinois EPA, and DNR's Division of Water Resources. Appendix 2 contains a bibliography of publications for the following groundwater assessments that were completed by the ISGS and ISWS during the past two years:

**Evaluation of the Potential for Contamination of Wetlands from Surrounding Land Uses at Dedicated Illinois Nature Preserves** - A study has been finished that assesses potential vulnerability of groundwater discharged from recharge areas surrounding 85 wetland sites located in dedicated Illinois Nature Preserves. Site geology and land uses on and off the sites were ascertained, and vulnerability assessments (low to high) were made. Packets containing well-log information, a summary geologic profile, and other data for each site was developed. In addition, detailed characterization and monitoring of the Spring Grove Fen in McHenry County was completed. Information supplied from this investigation could be applied toward an evaluation of sites for purposes of designating groundwater which supplies certain nature preserves as "Class III-Special Resource Groundwater".

**Geological Quadrangle Mapping for Illinois** - A Mapping Implementation Team was established at the ISGS for developing a strategy to integrate expertise and data sets from all disciplines of Survey staff into a mapping program that will geologically map each 7.5-minute quadrangle of Illinois. Two 1:24,000 quadrangles have been selected for development of a 'geologic map atlas' - the Villa Grove Quadrangle in Douglas County and the Vincennes Quadrangle in Lawrence County. The program will provide detailed relevant and user-friendly geologic information to a wide spectrum of local users to assist in earth-resource planning, including groundwater protection.

**Geology and Environmental Mapping for McHenry County, Illinois** - In response for needed earth-resource information by local planners and other county-agency personnel, developers, and educators, ISGS geologists have finished a 3-year effort to geologically map the county, delineate multiple aquifers, and help decision-makers with informed and prudent decisions regarding wise land-use and protection of valuable groundwater resources. A lengthy report has been prepared along with stack-unit maps to a depth of 100 feet for the 15, 7.5-minute quadrangles covering the county. Each quadrangle contains three cross sections and a detailed key.

**Ground-Water Protection Mapping and Assessment, McHenry County, Illinois** - The purpose of this project, conducted in coordination with the ISGS, is to map McHenry County's hydrologic and geologic framework to help county and municipal officials make informed decisions regarding resource development in this rapidly growing suburban Chicago county. Water Survey researchers have completed draft versions of potentiometric surface maps of the five principal shallow aquifers in McHenry County and have delineated 11 time-related capture zones around shallow public water supply wells in the county. Altogether, data have been compiled for 86 active public water supply wells and from 38 pumping tests of shallow aquifers in the county.

**Statewide Study of Groundwater and Surface Water Interactions** - The ISGS and ISWS have provided a methodology to the Illinois EPA and U.S. EPA for evaluating interactions between groundwater and surface water and the sensitivity of surface-water resources to degradation from contaminated groundwater. Low-flow information for over 200 watersheds and stream segments was compared against the absence/presence of aquifers and their depth, topography, and soils.

Results indicate that high recharge through soils is the main factor resulting in high base flows in low-flow watersheds. However, ease of groundwater movement is enhanced when shallow aquifers (<50' from the surface) are present and potential groundwater flow paths are short. This methodology could be used to help allocate financial resources for specific perspectives or interests such as Resource Conservation and Recovery Act (RCRA) site characterizations and Brownfields site evaluations.

**Champaign 30x60-degree Quadrangle Mapping** - After four years of work in cooperation with the U.S.G.S., the Champaign Quadrangle three-dimensional mapping products have been finalized, including re-interpreted maps of the Mahomet aquifer and overlying Glasford aquifer.

**Groundwater Geology of the Green River Lowland** - The Green River Lowland includes parts of Whiteside, Lee, Rock Island, Bureau, and Henry Counties. Although significant groundwater resources are found in the buried bedrock valleys of this area, they had never been well delineated. All available well data was entered into the Illinois State Geological Survey's database. New data obtained during the project included limited seismic data gathered in the southeast part of the lowland area and geophysical logs of the wells the Illinois State Water Survey had installed for a companion project. Even though the study showed that the bottom of the valley is as much as 100 feet shallower than previously thought, the potential for groundwater development remains very high.

**Regional Ground-Water Flow Systems in Lee, Whiteside, and Bureau Counties** - This multi-year study constructed observation wells for the purpose of developing regional potentiometric maps to describe dominant flow directions in the major sand and gravel aquifers of the Green River Lowlands, as well as for use in routine water-level monitoring. Water levels are being measured in 37 observation wells approximately 10 times per year, in order to monitor the effect of large-scale irrigation in the region.

**Aquifer Characteristics and Groundwater Availability in Western McLean and Eastern Tazewell Counties** - The primary goals of this joint project between the ISWS and ISGS are to determine if the area could support a 5-20 million gallons per day well field, where such a proposed well field could be located, and what the impacts would be to the potentiometric surface and existing wells. Aquifer characterization included collecting and analyzing additional data, entering all available data into the Surveys' databases, conducting seismic refraction surveys along 45 miles of road in the study area, drilling more than 29 test holes to bedrock and geophysically logging them, installing observation wells where possible, and performing two aquifer tests. Potential well fields are currently being tested through use of a computer model.

**Groundwater and Surface Water Interactions at the Sand Lake Wetland Complex Area, Mason County, Illinois.** - The ISWS and Office of Water Resources (OWR) initiated a two year study in 1995 to develop a full characterization of the hydrogeologic conditions at the Sand Lake wetland complex located near Havana, Illinois. This study included the installation of 14 monitoring wells and three staff gages. Geologic cross sections were prepared from the information obtained from seven drill sites. A numerical groundwater flow model was developed to characterize the groundwater hydrology of this wetland complex including areas of recharge, discharge and a mass balance analysis.

**American Bottoms Groundwater Model** - In 1996, the OWR completed the development of a numerical groundwater flow model for the area of Madison and St. Clair counties commonly known as the American Bottoms. The U.S.G.S. MODFLOW groundwater flow model was developed for this area based on data and a model developed for the Corps of Engineers by the ISWS in 1984. This new model has been calibrated to simulate the groundwater hydrology of this region for a period of 90 years (1905-1994). This model is now being used to evaluate the physical and economic effectiveness of a groundwater level management program designed to

reduce damages caused by periodically high groundwater levels in the Granite City area. This model has also been used by private consultants in evaluating potential locations for a regional groundwater supply in the American Bottoms area.

**The Mahomet Bedrock Valley Aquifer System: Knowledge Needs for a Vital Resource** - This comprehensive background document and study proposal for the Mahomet aquifer system was prepared by a task force of groundwater experts at the University of Illinois, State Geological Survey, State Water Survey, and Office of Water Resources in the Department of Natural Resources. The report describes the geology and hydrology of the aquifer system and overviews recent and ongoing study efforts. Brief sections on groundwater quality and groundwater modeling are presented. The comprehensive study plan details the need for nine distinct research components. Because of the large area covered by the aquifer system, the study plan recommends the research area be divided into four manageable components. The nine study components will be completed for each segment and follow a similar but staggered 7-year time frame.

**Dewatering Well Assessment for the Highway Drainage System at Five Sites in East St. Louis Area** - The IDOT owns 55 dewatering wells that are used to maintain ground-water elevations below the pavement of several interstate and state highways in the East St. Louis vicinity. Since 1983, IDOT has retained the State Water Survey to assess the condition of selected wells, improve monitoring activities, identify processes causing well deterioration, improve well design specifications, monitor the effectiveness of treatment methods used to restore well capacity, and develop an efficient well operational management scheme. IDOT uses the results from this work to make decisions concerning both short-term and long-range operation of the dewatering system.

**Groundwater Geology of the Buried Mahomet Valley Aquifer System in DeWitt and Piatt Counties** - This 30-month project began in January 1996 to delineate aquifers within the glacial drift of DeWitt and Piatt counties. It has a strong emphasis on geophysical field work outside of the Mahomet Bedrock Valley, where groundwater resources are less plentiful. A seismic refraction survey was completed in the Farmer City–Mansfield area to map the bedrock surface in greater detail. An electrical earth resistivity (EER) was begun in June to identify the distribution of sand and gravel deposits within the glacial drift. The ISGS records available for the Farmer City–Mansfield area are being reviewed. EER surveys are scheduled to be done across southern Piatt County in 1997.

**Mahomet Valley East: Exploration Drilling and Regional Flow Characterization** - This field study concentrated on the deepest parts of the buried Mahomet bedrock valley in Champaign County. Twenty observation wells, drilled to depths of 240 to 420 feet, were constructed approximately six miles apart along the axis of the valley. The observation wells will provide baseline data describing the regional ground-water flow system across east-central Illinois.

**Characterization of Field–Scale Transport of Solutes Using Agricultural Drainage Tiles** - A two-year study designed to improve our understanding of preferential flow paths for the movement of chemicals through the unsaturated zone and shallow saturated zone was completed in 1996. Data was collected on the tile-effluent discharge rate, temperature, and water quality. A rain gauge, air temperature/relative humidity probe, and two soil temperature probes were also installed. Calculations from the data suggested that over a 9 day period, approximately 20 percent

of the tile effluent was fresh rain water that was moving preferentially. Chemical tracers were transported with preferentially flowing rain water at rates that were 100 to 1,000 times faster than expected from non-preferential transport. The results were reported in the proceedings of the Illinois Groundwater Consortium.

**Technical Support to the Randolph County Water Commission in the Location of a Regional Groundwater Supply** - Supported by the Randolph County Water Commission, exploratory geophysical tests were conducted in the Evansville area to determine whether the Kaskaskia River Valley contains sand and gravel deposits large enough to produce two to three million gallons of water per day (mgd). The testing program consisted of 19 seismic refraction lines and 77 electrical earth resistivity soundings.

**Transport of Agrichemicals in Alluvial Aquifers and Nitrate Attenuation by an Associated Riparian Woodland: Effects of Flood Conditions** - The purpose of this project is to study the transport of nitrate and atrazine from a stream into an alluvial aquifer. Another purpose is to study the effect of flooding on this transport. Two field sites have been instrumented at municipal well fields of Mt. Pulaski (Logan County) and Henry (Marshall County). At both Mt. Pulaski and Henry, the atrazine concentration in the stream has exceeded the drinking water standard (3 µg/L) during spring floods. The atrazine concentration in groundwater is consistently lower than the concentration in the surface water and has not exceeded 1 µg/L. Also, as groundwater flows beneath the riparian forest at Mt. Pulaski, the groundwater chemistry is altered including a reduction in nitrate-nitrogen.

**Ground-Water Investigation in the Kaskaskia River Valley, Fayette County, Illinois** - This investigation estimated that about 576,000 gallons per day of ground water could be developed from the shallow sand and gravel aquifer system associated with the bottomlands of the present Kaskaskia River valley from two wells.

**Ground-Water Investigation in the Cache River Valley, Alexander County, Illinois** - This investigation estimated that about 4.6 million gallons per day of ground water could be developed as a supply source for a new rural public water system. Based on the results of an aquifer test in April-May 1996 at a site in the river lowland area it was estimated that the desired supply could be developed from two wells spaced 500 feet apart, each pumping about 1,600 gpm.

**Delineating 5-Year Time-of-Travel Recharge Area for Shelbyville's Municipal Well Fields** - Shelbyville operates two well fields southwest of the city in an unconfined aquifer system. As part of its ground-water management plan, the city enlisted the services of the State Water Survey to delineate the five-year recharge area for its wells, using a ground-water flow model and graphical interface. A network of 65 privately owned domestic and municipal monitoring wells was established and a mass measurement of water levels was conducted at the wells. The data were utilized in the development and calibration of the ground-water flow model.

**Potential Ground-Water Resources for the City of Springfield** - In order to meet the city's water demands during drought conditions and provide additional water for its growing population, the city of Springfield is currently analyzing the feasibility of developing additional water supplies to supplement Lake Springfield. Among the alternatives that are being investigated by the State Water Survey are the development of supplemental ground-water supplies from the Sangamon River bottomlands near the city, the Illinois River bottomlands in portions of Morgan and Scott counties, and the Havana Lowlands area of Mason County.

**Evaluation of Ground-Water Resource near Test Holes 5-93 and 9-93 and Sustained Yield of Sankoty Well Field, Peoria, Illinois** - The study, which was conducted for the Illinois-American Water Company, determined that as much as two million gallons per day (mgd) could be developed from two highly efficient production wells in the vicinity of TH 5-93, but that conditions near TH 9-93 did not offer potential for development of a high-capacity well field. It was also concluded that the Sankoty Well Field could be operated at plant capacity (8 mgd) for brief periods but not to exceed about 6 mgd on an annual average basis.

**Reconnaissance Study of Ground-Water Levels and Withdrawals in DeWitt and Piatt Counties and Long-Term Ground-Water Level Monitoring Network and Aquifer Hydraulic Property Database for DeWitt, Piatt, and Northern Macon Counties** - The first phase of the program to define the ground-water resources of the buried Mahomet bedrock valley system in the vicinity of DeWitt and Piatt counties was completed. The effort resulted in potentiometric surface maps and a summary of ground-water withdrawal data from which to assess the effects of increased ground-water withdrawals in the future. Currently efforts are directed to developing a plan for a limited network of dedicated observation wells to monitor long-term temporal changes of ground-water levels.

**Implementation of a Statewide Monitoring Well Network to Evaluate Pesticide Contamination of Groundwater in Illinois** - The ISGS and ISWS are installing a statewide monitoring well network to monitor shallow groundwater for certain agricultural chemicals. The purpose of this network is to provide data for testing the utility of the map of the aquifer sensitivity to contamination by pesticide leaching in Illinois as a predictive tool as described in the Illinois Generic State Management Plan for Pesticides in Groundwater. This multi-year project is funded by the Illinois Department of Agriculture, which will sample the wells and analyze the water samples. The ISGS and ISWS will statistically analyze the data. Nearly 100 of the 225 planned monitoring wells have been installed.

**Potential for Agricultural Chemical Contamination of Aquifers in Illinois: 1995 Revision** - To provide a technical basis for the Illinois Generic State Management Plan for Pesticides in Groundwater, the IDOA commissioned the ISGS to update their 1991 maps of the *Potential for Agricultural Chemical Contamination of Aquifers in Illinois*. The impetus for the updates was the release by the Soil Conservation Service of a computerized soil association map and database for Illinois. The detail and accuracy of the soils map was well suited to the statewide evaluation of soil factors relevant to the control of agricultural chemical leaching to groundwater. For the first time, it was possible to include both the characteristics of soils and the underlying geology in vulnerability maps, allowing better maps to be utilized for the new regulations.

**Geophysical Study of the Ticona Valley near Streator, Illinois** - Streator receives its water supply from a surface water source which routinely has had high nitrate levels. Working with the Northern Illinois Water Corporation, the ISGS conducted a geophysical study of the ancient Ticona river valley, which is about six miles north of Streator, to find a supplemental groundwater supply for blending with surface water to lower nitrate levels during the spring. Sand and gravel which were deposited in the ancient river bed now were sought for their potential to supply this water. Ten line-miles of seismic refraction profiles were used to update bedrock topography maps of the area with details on the geometry of the buried valley system. Additionally, 119 resistivity profiles were recorded in the area during the spring of 1998 in an effort to obtain detailed information on the variability of the glacial materials above the bedrock. The results of the study showed a fair to good probability of obtaining the needed water supply, but did not address sustained yield, impact on present users, and system costs. When including these factors, Northern Illinois Water Corporation decided that developing this source is not currently feasible for their needs.

**Effects of Hog Waste Lagoons on Groundwater Geology -** A project was begun in April 1996 to assess the effects of hog waste lagoons on groundwater quality. Conductivity surveys were conducted at six potential sites to help determine which sites will be monitored and where wells should be installed at those sites. Two small facilities in different geologic settings and one large facility are being monitored. The project will be completed in 1997.

**Preferential Flow in Effluent from Field Drainage Tiles -** Work was being completed on a project, funded by the Illinois Groundwater Consortium, to monitor preferential flow in tile effluent. Equations were developed to relate specific conductance of the tile effluent to the fraction of the effluent that is actually rain water. Analyses suggest that approximately 20 percent of the water discharged from the tile over a seven-day period was actually rain water that had fallen within that period. The equations could be very useful to people conducting tile monitoring studies as they provide a simple means of describing a part of the flow and transport characteristics of tile-drained soils. The final report will be published during State Fiscal Year 1998.

**Hydrogeologic Terranes of Illinois** -Survey scientists completed a statewide map of hydrogeologic terranes of Illinois. This map is a combination of several maps, including: slope, depth to aquifers within 50 feet, soil water movement characteristics, and alluvial deposits (used as a surrogate for upland/lowland delineation). Survey scientists plan on trying to use these physical variables with various surface water flow characteristics to better define hydrogeologic terranes throughout Illinois.

**A Critical and Statistical Evaluation of Characterization Methods for Sites Contaminated through Multiple, Discrete Spills** - With funding from the Hazardous Waste Research and Information Center, this two-year project was begun in 1996 to statistically analyze data collected in the early '90s by the Survey and IDOA at two agrichemical facilities. The project's goal is to demonstrate the level of uncertainty obtained at this type of site during standard site assessments and of various statistical sampling techniques. It will include a geostatistical description of the

contaminant distribution and show the impact that improper conceptual models of contaminant distribution, developed from inadequate sample schemes, have on site characterization efforts and on eventual remediation efforts.

**Karst Map of Illinois** - A map of the karst regions of the state, entitled "Karst Terrains and Carbonate Bedrock of Illinois" was completed and printed in 1997. It yields information for regulators and developers as to the locations and character of Illinois' karst regions. In conjunction with this, an ISGS Environmental Geology Series report entitled "Groundwater Contamination in Karst Terrain of Southwestern Illinois." The report describes an investigation into the degree and geographic extent of groundwater contamination in the sinkhole plain of southwestern Illinois. It discusses the types of contamination that are prevalent, and presents means by which the residents might remedy the problem.

**Educational Karst Poster** - An educational poster entitled "Karstlands of Illinois" is being developed. The poster highlights the nature and causes of karst terrain using numerous original figures and photographs and text. The poster will be in press following final administrative review.

**Sinkhole Density and Groundwater Contamination** - ISGS scientists are mapping the density of sinkholes in the state. These maps go a step beyond the karst maps, and pinpoint areas of intense karstification in karst regions. These maps should be useful to developers and regulators. ISGS scientists are using the sinkhole density maps in southwestern Illinois to examine the relationship between groundwater contamination and the degree of karstification. The sinkhole plain is the site of chronic bacterial contamination of wells and springs. The apparent culprit in the bacterial contamination of the karst aquifers is the means by which septic effluent is treated and disposed of in the region. Well construction techniques are also a major factor leading to groundwater contamination in this area.

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

**Monitor the long-term effects of the 1993 flood on groundwater quality -** From May of 1994 to September 1995, IDPH conducted a study to evaluate private water wells and sewage systems which were affected by the Flood of 1993 through a federal Centers for Disease Control (CDC) and Prevention grant. A total of 743 private wells were identified as flooded and were inspected during this study. Of this number, 299 wells were found to be abandoned and were not evaluated, and 53 well owners refused to participate in the survey or to have their wells sampled. The remaining 391 wells were evaluated and sampled for coliform bacteria and nitrate. Of this number, 141 (36.1 percent) tested positive for coliform bacteria and 45 (11.5 percent) tested positive for Escherichia coli (E. coli.).

Based on the type of construction, bored and dug wells had the highest rate of contamination, 100 percent and 84 percent respectively, followed by drilled wells (40 percent), buried slab wells (33 percent) and driven wells (19 percent). Nitrate concentration exceeded 10 mg/l in 7.9 percent of these same wells. Bored wells with buried slab construction, bored wells and dug wells had the highest rate of nitrate concentration exceeding 10 mg/l, at 33 percent, 14 percent and 13 percent respectively, followed by driven wells (8 percent) and drilled wells (4 percent). Of the 391 health questionnaires completed, only 13 households indicated some increase in health problems. Of these, nine have wells that were positive for coliform bacteria and five of the nine were also positive for E. coli.

Based on the type of risk, 151 of above 391 wells were sampled for pesticides and other contaminants including volatile organic compounds (VOCs), lead and copper. According to laboratory results, the concentration of pesticides and other contaminants did not exceed their respective MCLs. The home owners were informed of the sample results and were given recommendations for any repairs that should be made or disinfection procedures that should be implemented. Information on the location of the abandoned wells was given to each local health department to perform follow-up investigations to assure that they were properly sealed to prevent safety hazards and groundwater contamination. A report for this study was completed in 1996.

Also during 1994 as part of a U.S. EPA study, 74 non-community water systems affected by the flood of 1993 were surveyed. Sanitary surveys were performed and water samples collected twice from 67 of these water systems which were tested for coliform bacteria, nitrate, VOCs and the pesticides, atrazine and alachlor. For the two water tests performed, 31 percent of the water wells tested positive for coliform bacteria. The 31 percent rate of contamination is due but not limited to well construction deficiencies, flooding, well depth, nearby sources of contamination and improper or inadequate disinfection. The two wells constructed by the buried slab method tested positive for both total coliform and fecal coliform bacteria. The contamination rate for driven wells was 22 percent, and drilled wells, 34 percent. Nitrate concentrations exceeded 10 mg/l as N in water from 6 percent of the wells.

The triazine screening method was utilized to test water samples for atrazine and alachlor. Laboratory tests for VOCs were performed on water samples from 10 water wells considered vulnerable to contamination by VOCs. All laboratory tests results for pesticides and VOCs were less than the MCL. As a follow-up, contaminated supplies were required to be disinfected and posted until additional laboratory test results were negative and users were advised to use bottled water or water from a public water supply source.

The CDC awarded an additional grant to IDPH in 1994 to survey and sample a minimum of eight wells in each county to obtain background information on the incidence of contamination in private wells in the state which were not affected by the flood. A total of 818 private wells were surveyed and sampled. In this study, IDPH analyzed water samples from these wells for coliform bacteria and nitrate concentration. Coliform bacteria were found to be present in 44 percent of wells tested; E. Coli (15 percent), and 15 percent had nitrate levels above 10 mg/l as N. The well construction types showing the greatest degree of coliform contamination were dug and buried wells with 86 percent and 66 percent, respectively. Together, drilled and driven wells had a 24 percent contamination rate. This generally corresponded with the results obtained from the survey of flooded wells.

As part of the 818 CDC well study, IDOA tested water samples for atrazine and alachlor utilizing immunoassay methods. Atrazine was detected in 4.1 percent of the water samples. None of the laboratory test results exceeded the atrazine MCL which is 3 ppb. Owners/users whose wells tested positive for atrazine were given the opportunity to have their wells resampled by IDOA and analyzed for the presence of atrazine and three atrazine metabolites as part of a CIBA Corporation sponsored atrazine water well study. Ninety-two wells were sampled in this secondary study which will assist the U.S. EPA in the evaluation of re-registration issues relative to atrazine. The report for this study is in final preparation by CDC.

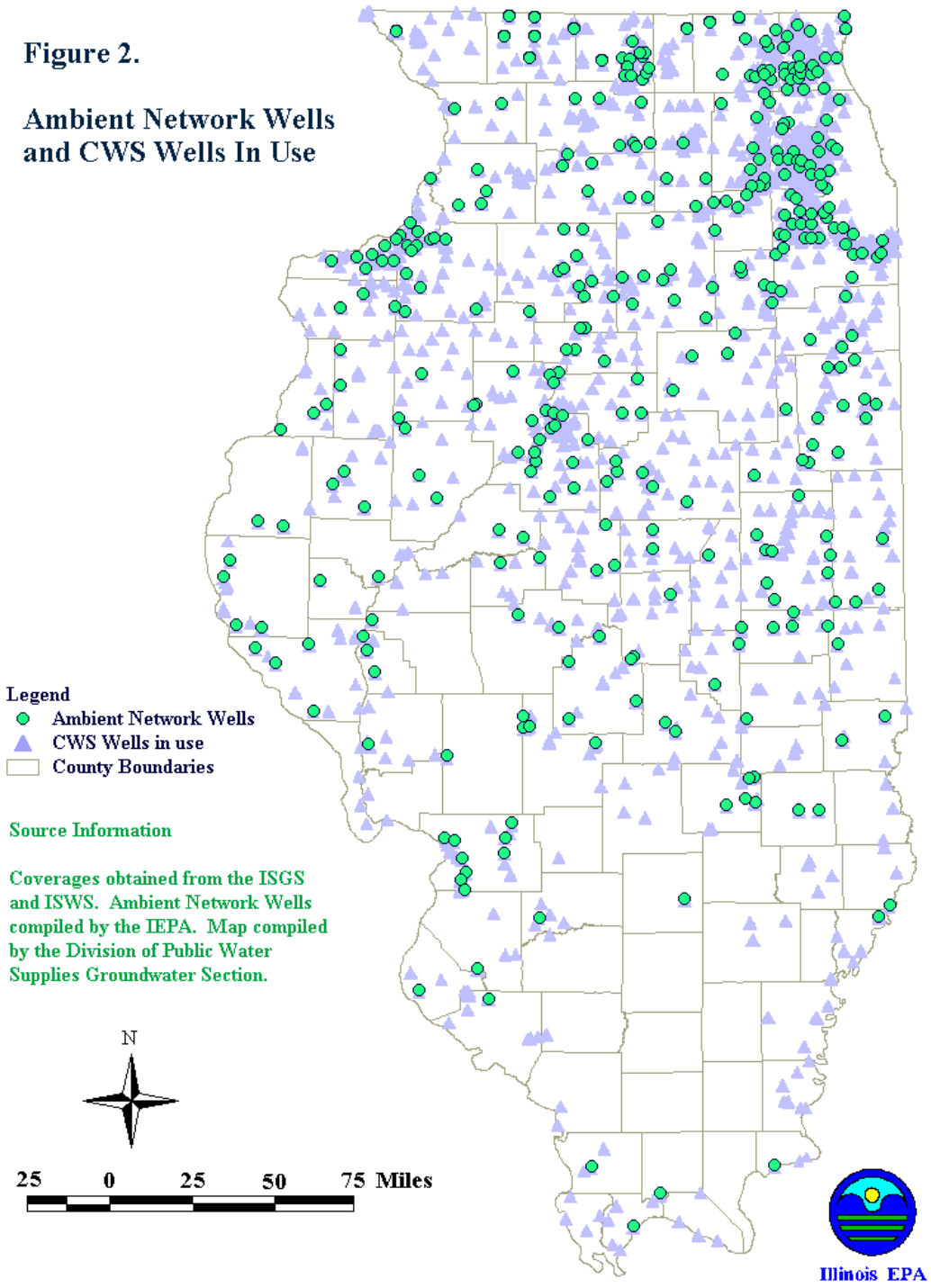
During June and July of 1995, in conjunction with local health departments, a follow-up survey of selected water wells from the first 818 well survey was performed in accordance with protocol developed by CDC. A total of 365 wells were surveyed and sampled, and each of these wells was resampled within two weeks after the initial sampling. Water samples were analyzed by IDPH for coliform bacteria and nitrate concentration. The laboratory results were sent to CDC for their analysis. Health questionnaires for households served by these wells were completed by local health departments conducting the data collection activities. The report for this study is also in final preparation by CDC.
In conclusion, no correlation could be found between persons drinking water from contaminated wells and illness, and there were no adverse health affects related to drinking water. A survey of the flooded wells indicated that physical damage to the wells was minimal. The flood did not appear to have an impact on the quality of water from wells that were flooded. In fact, the amount of contamination was similar to that found in those surveyed wells that were not flooded. This may reflect the fact that most homeowners had thoroughly flushed and disinfected their wells in accordance with Department-issued news releases and the advice of state and local health departments, prior to consuming the water. The study indicates that the groundwater quality in the area of the flood was not adversely affected by the flood waters.

**CWS Ambient Groundwater Monitoring Network (CWS Ambient Network)** - The Illinois EPA continues to maintain the CWS Ambient Network.[1] This statistically designed network of monitoring stations has been linked with detailed assessment information and represents the entire population of CWS wells and principal aquifers in Illinois. (see Figure 2)

[1]The design of this network is described in detail in the 1996 IGPA Biennial Report

## Figure 2.

## Ambient Network Wells and CWS Wells In Use



The quantitative assessment of groundwater protection has been divided into three separate but interrelated issues: critical potable resource groundwater protection; groundwater quality in unconfined and confined aquifers; and potential contamination sources.

**Critical Potable Resource Groundwater Protection** - Data from the CWS Ambient Network was utilized to quantitatively estimate the amount of groundwater protection that has occurred in Illinois over the past eight years relative to the overall resource. This network was designed to represent the 1,195 CWSs that utilize groundwater in the state. The potable water supply wells used by these groundwater CWSs pump from geologic materials below the land surface, and these geologic materials are referred to as aquifers. In some areas of the state, aquifers are overlain by soils and other geologic materials that provide natural protection to the groundwater. These aquifers are referred to as confined aquifers. This natural protection can be circumvented by improperly abandoned wells, injection wells and poor well integrity. In other areas, such as the city of Rockford or Mason County, there is no natural protection overlying the aquifers. These are referred to as unconfined or water table aquifers. Therefore, under these conditions the groundwater is very vulnerable to contamination that is released on or below the land surface.

Many of the 3,397 CWS wells in the state utilize aquifers that are unconfined, and it has been determined that there are approximately 912 such wells representing 403 CWSs. Over the past 10 years the Illinois EPA has estimated the recharge area for more than 222 of the CWS wells utilizing unconfined aquifers, and has determined that the land surface expression for an average five-year recharge period is approximately 111 acres per well. This area ranged from a minimum of 0.35 to 717 acres in size. Thus, if this is extrapolated to the 912 community water wells or 403 systems using unconfined aquifers, there are 101,232 recharge area acres associated with these systems.

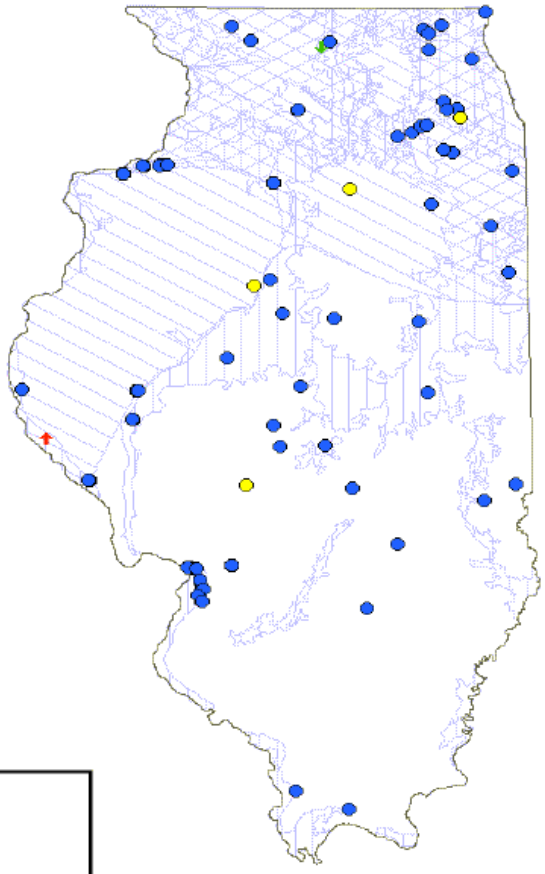
**Groundwater Quality Conditions in Unconfined CWS Ambient Network Wells** - Figures 3 thru 5 illustrate a comparison of groundwater quality over time. This data was collected from unconfined CWS Ambient Network Wells during the 1993 - 1994 and 1994 - 1995 monitoring cycles. The ambient groundwater quality has been classified as Good, Threatened, and Poor. The percentage of wells that were rated as Good increased from 65 percent in 1993 to 1994 to 67 percent from samples collected during 1994 to 1995. In addition, the percentage of Threatened wells decreased from 28 percent to 24 percent during this same period. However, there was a 2 percent increase (6.8 to 8.8 percent) in wells rated as Poor. The number of wells to be sampled also decreased during the 1994 to 1995 period due to wells that were taken out of service. The percentages presented above represent the statistical conditions for all of the CWS wells utilizing unconfined aquifers across the state.

# Figure 3.

## Unconfined CWS Ambient Groundwater Monitoring Network VOC Results for 1993-1995

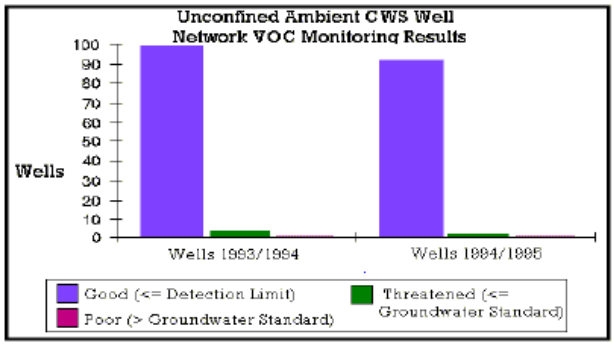
Source Information

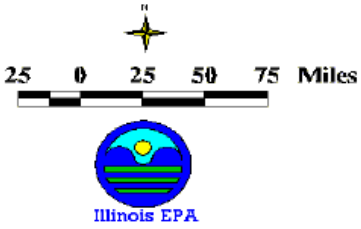
Modified from O'Hearn and Schock Principal Aquifers of Illinois Map 1984 and State Boundary obtained from the ISGS. Groundwater Monitoring Results for Unconfined Ambient CWS Network Wells compiled by the IEPA. Map compiled by the IEPA Division of Public Water Supplies Groundwater Section.



LEGEND

- No Detections
- VOC Upward Trend
- VOC No Trend
- VOC Downward Trend
- State Boundary
- Principal Sand & Gravel Deposits
- Principal Shallow Bedrock Deposits
- Principal Deep Bedrock Deposits




Illinois EPA

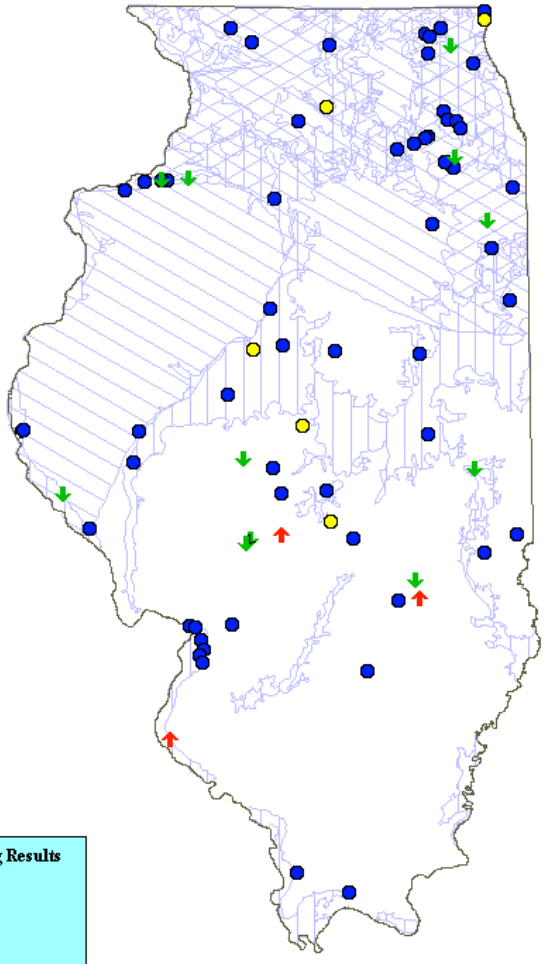
| Groundwater Monitoring Results | Wells 1993 / 1994 | Wells 1994 / 1995 |
|---|---|---|
| Good (<= Detection Limit) | 99 | 92 |
| Threatened (<= Groundwater Standard) | 4 | 2 |
| Poor (> Groundwater Standard) | 1 | 1 |

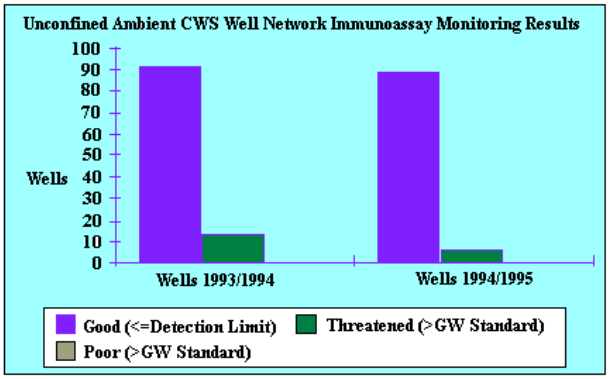
# Figure 4.

# Unconfined CWS Ambient Groundwater Monitoring Network Immunoassay Results for 1993-1995

### Source Information

Modified from O'Hearn and Schock Principal Aquifers of Illinois Map 1984 and State Boundary obtained from the ISGS. Groundwater Monitoring Results in Unconfined Ambient CWS Network Wells compiled by the IEPA. Map compiled by the IEPA Division of Public Water Supplies Groundwater Section.




| Groundwater Monitoring Results | Well 1993/1994 | Well 1994/1995 |
|---|---|---|
| Good ( <=Detection Limit) | 91 | 89 |
| Threatened ( <= GW Standard) | 13 | 6 |
| Pood ( >GW Standard) | 0 | 0 |

# Figure 5.

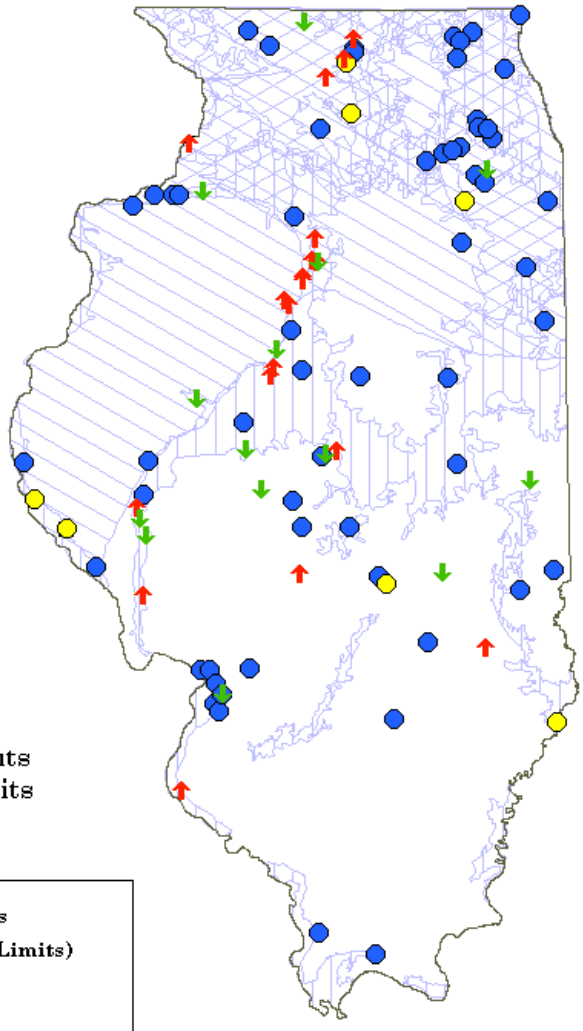
## Unconfined CWS Ambient Groundwater Monitoring Network Nitrate Results for 1993-1995

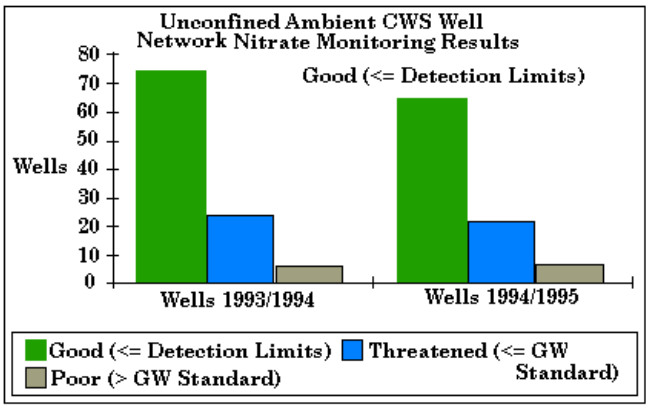
### Source Information

**Modified from O'Hearn and Schock Principle Aquifers of Illinois Map 1984 and State Boundary obtained from ISGS. Groudwater Monitoring Results in Unconfined Ambient CWS Network Wells compiled by the IEPA. Map compiled by the IEPA Division of Public Water Supplies Groundwater Section.**

### Legend

- No Detections
- Nitrate Upward Trend
- Nitrate No Trend
- Nitrate Downward Trend
- State Boundary
- Principal Sand and Gravel Deposits
- Principal Shallow Bedrock Deposits
- Principal Deep Bedrock Deposits






N

0 25 50 75 100 Miles

Illinois EPA

| Groundwater Monitoring Results | Wells 1993/1994 | Wells 1994/1995 |
|---|---|---|
| Good (<= Detection Limits) | 73 | 64 |
| Threatened (<= GW Standard) | 24 | 22 |
| Poor (> GW Standard) | 6 | 7 |

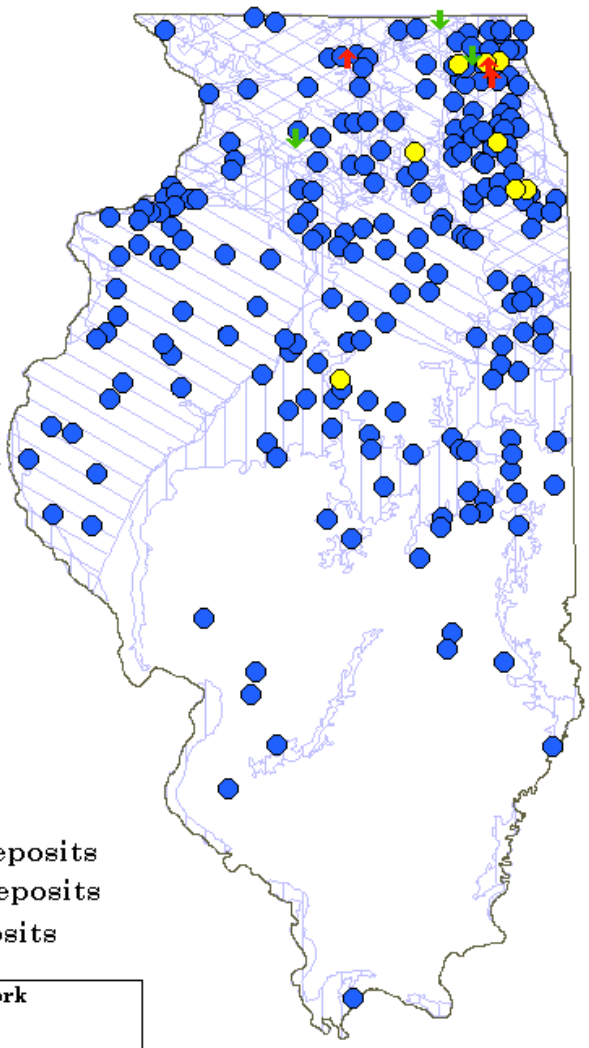
**Groundwater Quality Conditions in Confined CWS Ambient Network Wells -** Figures 6 thru 8 illustrate a comparison of groundwater quality conditions. This data was collected from confined CWS Ambient Network Wells during the 1993 - 1994 and 1994 - 1995 monitoring cycles. The groundwater quality has been classified as Good, Threatened, and Poor to represent the ambient conditions. The percentage of wells that were rated as Good increased from 95 percent in 96 percent from samples collected during the two sample periods. In addition, the percentage of Threatened wells decreased from 4.6 percent to 3.6 percent during this same period. There was no change in the 0.4 percent of the wells that rated as Poor. The percentages presented above represent the statistical conditions for all of the CWS wells utilizing confined aquifers across the state.

# Figure 6.

## Confined CWS Ambient Groundwater Monitoring Network VOC Results for 1993-1995

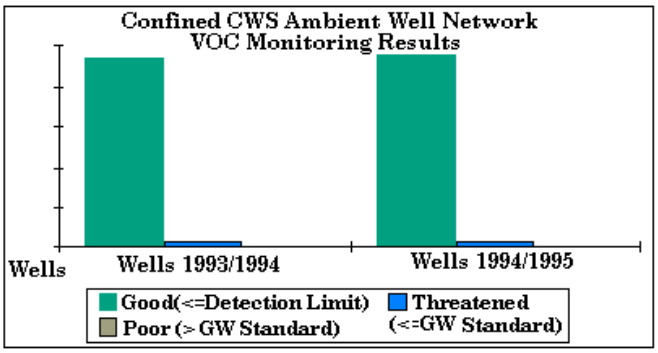
## Source Information

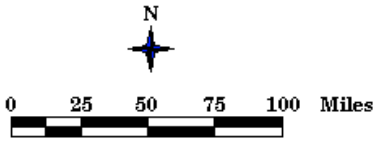
**Modified from O'Hearn and Schock Principal Aquifers of Illinois Map 1984 and State Boundary obtained from ISGS. Groundwater Monitoring Results in Unconfined Ambient CWS Network Wells compiled by the IEPA. Map compiled by the IEPA Division of Public Water Supplies Groundwater Section.**



## Legend

- No Detection
- VOC Upward Trend
- VOC No Trend
- VOC Downward Trend
- State Boundary
- Principal Sand and Gravel Deposits
- Principal Shallow Bedrock Deposits
- Principal Deep Bedrock Deposits




Illinois EPA

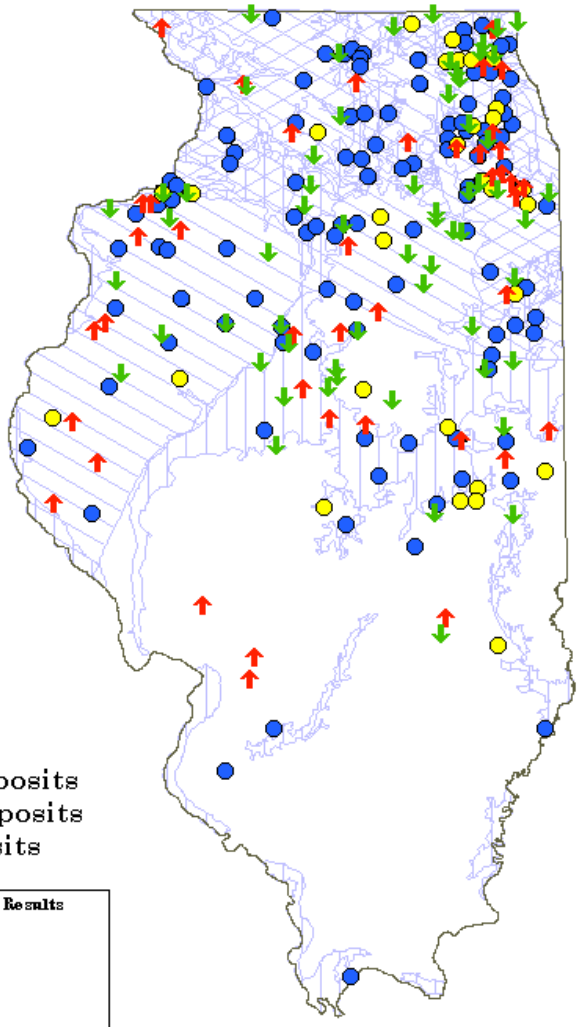
| Groundwater Monitoring Results | Wells 1993/1994 | Wells 1994/1995 |
|---|---|---|
| Good (<= Detection Limit) | 232 | 235 |
| Threatened (<= GW Standard) | 9 | 8 |
| Poor (> GW Standard) | 0 | 1 |

# Figure 7.

## Confined CWS Ambient Groundwater Monitoring Network Nitrate Results for 1993-1995

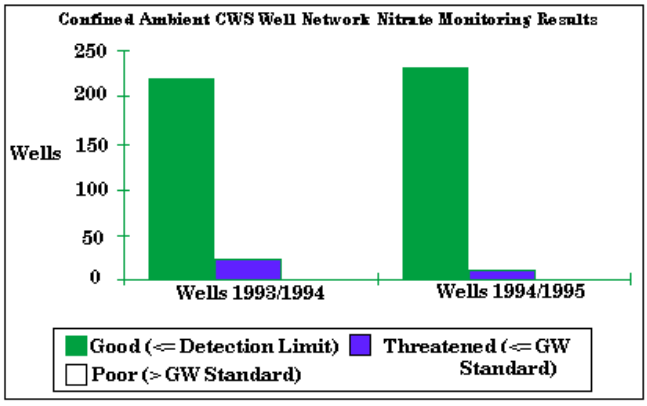
### Source Information

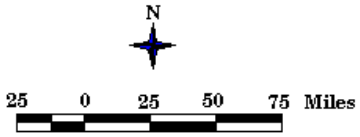
Modified from O'Hearn and Schock Principal Aquifers of Illinois Map 1984 and State Boundary obtained from ISGS. Groundwater Monitoring Results in Confined Ambient CWS Network Wells compiled by the IEPA. Map compiled by IEPA Division of Public Water Supplies Groundwater Section.



### Legend

- No Detections
- Nitrates Upward Trend
- Nitrates No Trend
- Nitrates Downward Trend
- State Boundary
- Principle Sand and Gravel Deposits
- Principle Shallow Bedrock Deposits
- Principle Deep Bedrock Deposits




Illinois EPA

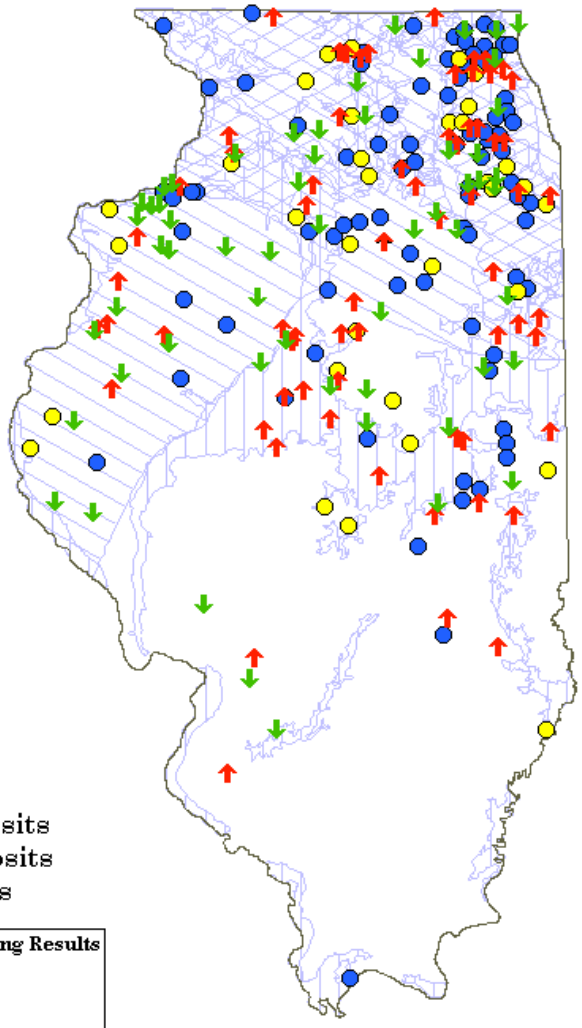
| | | |
|---|---|---|
| Good (<= Detection Limit) | 237 | 223 |
| Threatened (<= GW Standard) | 3 | 5 |
| Poor (> GW Standard) | 1 | 1 |

# Figure 8.

## Confined CWS Ambient Groundwater Monitoring Network Nitrate Results for 1993-1995

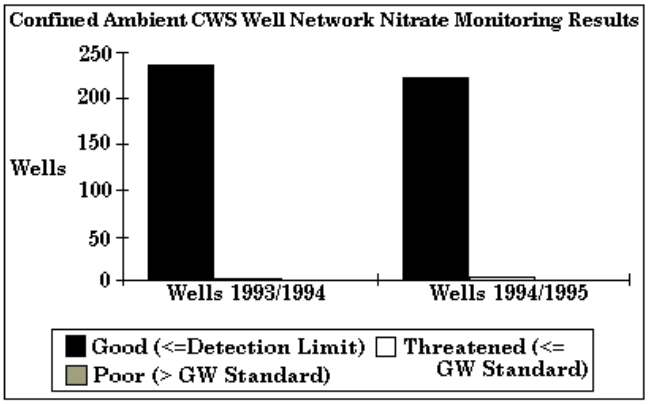
### Source Information

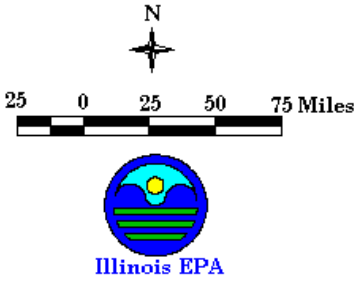
**Modified from O'Hearn and Schock Principal Aquifers of Illinois Map 1984 and State Boundary obtained from the ISGS. Groundwater Monitoring Results in Unconfined Ambient CWS Network Wells compiled by the IEPA. Map compiled by the IEPA Division of Public Water Supplies Groundwater Section.**



### Legend

- No Detections
- Nitrate Upward Trend
- Nitrate No Trend
- Nitrate Downward Trend
- State Boundary
- Principal Sand and Gravel Deposits
- Principal Shallow Bedrock Deposits
- Principal Deep Bedrock Deposits




Illinois EPA

| Groundwater Monitoring Results | Wells 1993/1994 | Wells 1994/1995 |
|---|---|---|
| Good (<=Detection Limit) | 237 | 223 |
| Threatened (<=GW Standard) | 3 | 5 |
| Poor (<=GW Standard) | 1 | 1 |

**Potential Contamination Sources** - Many common materials such as gasoline, oil, paint and industrial solvents are potential groundwater contaminants. Among those most often occurring in public groundwater supply systems in Illinois are chemical solvents commonly used by dry cleaners, automotive service stations, metal finishing and fabricating facilities, and other industrial activities. The health effects of VOCs/industrial solvents are addressed in terms of "acute toxicity" (effects from immediate, short-term exposure), and "chronic toxicity" (effects from long-term exposure). Acute health effects from VOCs/Industrial solvents include unconsciousness, circulatory collapse, and a central nervous system depressant. The major concern is potential chronic effects which may include increased cancer rates, birth defects, damage to the kidneys, heart, liver and lung.

- VOC contamination appears to be due to commercial and industrial sources.
- The majority of SOC and nitrate contamination appears to be due to agricultural nonpoint sources of contamination.

Other common materials, such as pesticides and fertilizers, are also potential groundwater contaminants. Most of these contaminants are compounds containing carbon, known as synthetic organic chemicals (SOCs). Other common groundwater contaminants may include pathogens (bacteria and viruses) and nitrates. The most serious groundwater contaminants which pose a significant health risk come from human activities and land uses. For example, agricultural point source (i.e., distribution centers) and non-point source (i.e., farm field applications) pose potential hazards to groundwater. The widespread occurrence and persistent toxicity of pesticides is of great concern for public health. Acute health effects from pesticides include burns, nausea, and/or vomiting. The major concern is potential chronic effects including increased cancer, birth defects, genetic mutations, damage to kidneys, and damage to the central nervous system.

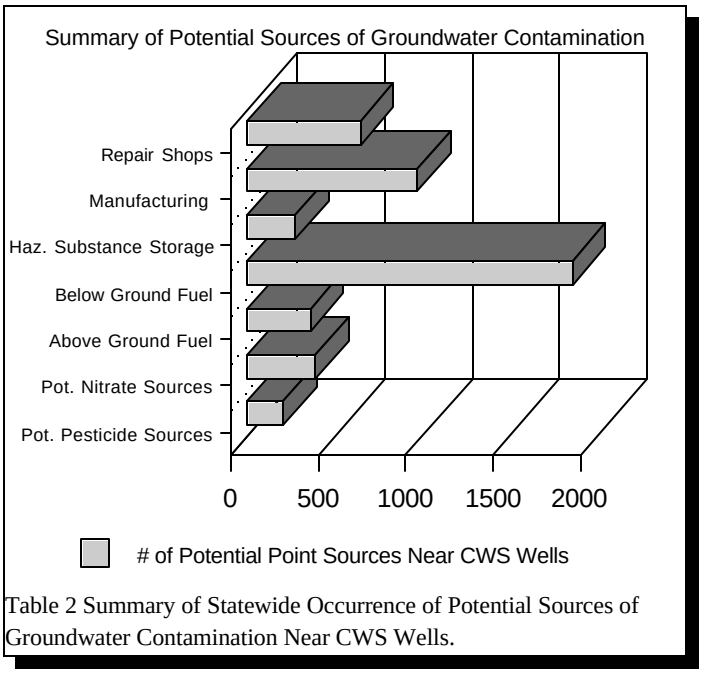



Table 2 Summary of Statewide Occurrence of Potential Sources of Groundwater Contamination Near CWS Wells.

Nitrate is a naturally occurring inorganic ion which makes up part of the nitrogen cycle. Nitrates occur naturally in a number of foods, particularly vegetables. Both nitrate and nitrite are also added to meat products as preservatives. The major use of nitrate is in inorganic fertilizers.

The United States Environmental Protection Agency (U.S. EPA) has set a standard for nitrate in drinking water at 10 milligrams per liter and standard for nitrite in drinking water at 1 milligram per liter. The standard for the combination of nitrate and nitrite in drinking water is 10 milligrams per

liter. These levels include a margin of safety to protect human health. A recent study for U.S. EPA was conducted by National Research Council (NRC) to evaluate nitrates and nitrites in drinking water. The study found that data from laboratory studies support the present standard and also show no increased cancer rates in humans when exposed to nitrates or nitrites in drinking water. U.S. EPA believes that water containing nitrate or nitrite at or below the levels described above are acceptable for drinking every day over the course of one's lifetime and are adequate to protect human health.

However, in infants, exposure to nitrate at levels in excess of 10 milligrams per liter can result in a blood condition called methemoglobinemia. Methemoglobinemia, also known as "blue baby" syndrome, is characterized by a reduced ability of the blood to carry oxygen. Methemoglobinemia related to drinking water contamination has only been observed in infants up to the age of about six months.

**Section 5. Continue to implement and improve overall groundwater quality indicators**

The groundwater program has initiated both long and short-term efforts to protect groundwater resources in Illinois. However, quantifying the amount of groundwater protection that has occurred for critical groundwater resources that support potable use, and for determining the amount of threatened resource, is more difficult. Therefore, the Illinois EPA determined that an estimate could be made based on the most current and accurate information available. Certain qualitative indicators of groundwater protection progress were considered. These can be broken out into what locals can do given the authority and information provided as a result of the IGPA versus programs implemented under state authority. The qualitative assessment of groundwater quality protection progress considered the impact of the following three key IGPA program elements: groundwater quality standards; regional groundwater protection planning; and local and state community wellhead protection programs. These three IGPA programs were considered to qualitatively assess groundwater protection progress with respect to the protection of CWS wells.

**Groundwater Standards** - Establishment of comprehensive groundwater quality standards is a critical component of a groundwater protection program. Such standards are ultimately necessary to provide a practical means of defining expectations for groundwater quality and determining the adequacy of the protection program. Illinois adopted comprehensive groundwater quality standards that became effective November 25, 1991. Since then, adoption of these 60 standards have:

- served as a general water quality goal;
- been used to determine performance expectations and characteristics of control technologies used by certain facilities and activities with the potential for contaminating groundwater;
- assisted with usage determinations considering the compatibility or suitability at specific geographic locations;

- assisted in the development of site cleanup objectives where significant contamination has occurred; and
- been utilized in conjunction with groundwater management zone provisions to give consideration to complex evaluations of applicable treatment technology, institutional mechanisms and economic implications of alternative cleanup scenarios.

During the first year of the last biennial reporting period, the Illinois EPA amended the standards to include 16 additional constituents that have been found as contaminants in Illinois groundwater, and that have been adopted as federal drinking water standards. These amendments were adopted on August 11, 1994.

Although, these standards apply statewide, they can have a direct effect on the protection of CWS wells at the local level. Thus, it is estimated that the expanded standards have had a positive impact on the protection of CWS wells.

**Regional Groundwater Protection Program** - One of the main programs used to assess groundwater quality protection progress, with respect to CWS wells, is through the performance of the "Priority Groundwater Protection Planning Regions." Section 17.2 of the IGPA required the formation of "Priority Groundwater Protection Planning Regions." Priority regions were selected based on statewide mapping of "appropriate recharge areas" conducted by the DNR. The regional program emphasizes information transfer, education and advocacy rather than regulation. Under the IGPA a framework was established for pursuing regional protection but no pre-determined regulatory template was imposed. This aspect was left open by the IGPA for more analysis and development as the program unfolded. Local areas differ in the extent of vulnerability to contamination depending on geologic conditions and land use patterns. These geographic areas differ in the appropriate mix of protective measures that should be applied.

Four Priority Groundwater Protection Planning Regions have been established to date (see Figure 9). The Northern and Central regions were established in 1991, the Southern in 1992, and the Northeastern in 1995. Since the regional planning process has started, three pilot "Groundwater Protection Needs Assessments" have been completed, (Pleasant Valley PWD, city of Pekin, and Village of Cary), and a comprehensive document entitled "Guidance Document for Groundwater Protection Needs Assessments" has been produced and distributed by DNR and Illinois EPA staff. A number of CWS facilities (e.g., Bethalto, Fairbury, Gibson City, Mackinaw, Shelbyville, Lincoln, and St. Charles) have utilized the guidance document to complete groundwater protection needs assessments.

In 1995, the Illinois EPA received the first petition from a Priority Groundwater Protection Planning Committee (Central Region) for developing a regulated recharge area proposal for Pleasant Valley Public Water District (PWD). The Illinois EPA has developed a draft regulated recharge area petition for Pleasant Valley PWD and intends to initiate Illinois Pollution Control Board hearings before the end of 1997. In addition, the city of Pekin has developed a comprehensive local recharge area protection program that incorporates special use/conditional use permits into a groundwater protection overlay zoning ordinance.

The city of Pekin's proactive management program has become a state and National example of successful groundwater protection efforts at the local level, due in part, to the assistance of the Central Groundwater Protection Planning Committee.

The most effective method of encouraging local groundwater protection programs is through direct, one-to-one contact with local stakeholders and decision makers. Members of the Priority Groundwater Protection Planning Committees provide a mechanism of broad interest group input and networking with local community officials to accomplish this goal. The regional committees have been responsible for a number of successful groundwater protection education and outreach efforts throughout the state, including:

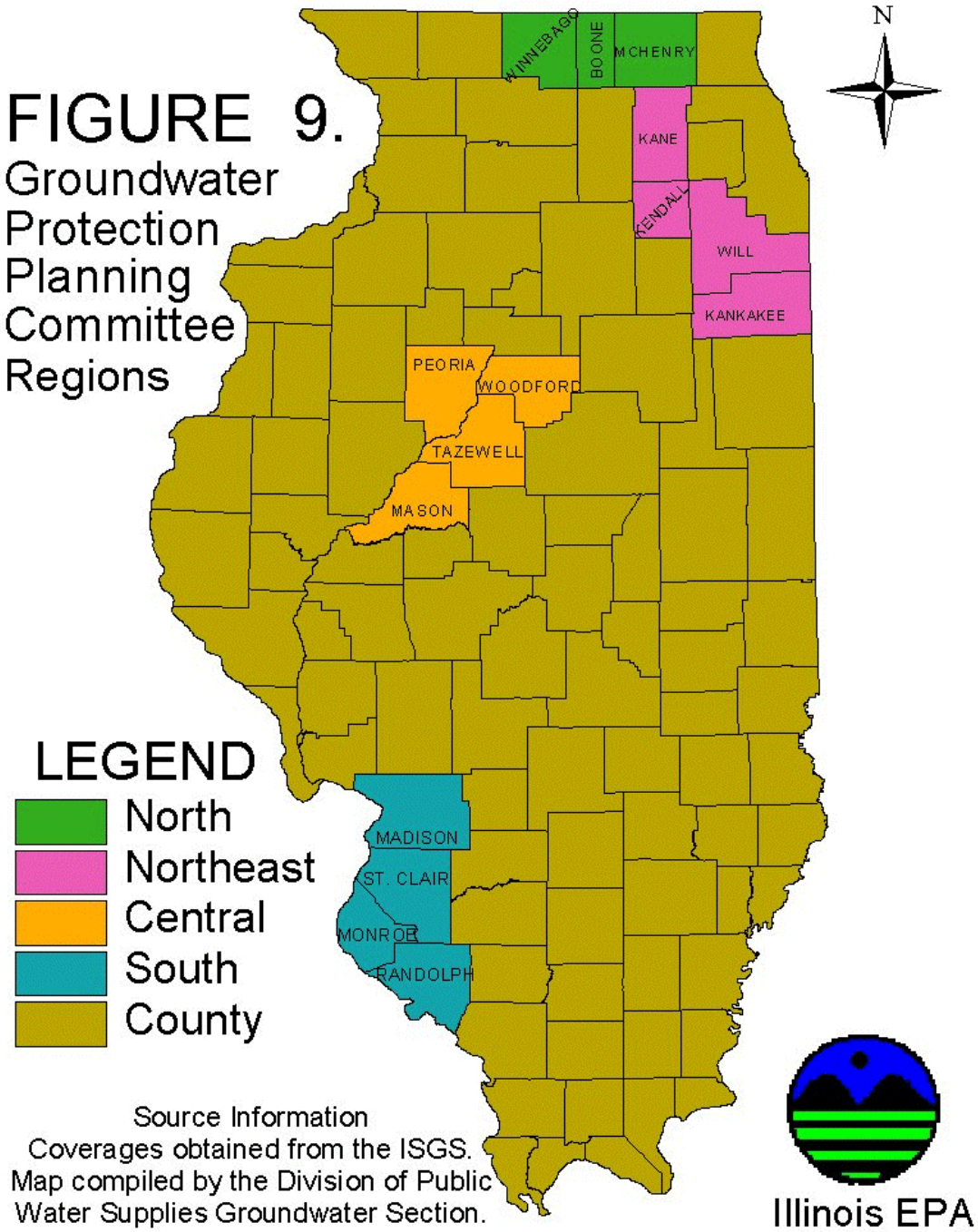
facilitating pollution prevention workshops for small businesses;
sponsoring pollution prevention graduate student interns;
developing and promoting Farm-A-Syst pilots within regions;
assisting in implementing middle school groundwater education program
promoting groundwater protection "Field days" within regions;
organizing and co-sponsoring the "clean water celebration"; and
numerous other educational events, statewide.

Many members of the regional committees have also participated in numerous presentations to local communities for the purpose of educating and influencing them on the many benefits of establishing maximum setback zones and local recharge area protection programs. Within the four Priority Groundwater Protection Planning Regions a total of 32 communities, representing 118 wells, have established or are awaiting final approval of maximum setback zone ordinances. This represents 33 percent of the number of ordinances adopted or awaiting approval statewide.

These efforts continue to provide major groundwater quality protection progress. However, this report indicates that there is still a significant gap in local recharge area protection. The regional groundwater protection planning program continues to assist state and local governments with making progress in these high priority areas.

# FIGURE 9.

## Groundwater Protection Planning Committee Regions




Source Information
Coverages obtained from the ISGS.
Map compiled by the Division of Public Water Supplies Groundwater Section.

Illinois EPA

**Wellhead Protection Program** - Under the IGPA the authority for implementing protection programs for CWSs using groundwater is split between state and local governments. A balance was sought between the State and local responsibilities under the IGPA. A well site survey program was developed and has been implemented by the Illinois EPA. This program provides a means of generating needed information that local governments could use in adopting minimum and maximum setback zone ordinances. The IGPA also authorized, not mandated, local governments to adopt maximum setback zones. Ninety-four communities, representing 294 wells, have adopted or awaiting approval of their maximum zone ordinance(s). Two years after the adoption of the IGPA, the Illinois EPA was authorized to propose regulations for needed maximum setback zones in instances where local governments choose not to act. To date, the Illinois EPA has prepared initial proposals for establishing such regulations for six communities. However, in the majority of these instances, the local government has proceeded in adopting local ordinances. One of these communities indicated that they would prefer that the Illinois EPA develop the maximum setback zone. A Board regulatory proposal has been developed for this community.

The Illinois EPA was also provided the authority to propose "regulated recharge areas" be established and managed for protection of groundwater. The Illinois EPA received its first petition in 1995 to develop such a proposal.

In order to quantitatively measure the progress made on groundwater protection for CWS wells, it was determined that the information associated with the critical potable resource groundwater protection, potential contaminant sources and impacted groundwater quality needed to be combined into one overall groundwater quality protection indicator. This overall indicator should also incorporate several common conceptual tools for identifying types and quality of indicator data that have been embraced by the Organization for Economic Cooperation and Development (OECD). OECD has embraced the following indicators:

- pressure indicators or data collected on potential sources and routes of groundwater contamination from the well site surveys for CWS wells;
- state indicators or information collected and analyzed in association with the ambient network of CWS wells; and
- response indicators or progress made by local governments to develop and implement proactive groundwater protection programs.[2]

Thus, the overall indicator combines pressure, state and response indicators to help assess groundwater quality protection progress. Figure 10 graphically illustrates the Illinois EPA's overall groundwater protection indicator for CWS wells in the State of Illinois.

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[2] The detailed methodology for the development of these three indicators was presented in the 1996 IGPA Biennial Report and the 1996 Illinois Water Quality Report under Section 305(b) of the Clean Water Act. This level of detail will continue to be maintained in the Illinois Water Quality Report.

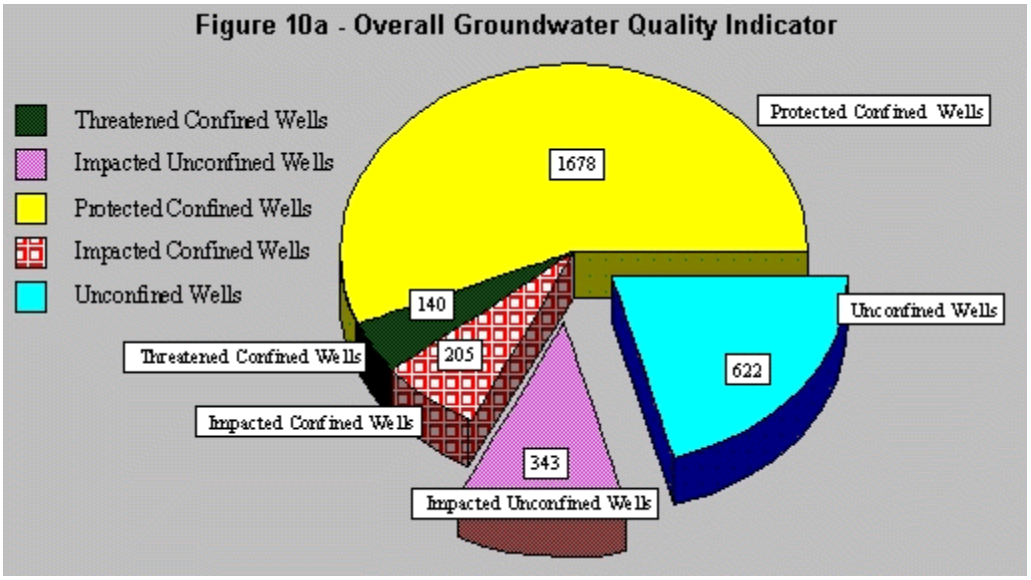
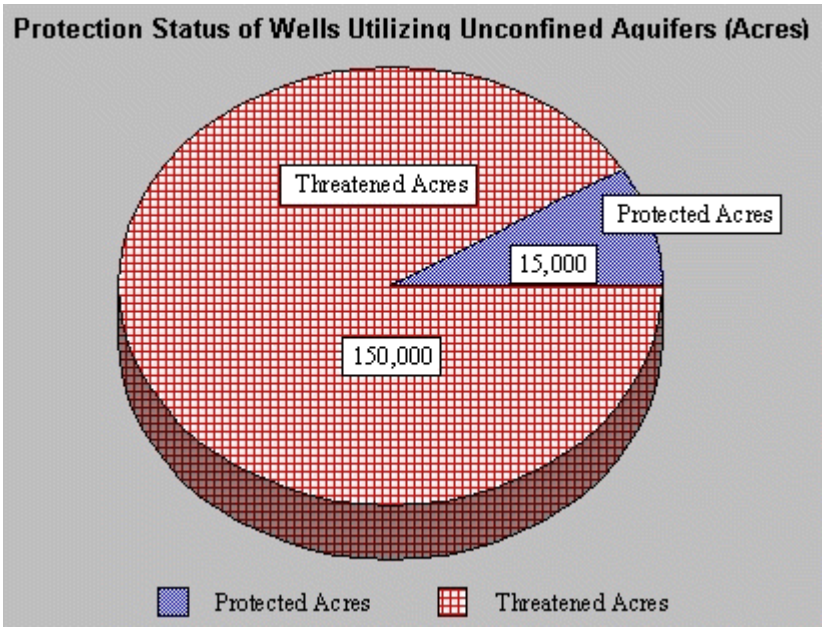


Figure 10a - Overall Groundwater Quality Indicator
Threatened Confined Wells
Impacted Unconfined Wells
Protected Confined Wells
Impacted Confined Wells
Unconfined Wells
1678
Protected Confined Wells
140
Threatened Confined Wells
205
Impacted Confined Wells
622
Unconfined Wells
343
Impacted Unconfined Wells


Protection Status of Wells Utilizing Unconfined Aquifers (Acres)
Threatened Acres
Protected Acres
15,000
150,000
Protected Acres
Threatened Acres

The previous discussion indicated that the IGPA established a three-tiered approach for protecting or supporting the groundwater uses in Illinois. The first tier implemented minimum setback zones of either 200 or 400 feet. The latter minimum setback zone was established for the more vulnerable CWS wells in the state. Minimum setback zones prohibit new potential primary sources, potential secondary sources and potential routes of contamination from locating in this area.

The second tier of protection provides authority to local units of government to extend this zone up to a maximum of 1,000 feet radially from the well, which also expands the prohibition of new potential primary sources of contamination. Maximum setback zones are established by local governments in conjunction with an Illinois EPA review procedure. The IGPA also provides the Illinois EPA with the authority to propose maximum setback zones to the Board. The last tier of protection can be accomplished by establishing a regulated recharge area. Regulated recharge areas are established through a Board rulemaking procedure. The ISWS worked with Illinois EPA staff to analyze 300 CWS wells utilizing unconfined aquifers, and determined that 80 to 90 percent of the recharge areas extended more than 1,000 feet from the well. Under the Illinois program, each of these protection measures provides a different degree of protection or use support to vulnerable potable resource groundwater.

The Illinois EPA has determined that minimum setback zones provide a baseline of protection for potable use support. Maximum setback zones provide supplemental protection for potable use support and regulated recharge areas could theoretically provide protection for full use support for unconfined CWSs.

The data described above indicates that there are approximately 18,120 acres out of 162,870 acres that have baseline and/or supplemental protection measures in place.(Refer to Chapter VI, Section 1 for additional discussion of recharge area protection.)

## CHAPTER V. GROUNDWATER QUALITY STANDARDS AND TECHNOLOGY CONTROL REGULATIONS

### Section 1. Continue to implement and integrate the groundwater quality standards into environmental programs

The state agencies and departments associated with implementing this recommended goal are the Illinois EPA, IDPH, IDOA, Illinois Department of Nuclear Safety (IDNS), and DNR. The state agencies/departments continue to effectively implement and integrate groundwater quality standards in their respective programs.

The Illinois EPA's Bureau of Land has utilized the groundwater quality standards as the basis for the Tiered Approach to Cleanup Objectives (TACO). The TACO rules employ a risk based approach to establish cleanup objectives in three tiers. Tier one is applicable within established setback zones and regulated recharge areas and requires a strict adherence to the groundwater standards. Tiers two and three allow the use of site specific information to determine levels that can remain on-site and not pose a risk to off-site receptors.

The Illinois EPA's Bureau of Water (BOW) and Office of Chemical Safety have evaluated the rules. They agree that unless there is an easement made by the property owner to allow contamination, or a local ordinance forbidding the use of groundwater or restricting property use, receptors are possible at the property boundary. Therefore, groundwater contaminated in excess of the standards is not allowed off-site without some type of institutional control in place.

The Groundwater, Planning, Mine Pollution Control Program and Permit Sections of the Illinois EPA's BOW are continuing to work together to integrate the groundwater protection program components with the Total Maximum Daily Load (TMDL) process, Non-Point Source (NPS) Management plan, watershed planning, National Pollution Discharge Elimination System (NPDES) permitting program, and best management plan development. The Groundwater Section of the Illinois EPA's BOW continues to provide hydrogeologic and groundwater remediation assistance to the BOW Compliance Assurance Section, Permit Section and the Mine Pollution Control Program.

**Section 2. Continue to update and amend the groundwater standards to parallel the drinking water standards adopted by U.S. EPA**

As part on the Illinois EPA's continual updating and re-evaluation of the groundwater quality standards (Part 620) a rule making was proposed to the Board, and became R96-18. The proposed changes under R96-18 fell into two categories, substantive and nonsubstantive. Nonsubstantive changes such as typographical errors, inaccurate cross references, and out of date citations that frequently crop up once a set of rules becomes widely and well used were addressed. One substantive change was also addressed. A concern had been raised within the Illinois EPA that Part 620 was not enforceable because the Board's authority note lists only Section 8 of the IGPA, but does not specifically reference the Illinois Environmental Protection Act (Act). The IGPA does not provide for independent enforcement of standards adopted pursuant to it. However, the original framers of Part 620 argued that Part 620 was adopted pursuant to both the IGPA and the Act. Section 8 of the IGPA mandated that the Board adopt Part 620 in compliance with the rulemaking requirements and authorities specified at Title VII of the Act. Title VII of the Act includes Section 27 which states that:

> "Within 2 years after the date upon which the Illinois EPA files the proposed regulations, the Board shall promulgate the water quality standards for groundwater. In promulgating these regulations, the Board shall, in addition to the factors set forth in Title VII of the Environmental Protection Act, consider the following..."

The Board agreed and proposed an amendment to the authority note of Part 620 to add Section 27 of the Act as one of the two authorities for adoption of Part 620.

**Section 3. Continue to implement preventive notice and response programs and integrate with environmental programs**

The Illinois EPA's BOW has established a CWS well sampling program which will provide the basis for continued preventive notice and response activities. Communities that use a groundwater source and are known to have detectable levels of organic contaminants in water pumped to the distribution system are being sampled to determine if there is a corresponding contamination problem in the raw water. If organic contaminants are detected pursuant to Part 620.305 the preventive notice process will begin. If the raw water sample collected by the Illinois EPA confirms the presence of organic contaminants, the owner of any potential route, potential primary source, or potential secondary source, that currently or in the past has possessed or handles the contaminant of concern will be required to sample groundwater on-site if they have the capability to do so. Therefore, the Illinois EPA, concurrently with the initial round of monitoring, is updating existing well site survey reports. Data on currently known potential routes and sources will be confirmed and updated where possible. Data from new potential routes and sources will be added into the Compliance Data Base System (CDBS). Data about potential routes, sources and their owners will be collected for an area within 2,500 feet from the contaminated wellhead to meet the requirements of Part 620.310. Potential sources will also be evaluated for compliance with 35 IL. Adm. Code 615 and 616 and other pertinent groundwater protection regulations.

**Section 4. Continue to implement the technology control regulations and establish a database for tracking and evaluating compliance data**

The Illinois EPA has completed the entry of data from the Well Site Survey Reports into the CDBS. Approximately 8,500 sites are associated with community wells. Many of the sites in CDBS are not regulated, but because of their proximity to community wells many sites have been recorded. Those sites that may have one or more regulated units are being prioritized for compliance determinations. As discussed in Section 3 of this Chapter, potential sources within regulated areas (minimum and maximum setback zones) of contaminated community water supply wells are being evaluated first for compliance.

The Illinois EPA has also been working closely with IDPH on two separate compliance issues. First, the Illinois EPA has been providing copies of concurrence letters for each setback zone waiver it reviews. In that fashion, the county health departments that are issuing permits for new wells will be aware of existing potential sources. The other compliance activity being accomplished is the review of Structural Pest Control Facilities for compliance with the technology control regulations. Most of these types of facilities meet the requirements for Certification of Minimal Hazard to groundwater. Therefore, further compliance under 35 IAC 615 and 616 is not required. However, the facility owner must first complete and sign an application which describes the potential source and the potable well(s) with which it is associated. The Illinois EPA has been working closely with several different County Health Departments in an effort to identify and bring these facilities into compliance by means of a certification or other means if required.

**Section 5. Evaluation of activities located proximate to CWS where local groundwater protection management efforts are completed or in progress will be given priority**

To optimize compliance efforts, the Illinois EPA has chosen to begin the evaluation for compliance with 35 IAC 615 and 616 at CWS that have adopted maximum setback zones. The advantages of this approach are two-fold. First, the adoption of a maximum setback zone demonstrates concern with groundwater quality and a spirit of cooperation at the local level. Second, a maximum setback zone of 1,000 feet and in specific cases 2,500 feet will provide groundwater protection within a significant portion of the well recharge areas (in some cases the entire recharge area may be protected). The Illinois EPA has evaluated 49 wells, representing 22 CWS facilities, for compliance.

**Section 6. Evaluation and compliance determinations for activities referred by permit programs will also be given priority**

The Groundwater Section has continued to provide hydrogeologic expertise to the water supply and Water Pollution Permit Sections. In an effort to be proactive in regard to groundwater quality issues, the Groundwater Section, Permit Sections and Compliance Section of the BOW are attempting to develop standard operating procedures applicable to permitted facilities. The goal is to develop procedures that will provide prompt review of monitoring results and assure continued compliance with groundwater standards. These procedures should reduce the number of facilities that are out of compliance upon permit review and therefore in need of corrective actions.

**Section 7. The Illinois EPA should work cooperatively with the IDPH to provide statewide education seminars on the implementation of the technology control and groundwater standards regulations**

The Illinois EPA and the IDPH are the primary state agencies responsible for implementing this groundwater protection goal. Coordination between Illinois EPA and IDPH has been good and there has been some success with implementing this activity. However, there is still work to be done.

Through the SDWA, the IDPH inspects non-community public water systems. Monitoring for pesticides, inorganic chemicals, PCBs and VOCs took effect in 1993 for 535 non-transient non-community water systems. Monitoring for lead and copper occurred in 1994. By the end of 1996, approximately 75 percent of these water systems were sampled for the above parameters. During the next two years, the goal is to increase the rate of compliance to 100 percent. Five seminars, pertaining to water treatment and non-community policy and rules, were sponsored by IDPH during 1995-96. Water program staff from local health departments and IDPH attended these non-community training programs.

The Illinois Water Well Construction Code and the Illinois Water Well Pump Installation Code are scheduled to be amended and effective in 1997. For quite some time IDPH and the Illinois Association of Groundwater Professionals have been working on amendments to the Illinois Water Well and Pump Installation Contractors Licensing Act to include continuing education requirements for licensed water well and pump installation contractors. In addition to water well construction technologies, groundwater protection will be a major topic in continuing education programs. This Act is scheduled to be amended and effective during 1997.

In 1997, through grants to IDPH, reports from two CDC studies of private water wells will be completed. The Illinois Association of Groundwater Professionals completed its first year of a two year study into groundwater contamination and water well disinfection in 1996. According to a press release to all ICCG agencies, the first year study focused on bored wells since they showed a higher rate of contamination than other groundwater sources. The Illinois Association of Groundwater Professionals study team is also compiling information and researching methods for improving the construction, inspection and maintenance of a water well system. The second year of the study will include a review of construction methods and maintenance procedures of the conventional drilled well and to educate industry and the public on proper well construction and maintenance The educational feature of this study will be facilitated through a cooperative effort with the DNR, Illinois Farm Bureau, Illinois Cooperative Extension Service, IDPH and other interested groups. This study is funded through a grant awarded to the Illinois Association of Groundwater Professionals from DNR in 1995.

The Well Site Survey Reports and other regulatory initiatives under the IGPA provide a valuable avenue for implementation and prioritization of the technology control and groundwater regulations for community wells. Through the permitting and inspection of new private, semi-private, non-community and non-potable water wells and through its educational program, IDPH has provided technology control and groundwater regulations. The IDPH and the Illinois Association of Groundwater Professionals cosponsored 10 water well construction and groundwater protection seminars throughout the state during 1995-96 for local health department and IDPH water program staff and licensed water well contractors. At one of these educational workshops, Illinois EPA explained the groundwater technology control regulations. IDPH plans to offer eight groundwater educational workshops during the next two years.

The Illinois EPA contacts the IDPH whenever the contamination or siting of a private or non-community well is a concern with regard to these regulations. Through six regional offices and 83 local health departments, IDPH will continue to utilize efficient methods to implement statewide groundwater quality monitoring.

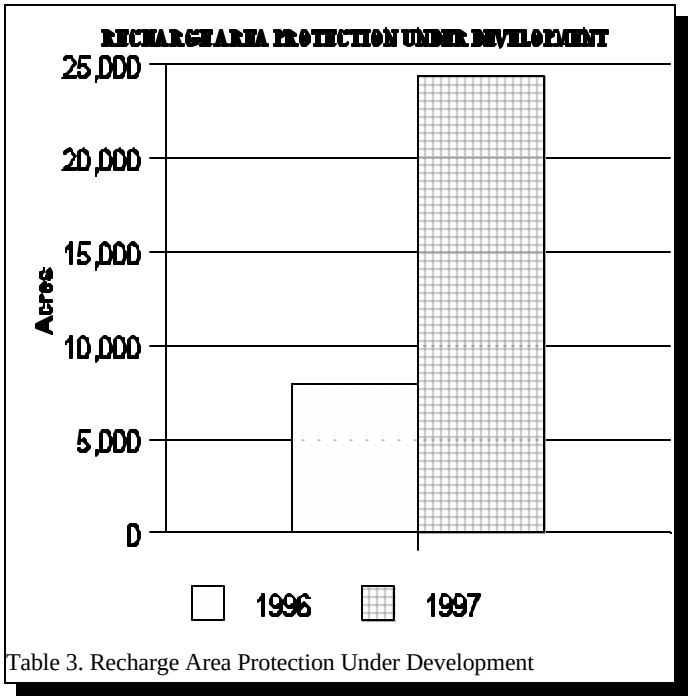


Table 3. Recharge Area Protection Under Development

**Section 1. Increase the percentage of recharge acres with full protection progress established or under development. The goal is to increase this percentage 15 percent by the year 2000.**

In the last Biennial Report the ICCG stated a goal of increasing the percentage of groundwater recharge areas (acres) with protection programs established or under development by 15 percent between 1995 and the year 2000. As illustrated in Tables 3 and 4, the Illinois EPA has made significant progress toward achieving the 15 percent goal by increasing the number of source water protection programs that are under development. The percent of recharge area protection programs under development increased from 4.81 percent in 1996 to 14.94 percent (acres protected) in 1997 (7,900 to 24,339 acres). Additionally, the supplemental protection (maximum setback zones) percentage of acres protected increased from 1.89 percent in 1996 to 4.56 percent in 1997 (3,100 to 7,440 acres).

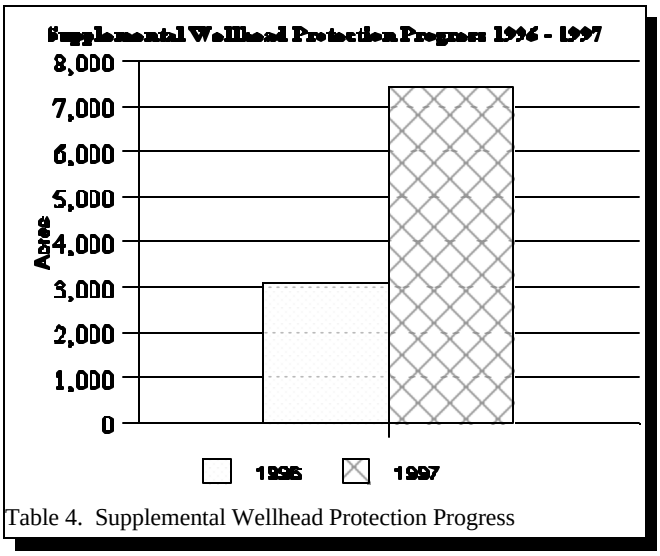


Table 4. Supplemental Wellhead Protection Progress

Seventy four percent of the critical resource groundwater for the state lacks adequate protection. This provides a response indicator of the groundwater protection progress made for this critical resource.

Further, in the past no recharge area evaluation process was included for newly permitted community water supply wells. A new permit requirement has been developed that will allow Illinois EPA to make area of influence/recharge area determinations. The overall groundwater quality protection indicator also tells us that there is a 3:1 ratio between detections in unconfined versus confined aquifer system wells. Thirty-five and a half percent of the unconfined aquifer wells have already been impacted by one of the three contaminant groups assessed in this report. Potential nonpoint sources of agricultural chemicals appear to be primarily responsible for impacts from triazine/alachlor and nitrates in CWS.

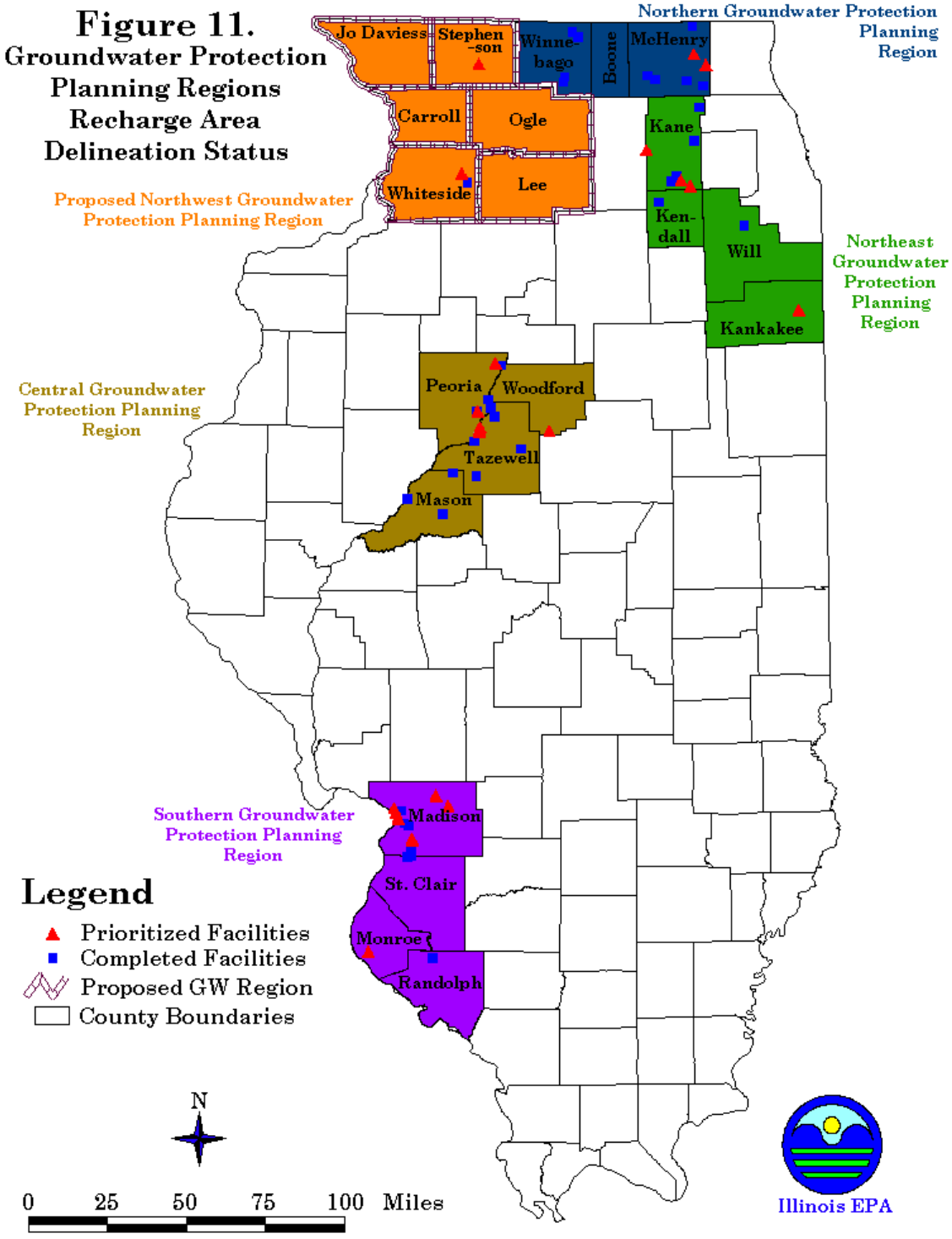
**Section 2. Implement and integrate the WHPP elements into protecting regional groundwater sources for CWS wells**

The Illinois EPA is the primary agency responsible for implementing this program and has had some success. However, there remains a great deal of work to be done in this area. WHPPs have been implemented for CWS wells in Priority Groundwater Protection Planning Regions.

There are certain programmatic indicators that show CWS groundwater protection progress within the Priority Groundwater Protection Planning Regions. In general, the first step of developing a CWS groundwater protection program involves determining the recharge area for CWS wells in unconfined aquifers utilizing existing data. In Illinois, the recharge area is based on a five-year time of travel delineation. The second step involves determining the potential sources, potential routes, and the land use zoning within these recharge areas. The third step involves establishing a local team of stakeholders to develop a groundwater protection strategy, and most importantly, taking the necessary measures to implement these activities to protect groundwater resources. The last step involves the development of a local emergency planning document that addresses: natural disasters, chemical contamination, and physical descriptions that threaten the supply and distribution network of the public water supply.[3] Figure 11 illustrates the progress made in local WHPP elements. Further, the status of each CWS located within Priority Groundwater Protection Planning Regions is described in Appendix 3.

[3]These programatic indicators are described in detail subsequently in the following Sections of this report.

# Figure 11.
## Groundwater Protection Planning Regions Recharge Area Delineation Status



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

The Illinois EPA is the primary agency responsible for developing and implementing this protection goal. The Illinois EPA is currently creating procedures for CWS systems expanding through the construction of new wells. There are many reasons to support the concept of wellhead protection at the time of construction. Primary among them is the fact that delineation of wellhead protection areas is accomplished more easily and at considerably less cost since much of the hydrogeological work required for a delineation is also required in the resource assessment to determine the availability of groundwater at a site. This information can then be utilized as the technical support to initiate:

maximum setback zones;
eligibility for chemical monitoring reform/permanent monitoring relief;
lab fee cost savings;
prevention programs including the pollution prevention and conservation reserve programs.

This hydrogeologic information could include: well logs, static and pumping water levels, regional groundwater flow direction, etc. The goal of acquiring this information is so the Illinois EPA can provide a delineated source water protection area for new wells utilizing unconfined aquifer settings as required under Section 1453 of the 1996 SDWA.

**Section 4. Prioritization of wellhead protection efforts within the Groundwater Protection Planning Regions**

During the past two years, the Illinois EPA has utilized its relational database systems to prioritize recharge area delineations for 24 systems within the Priority Groundwater Protection Planning Regions. Recharge area delineations for three of the 24 systems have already been completed. Work for the remaining 21 systems was initiated during the summer of 1997 and is expected to be completed by late 1998.

**Section 5. Work with the Groundwater Protection Planning Committees to implement programs and to assist with targeting local contacts and interest groups**

The Illinois EPA is the primary Agency responsible for implementing this groundwater protection goal. The 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 much more work is needed in this area.

The Groundwater Section has coordinated with the regional groundwater protection planning committees to implement programs and assist with targeting local contacts and interest groups. Each regional committee has 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 mission statements are useful in the prioritization and development of local groundwater protection programs, many of which are described in this Chapter.

Although each region has specific priorities and areas of concern, their mission statements all have common goals and objectives as described below:

**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.

**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 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 the following:
   - Local zoning;
   - Maximum setback zones;
   - Technology control regulations; and
   - Defining regulated recharge areas.

Develop procedures that implement the recommendation/petition process for establishing regulated recharge areas.

**STRATEGIES**

1. Act as a catalyst for implementation of groundwater protection tools including meeting one on one with local officials and businesses.
2. Conducting workshops for education and assistance.
3. Develop and distribute a newsletter.
4. Annual self evaluation review of program effectiveness.

During the past two years, the Illinois EPA and members of the Priority Groundwater Protection Planning Committees have met with local stakeholders to develop groundwater protection programs and to implement activities to protect CWS recharge areas. One of the most effective methods of encouraging local groundwater protection programs is through direct meetings with local stakeholders. The following information provides a summary of community programs that the regional committees have targeted for groundwater protection efforts.

Northern Groundwater Protection Planning Region (Winnebago, Boone, and McHenry counties)

The Northern Groundwater Protection Planning Committee has assessed their efforts, and the following provides a summary of these actions:

*Rockton* - Illinois EPA staff and members of the planning committee participated in a potential source and route identification project in the Village of Rockton's CWS well recharge area. The majority of land-use within this recharge area is residential, incorporating a very old part of town that had previously relied on private water supply wells. Therefore, much of the survey focused on identifying improperly abandoned wells, septic systems, cisterns, and dry wells, using a homeowner questionnaire. Approximately 25 people, including a number of high school students, volunteered to conduct the survey which identified 40-50 improperly abandoned wells, cisterns, and dry wells. The committee is working with the village to address these concerns by sponsoring a well sealing demonstration project this fall.

*North Park PWD* - The Illinois EPA and the regional committee funded a graduate-level pollution prevention (P2) intern at a facility located within the recharge area of one North Park PWD's CWS wells. The intern was assigned to investigate the possibility of P2 opportunities at Hydro-line, Inc., a manufacturer of actuators and pneumatic pumps for industry. Several projects were undertaken by the intern, including: on-site coolant recycling; metal scrap recycling; and waste paint filter disposition. Results of the intern's efforts indicate, that when implemented, the projects will have a combined projected savings of approximately $50,000 per year while also reducing waste generation and energy usage, and increasing employee safety.

*Rockford* - The Illinois EPA has completed recharge area delineations for eight of Rockford's CWS wells. The Illinois EPA also provided technical assistance to the city for the establishment of maximum setback zones for these wells. Rockford formally adopted maximum setback zone ordinance for the eight wells on October 21, 1996. In addition, the regional committee has targeted an educational campaign for area loan officers, banks, and developers on groundwater concerns related to property transfer and urban sprawl issues.

*Loves Park* - A survey of Loves Park CWS recharge area was conducted by representatives of the regional committee, Winnebago County Health Department, Winnebago County Retired Senior Volunteer Program (RSVP), and the League of Woman Voters. Similar to the Rockton project described above, the goal of this project was to inventory potential sources and routes within the CWS recharge areas and to educate citizens and local officials about groundwater protection. This pilot effort included door-to-door visits by trained volunteers to inventory pollution sources using a questionnaire survey form. Approximately 27 people, including a number of high school students, assisted in conducting the survey which identified roughly 75 improperly abandoned wells including six dry wells, nine septic systems and three cisterns. Future plans include developing a payment assistance program for well owners committing to properly seal wells on their property.

*Marengo* - The city of Marengo has made significant progress in developing a comprehensive management program for the protection of the CWS groundwater resources. Marengo established

a Groundwater Protection Team to evaluate various site-specific programs for managing and protecting the CWS recharge area. This team was organized in early 1997 and includes: city manager, alderman, water supply operator and building inspector. Other stakeholders participating on the team are representatives from two local businesses, a local consulting firm, and a school teacher. The Illinois EPA and IRWA Groundwater technician also serve on the team as technical advisors.

A groundwater protection overlay district is currently being developed to include special/conditional use permits for certain types of commercial/industrial uses locating or expanding within the CWS recharge area. Due to the fact that a majority of the land-use within the recharge area is currently zoned commercial/industrial use, a strategy of addressing these potential sources with P2 technical assistance has been implemented.

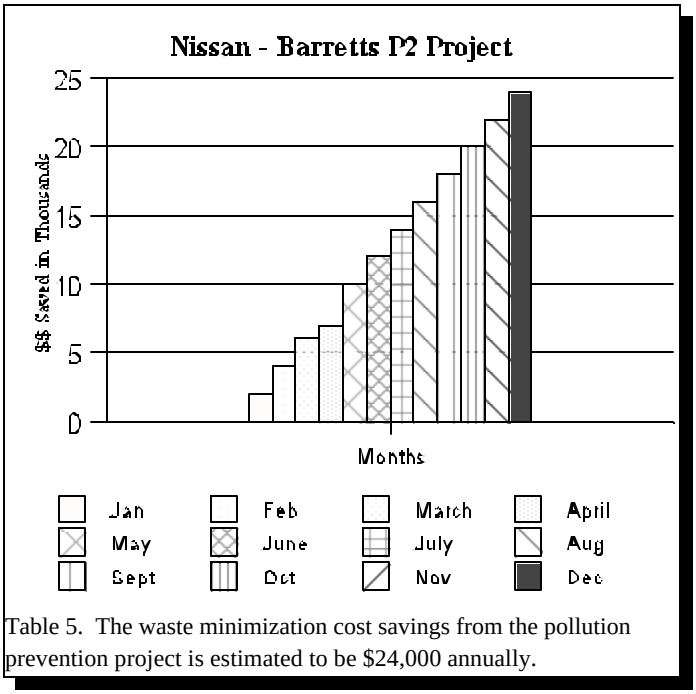


Table 5. The waste minimization cost savings from the pollution prevention project is estimated to be $24,000 annually.

Most recently, Marengo developed a color brochure which illustrates the CWS well recharge area and land-use zoning. The brochure also provides useful information to local businesses and citizens on how they can help to protect the community's groundwater resource. In addition, the city has purchased and posted road signs to alert travelers when they are entering and leaving the wellhead protection area.

Northeastern Groundwater Protection Planning Region (Kane, Kendall, Will, and Kankakee counties)

*St. Charles* - The city of St. Charles has been actively involved in developing a local groundwater protection and management program. The city retained the services of a local engineering company to assist in completing the technical components of a wellhead protection program. With the assistance of the ISGS, Illinois EPA, and the regional committee, the engineering firm has determined the recharge areas for all of the city's unconfined wells, conducted a survey to identify potential sources and routes of groundwater contamination within the recharge areas, and provided the city with a draft groundwater protection and management program, including a list of recommendations for the city to consider. The city has also posted road signs, with assistance from IDOT, at the entry and exit of state highways crossing the CWS recharge areas. These road signs are designed to educate individuals of the importance of protecting the city's CWS recharge areas.

*East Dundee* - The Illinois EPA has completed recharge area delineations for the village of East Dundee. With assistance from the regional committee, IRWA, and Illinois EPA, a training session on conducting a potential source and route identification program was sponsored by the Village using area high school students. A group of approximately 20 students conducted the potential source and route survey program within the CWS recharge area and provided these results to the Village Board. The regional committee would like to work with the village in the future, using retired senior volunteers and high school students, to revisit the survey program and develop a local groundwater protection program.

*Plano* - The Illinois EPA has completed recharge area delineations for the city of Plano. The regional committee believes that developing a groundwater protection program is very important because the city of Plano's CWS wells are all very shallow and are located in the flood plain of Big Rock Creek. The Director of Public Works for the city (and regional committee member), has been working with the Plano City Board to develop a local groundwater protection program. Most recently, the city properly abandoned an old dug well, idle since the 1970s, because it was a potential route of groundwater contamination to the existing wells.

The Illinois EPA and regional committee funded a graduate-level P2 intern at a facility, located within the CWS recharge area, to review on-site operating practices for waste minimization opportunities. The intern worked at the Plano Molding Company, a plastic-resin injection molding processor, to develop a hydraulic oil recycling program and to evaluate management programs for the on-site containment/control of resin pellets. This project is on-going at the time of this report.

*Joliet* - (Joliet Army Ammunitions Plant) - The regional committee has learned that the Joliet Army Ammunitions Plant will phase out operations in the Joliet area. Members of the regional committee are concerned that a significant number of improperly abandoned shallow wells located on arsenal property could pose a significant threat to the groundwater quality in this area. The regional committee has directed their concerns to the Commander of the Ammunitions Plant and the Will County Health Department. The Army is currently considering the committee's request to properly abandon these wells.

*Sugar Grove and Prestbury*- The village of Sugar Grove is in the process of implementing a local groundwater protection and management program for its two facilities. The village had hired a local engineering company to complete the technical aspects of their Wellhead Protection Plan. The Illinois EPA assisted the village in providing the delineation for the Sugar Grove CWS wells and the Illinois DOT posted road signs, marking the entry and exit where the state highways intersect the CWS recharge areas.

The village is currently reviewing their draft groundwater protection area ordinance and voluntarily removed several village-owned underground storage tanks located within the CWS recharge areas.

Central Groundwater Protection Planning Region (Peoria, Tazewell, Woodford, and Mason Counties)

*Pekin* - The regional committee continues to work with the city of Pekin in the development and implementation of a comprehensive local groundwater protection program. The city of Pekin's groundwater protection program includes both regulatory and non-regulatory/public education components. Pekin adopted and implemented a comprehensive recharge area overlay protection ordinance and maximum setback zone ordinance in January 1995. The overlay zoning ordinance has been used in the development of several site plans for new and existing businesses. The Pekin's Inspection Department has incorporated requirements of the ordinance into part of the building permit process.

Since the initial passage of the ordinance, the City Public Works Director (and member of the regional committee), has received requests for copies of the city's ordinance from throughout the country. In addition, he has made numerous presentations on the city's groundwater protection program, including: the Groundwater Foundation, League of Women Voters, American Water Works Association, Illinois Rural Water Association, and others. For the third consecutive year, the city of Pekin has received national recognition from the Groundwater Foundation for being a "Groundwater Guardian Community." The Pekin Groundwater Protection and Education Team continues to work on the development of "Result Oriented Activities" as required under the Groundwater Guardian Program. This year's result oriented activities include:

Establish incentive and educational programs to educate the public, businesses, and local schools about groundwater protection activities and P2 opportunities;
Purchase and erect additional road signs indicating the boundaries of the city's CWS recharge areas;
Update the city's Emergency Planning Document to address any spills/releases within the CWS recharge areas; and
Coordinate with the Tazewell County Planning and Zoning Department to protect a portion of CWS recharge area located in the county's jurisdiction.

The city of Pekin has also received the "Governor's Hometown Award," in recognition of its proactive groundwater protection program.

*Pleasant Valley PWD* - The Illinois EPA, with input from the regional committee, continues the development of a regulatory management program for the Pleasant Valley PWD well recharge areas. The regional committee initiated the regulatory management program when it officially petitioned the Illinois EPA to proceed with the development of a regulated recharge area rulemaking proposal to the Illinois Pollution Control Board (Board). Since that time, the Illinois EPA has developed a draft regulation that includes provisions for: differential management between existing and new potential sources; chemical substances registration, management, and reporting procedures; an employee training requirement; and design and operating criteria. A framework based on the Illinois Chemical Safety Act was also used, and a concept of de-minimus quantities was incorporated. In addition, the draft regulations would prohibit certain types of new potential sources. Currently, the draft regulated recharge area proposal is being reviewed by Illinois EPA legal staff prior to making a formal petition to the IPCB.

*Tazewell County* - The regional committee, with assistance from Illinois EPA staff, has been working with the Tazewell County Planning and Zoning Department to develop a county-wide groundwater protection ordinance. The intent of this ordinance is to assist communities in the county by providing them a "generic" groundwater management ordinance that could be adopted at the local level. In addition, this ordinance would cover recharge areas that extend outside of local corporate limits, where the county is responsible for land-use planning. Much of the "generic" ordinance was based on the city of Pekin's groundwater protection overlay zone, which addresses many of the same groundwater protection issues that the county has. The proposed groundwater protection ordinance will be presented to the Tazewell County Board, and may be adopted before the end of 1997.

Southern Groundwater Protection Planning Committee (Madison, Monroe, St. Clair, and Randolph counties)

*Edwardsville, Troy, and Roxana* - The Illinois EPA and the regional committee have worked with the Madison County soil and Water Conservation District (SWCD) to develop a pilot non-point source management program for the Edwardsville, Troy, and Roxana CWS recharge areas. These communities were prioritized for Clean Water Act Section 319 grant (non-point source) funding by the regional committee because the predominant land-use within the recharge areas is agricultural row crops. The total amount of agricultural land area within the three CWS recharge areas is approximately 1,000 acres, and the county SWCD has set as a goal getting 750 acres in the program.

- A pilot program to address agricultural nonpoint source BMPs is being implemented in the community recharge areas of Edwardsville, Troy, and Roxana. With assistance from the Madison County SWCD and certified crop advisors, incentive payments will be provided to farmers to develop and implement the following BMPs:
  - nutrient and pesticide management plans;
  - integrated pest management techniques;
  - soil testing for nitrogen and nutrients;
  - weed and pest scouting programs;
  - buffer strips and/or grassed waterways; and
  - winter cover crops

The goal of this two-year project is to provide incentive payments (up to $30/acre) to farmers within the three CWS recharge areas to develop and implement agricultural non-point source pollution control best management practices (BMPs), not currently being utilized, suitable for the protection of groundwater. One of the main objectives of the pilot project is to reduce the potential leaching of agricultural chemicals and nutrients by developing alternate management systems. These alternative management systems could include: different agricultural chemical combinations; reduced application and altered timing of application. It is anticipated, by Madison County SWCD, that 80 percent of the agricultural cropland located within the recharge area of these communities will be implementing these BMPs.

To assist in completing this project, the county SWCD has contacted several Certified Crop Advisors who have agreed to participate in the program. The agricultural producer will select a certified crop advisor, and proceed to work with that person to develop and implement some or all of the agricultural BMPs that apply to this cropland. In return, a portion of the certified crop advisor's fee will be reimbursed with funding available from the 319 grant.

*Collinsville* - The city of Collinsville is actively working on the development of a local groundwater protection and management program. The Illinois EPA provided the recharge area delineation for the CWS wells utilized by the city and participated in a potential source and route identification survey. Based on the information obtained from the survey, the water supply operator has met with several of the businesses and land owners in the area to evaluate specific risks to groundwater quality posed by these activities. The city also has coordinated with the IDOT to place water supply protection area road signs at the entry and exit points of state highways crossing the CWS recharge area.

*Bethalto* - The regional committee has been working with the village of Bethalto to develop a groundwater protection and management program. Staff from the Illinois EPA provided the village with recharge area delineations and assisted the water supply operator in conducting a potential source and route identification program. Using this information, the village water supply operator (and member of the regional committee), developed a chemical substances inventory sheet and conducted on-site visits with business owners located within the CWS recharge area. The village has also coordinated with the IDOT to post water supply protection area road signs at the entry and exit points of state highways crossing the CWS recharge area.

With assistance from the regional committee and the Illinois EPA, the village was able to place a pollution prevention intern with three automotive related facilities located within the recharge area of the village's wells. This intern is evaluating the in-house processes and waste streams at the businesses and making recommendations to reduce or recycle chemical wastes or alter existing practices to eliminate waste generation at the source. It is anticipated that the results of these projects can be shared with other business owners in the recharge area.

The village is also in the process of developing a regulatory management program for groundwater protection. This effort is proving to be challenging and time-consuming because most of the recharge area for the village's wells are located in the municipal jurisdiction of Wood River and East Alton. Therefore, any type of groundwater protection ordinance or management program will have to be implemented by both Wood River and East Alton city government. The Village Board is currently working to establish an intergovernmental agreement with the other two villages to accomplish this goal.

**Section 6. Integrate the WHPP with vulnerability waiver assessments under the SDWA**

The Illinois EPA is the primary agency responsible for implementing this program. The Groundwater Section has worked cooperatively with the BOW, Compliance Assurance Section (CAS), and the Illinois Municipal League to develop and administer a monitoring waiver program for the SDWA Phase II, IIb and V constituents. The progress and participation on this groundwater protection goal has been highly effective to date.

Community water supplies can potentially reduce the number of water sample analyses required by conducting a vulnerability assessment and implementing a WHPP. The intent of this integrated program is to accelerate the adoption of local recharge area protection programs and to assure compliance with the SDWA monitoring requirements. Monitoring waivers are being used as an incentive mechanism for encouraging the establishment of local source water protection and prevention programs. The Community Water Supply Testing Fund Council approved a new rate or fee classification for groundwater supplies receiving a monitoring waiver. This rate reduced the annual cost to water supplies with a waiver by more than 50 percent. The goal of the monitoring waiver program is to protect WHPAs from contaminants which may have an adverse effect on public health or the environment.

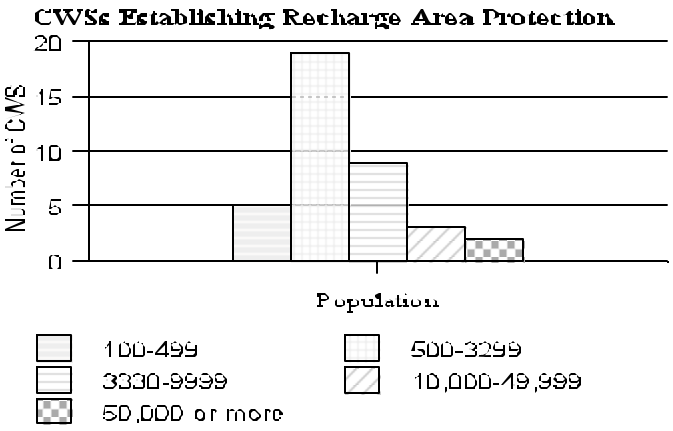



Table 6. As a result of the SDWA Phase II, IIb and V Monitoring Waiver Program, 38 CWSs are developing recharge area protection programs (128 wells).

This program has been developed to recognize areas where natural protection exists by differentiating between confined versus unconfined aquifer systems. Key elements of the waiver program include: mapping the five-year recharge area for unconfined wells; identification of potential sources and routes of contamination located within the recharge area of unconfined aquifer wells; identification and sealing of potential routes of contamination located within 1,000 feet for confined aquifer wells, contingency planning; and a program to manage potential sources and potential routes to reduce the vulnerability to contamination. In order to obtain a monitoring waiver, the CWS will evaluate the vulnerability of their wells to potential contamination sources. The systems vulnerable to

contamination must develop and implement a groundwater protection management program for potential contamination sources located with CWS recharge area, see Table 6.

The Illinois EPA has received more than 683 waiver applications. Thus, more than 683 WHPP plans have been submitted from the approximately 1,183 communities utilizing groundwater. The 683 applications consist of multiple entry or treatment application point (TAP) and associated well combinations. To date, 1185 TAPs and the associated wells have been reviewed and approved.

The Illinois EPA's BOW will be responsible for reviewing waiver renewal applications every three years. Re-authorization of waivers will be based on implementation of local WHPPs. In addition, the Illinois EPA will retrofit the waiver program to include new constituents as they are adopted by U.S. EPA.

## CHAPTER VII. REGIONAL GROUNDWATER PROTECTION PLANNING PROGRAM

### Section 1. Assist with conducting and supporting both new and follow-up efforts of encouraging local groundwater protection programs

As previously described in Chapter VI, the Illinois EPA is the primary agency responsible for developing and implementing this program. To date, the 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 benefitted 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 will assist the regional groundwater protection process by providing national attention and recognition to CWS developing groundwater protection programs. Illinois EPA worked with the Groundwater Foundation to pilot a new program referred to as the "Groundwater Guardian Affiliate" program. The Illinois EPA worked with each of the four Priority Groundwater Protection Planning Regions to become 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.

> Groundwater Guardian Communities are committed to preparing new "result oriented activities" each year. This program will assist with measuring the long-term success of local source water protection efforts. Illinois currently has 11 Groundwater Guardian Communities, second only to Nebraska the home state for the Groundwater Foundation. Illinois EPA will continue to expand these activities.

Illinois EPA is also participating in a program referred to as the "Source Water Protection Mentor Program" with the U.S. EPA Region V. This mentor program is being conducted in nine states across the country, and is working with retired senior volunteers to assist with implementation of local source water protection programs. Under the Initiative, a team of local senior volunteers or mentors will be trained to provide technical support and assistance to communities and water supply providers participating in the program in the Northern and Northeastern Priority Groundwater Protection Planning Regions.

The Source Water Protection mentor volunteers will be able to assist in the development and implementation of Source Water Protection Plans. Interested communities will bear no costs for services of the volunteers. The McHenry/Kane and Winnebago County Retired Senior Volunteer Programs (RSVP), the National Rural Water Association, the Environmental Alliance for Senior Involvement, the National Association of Counties (NACO) and the National Association of Towns and Townships (NATAT) have endorsed this effort and are providing their assistance to this collaborative endeavor. To date, 10 volunteers have been recruited to participate in the development of source water protection programs for 12 communities in the Northern and Northeastern Groundwater Protection Planning Regions. Two communities will be contacted by IRWA to perform a training session for the two RSVP groups.

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. Two main goals were identified by the committee: public education, and local government assistance.

In addressing the first goal, the committee looked at ways in which it could best educate the public The committee facilitated public education through participation in several public forums. The first forum was the McHenry County Environmental Expo held at McHenry Community College. Another educational opportunity was presented at the Farm Show Expo held in Winnebago County at Rockford. The committee also sponsored a Field Day Education Seminar in Boone County at Capron. The committee co-sponsored a couple of other programs on groundwater protection: the Children's Groundwater Festival held at Rock Valley Community College in Rockford with the League of Women Voters, and the Illinois Middle School Groundwater Project covering the three counties of Boone, McHenry and Winnebago.

The second goal, local government assistance, was an effort to work with local governments and water supplies to assist them with groundwater protection programs. The Committee worked with the Illinois EPA to employ two pollution prevention efforts. The first intern was placed in Marengo. His task was to help identify ways in which a local business could reduce waste by-products, recycle more materials, and to investigate alternative processes to further reduce chemicals used. A second pollution prevention intern was placed in an industry located within a five-year recharge area of a North Park Public Water District well in Machesney Park. This intern had similar goals of the intern in Marengo: reduce and recycle

products used in manufacturing, investigate alternatives to replace current in-house processes. The committee worked with the League of Women Voters, senior volunteers, and the village of Rockton to conduct a door-to-door survey of potential sources of groundwater contamination.

The Northern Regional Committee plans to continue these efforts over the next two years. Additional communities have been identified for assistance with wellhead and source water protection programs, and local governments will continue to be targeted for groundwater protection assistance. The committee is interested in participating in additional public education forums such as Farm Show Expos, local health department environmental programs, and continuing its support of the middle school groundwater project.

The Northeastern Groundwater Protection Planning Committee

The Northeastern Committee was first appointed in October 1995. One of the first activities undertaken by the committee was to sponsor a "Groundwater Protection Field Day." This field day was held at the Joliet Jr. College and focused on the importance of preventing groundwater contamination and encouraging local implementation of groundwater protection programs. Members of the committee also participated in a Future Farmers of America (FFA) teacher training workshop which emphasized the importance of incorporating groundwater education into FFA curriculum.

The Northeastern Committee has also been working with the Regional School Superintendent to provide funding to initiate and support a groundwater education program for middle schools in Kane County. This pilot project will be modeled after the Illinois Middle School Groundwater Education program that began in Boone, McHenry and Winnebago counties in 1994. If this pilot program proves successful in Kane County, the committee hopes to encourage other counties within the region to adopt similar middle school programs.

Most recently, the Northeastern Committee sponsored another "Groundwater Protection Field Day," in the City of Plano which focused on the identification and protection of community and private water supplies. The morning session highlighted several programs currently underway at the state and local levels to provide assistance in identifying and protecting groundwater resources. The afternoon session included field demonstrations on proper well sealing procedures: Farm-A-Syst, homeowner best management practices, and proper septic system maintenance.

Central Groundwater Protection Planning Committee

The Central Committee continues to work with the city of Pekin and the Tazewell County Planning and Zoning Department to develop a county-wide Groundwater Protection Ordinance (see Chapter V for summary of these efforts). The Central committee has also been selected to participate in the pilot year of the "Groundwater Guardian Affiliate" program sponsored by the Groundwater Foundation. The committee has developed result oriented services that will provide support to the Groundwater Guardian Community of Pekin as well as encourage other communities to participate in the program.

The Education Subcommittee continues to be very active in promoting groundwater protection awareness programs throughout the region. With assistance from the Illinois Department of Agriculture, the Education

Subcommittee promoted the Farm-A-Syst program by sponsoring three county wide "Field Days." These Field days were held at participating farmsteads where demonstrations on proper well maintenance, chemical storage, and livestock waste management procedures were highlighted. In addition, the committee sponsored low cost water screening analysis for private well owners as an incentive to participate in the Farm-A-Syst program.

Southern Groundwater Protection Planning Committee

The Southern Regional Groundwater Protection Planning Committee continues to hold regular meetings and is continuing with its efforts to protect groundwater resources in the four county region. The Southern Regional Education Subcommittee participates in an ongoing groundwater education program. Groundwater related educational booths are set up at local fairs and expos. Educational programs are presented at schools throughout the four counties.

A Groundwater Protection Field Day was held on May 7, 1997. The Field Day was hosted by Illinois American Water Company and was very well attended. Visits were made to the Collinsville Water Treatment Plant and the American Water System Water Quality and Research Lab. The afternoon session consisted of a Farm-A-Syst program at a local farmstead, a well drilling demonstration at a local research farm, and a bus tour of an area of karst features.

A geology and groundwater field day was held on April 19, 1997. The field day was co-sponsored by the Illinois State Geological Survey and the Mississippi Karst Resource Planning Committee. The field day was attended by more than 400 participants and dealt with a variety of groundwater issues in Monroe County.

The education program in the karst area funded by a U.S. EPA Section 319 nonpoint source grant is ongoing in Monroe, St. Clair and Randolph counties. The karst educator works with the residents of the three county area on sinkhole related issues. The groundwater testing done as part of this grant has been completed and the dye tracing is almost complete. Funding is being requested to do additional dye tracing in the area to delineate recharge areas of important cave systems. The Karst Committee will host a Sinkhole Conference in October of 1997 in Monroe County.

The Southern Regional Committee plans to continue with their efforts to work with local governments on issues dealing with groundwater protection. The communities, with assistance from Illinois EPA, coordinated with Madison County Board to develop an amendment to their county ordinance to allow a municipality to implement a recharge area overlay zone to protect CWS wells located within the county's jurisdiction. The committee will offer technical support to the Illinois Rivers Project for their groundwater related projects.

**Section 2. Assist with coordination of Section 319 grant best management plan implementation for nonpoint sources of contamination within community well recharge areas**

A significant amount of work completed under this section has previously been described in Chapter VI (see Section 5: Community Profile for Edwardsville, Troy, and Roxana).

In addition, the Illinois EPA recently completed a study entitled, "An Assessment of CWS Facilities Utilizing the Macon-Christian Strip Aquifer in Central Illinois," which included as a recommendation the possible use of Section 319 funds to implement best management practices for non-point sources of contamination. The intent of this study was to bring together and consolidate into one report several different aspects of wellhead protection, engineering, and hydrology. This report provided five-year recharge area delineations for the CWS wells utilized by the cities of Taylorville, Stonington, Assumption, Blue Mound, Moweaqua, and Macon.

Representatives from these communities meet with Illinois EPA staff on July 23, 1997, to discuss the major finding of the report, including the development and implementation of local groundwater protection programs. Also in attendance at this meeting were representatives from IRWA, IDOA, and county SWCD staff. Most of the discussions focused on appropriate voluntary management programs for agriculture including: development of agricultural BMPs, use of the Conservation Reserve Program in wellhead protection areas, use of Section 319 funds to address nonpoint source concerns, and promotion of IDOA's Farm-A-Syst program. The Illinois EPA is willing to work with these stakeholders to develop appropriate groundwater and source water protection management programs for these vulnerable CWS.

**Section 3. Continue to develop and integrate a source water protection component under the Illinois EPA's Watershed Management Program**

The Illinois EPA continues to develop pilot programs to integrate source water protection components to assess and respond to point and nonpoint pollution sources in the state's watersheds. A key requirement for development of effective watershed implementation plans is a thorough understanding of the land use and land management characteristics of the watershed. This information, when provided on geographic information system maps, can be used as a guide by federal, state, and local stakeholders to determine priorities in implementing pollution prevention and control methods at the watershed level.

In one of the pilot programs, the Illinois EPA has linked watershed and wellhead protection boundaries to assist with targeted implementation of the IDOA's Farm-A-Syst program. This program is a first in Illinois to link Farm-A-Syst with community wellhead protection programs. Illinois' Farm-A-Syst program was developed by the IDOA to assist rural farmstead owners with evaluating groundwater contamination potentials by assessing natural and management conditions relative to well location. A map is generated to link adjacent 1:24,000 watershed boundaries with delineated WHPA located in Illinois' Priority Groundwater Protection Planning Regions. This will provide an expanded number of farmsteads beyond but including the WHPA(s), to target for Farm-A-Syst. These maps will be provided to the IDOA and to regional SWCD offices.

In addition, a small amount of funding is provided to the Regional Groundwater Protection Planning Committees to assist with facilitating these efforts. Additionally, each associated SWCD will be contracted

with to conduct farmstead assessments within these targeted areas. Two of these pilot projects are being planned for the cities of Rockton and Plano. A total of four WHPA/watershed(s) areas covering multiple farmsteads will be targeted within the state during fiscal year 1998.

Another Illinois EPA effort has been to assist local community based source water protection initiatives by developing and providing 1:24,000 scale watershed maps for the 25 community water supplies using surface water that have exceeded SDWA Maximum Contaminant Levels. Two maps have been produced: 1) a 1:24,000 scale watershed boundary has been delineated and linked with statewide geologic mapping augmented with soil associated information developed by the ISGS to predict aquifer sensitivity to pesticide leaching, SDWA compliance monitoring data graphics, geographic features within the watershed (including roads, rails, municipal and county boundaries, etc.), and surface water intakes and hydrologic features (including lakes, and streams); and 2) the 1:24,000 scale watershed boundary, surface water intakes, and hydrologic features linked with a digital elevation model (DEM) to show the slope within the watershed. The maps were provided to the water supply owners and operators, community officials, SWCD, IDOA, Monsanto and Novartis (formerly Ciba-Geigy) to assist in watershed protection and restoration efforts. Each of these interests in watershed protection was also invited to participate in the Illinois EPA's Watershed Management Plan workshops. Monsanto is utilizing these maps to target their "Operation Green Stripe Program" to plant grass buffer stripes in these areas. In addition, watershed maps were prepared and provided to Novartis for 34 community water supplies using surface impoundments. Novartis is preparing a customized technical assistance document for each of these watersheds. The document will include specific farm service agency contacts, and best management practices applicable to each individual watershed.

**Section 4. Coordinate with watershed protection initiatives and groups**

The IGPA required the DNR to conduct a statewide groundwater assessment for the purpose of identifying appropriate recharge areas. The IGPA further required DNR to complete the mapping of appropriate recharge areas within 18 months after its adoption at a level of detail suitable for guiding the Illinois EPA in establishing Priority Groundwater Protection Planning Regions. In 1990, Keefer and Berg completed the preparation of a map entitled *Potential for Aquifer Recharge in Illinois [Appropriate Recharge Areas] Map*.

Section 17.2(a) of the IGPA requires the Illinois EPA, in cooperation with DNR, to establish a regional groundwater protection planning program. The Illinois EPA has established four priority groundwater protection planning regions and designated the associated committees.

The prioritization criteria for groundwater within a Targeted Watershed Area are as follows (in addition, reference the Targeted Watershed Approach Document for Priority Watershed Selection Criteria for Groundwater Recharge Areas Utilizing Unconfined Aquifers):

Priority 1 All CWS wells using unconfined aquifers in Priority Groundwater Protection Planning Regions with Full, Partial Minor and Partial Moderate Use Support.

To involve the public in the development of the Watershed Management Program, Illinois EPA sponsored a series of four workshops to seek citizen input. The workshops were held over a period of one year. Comments from all four workshops were compiled and a response developed for each category of comments. This document was published in June 1997.

Priority 2 All unconfined CWS wells outside Priority Groundwater Protection Planning Regions with Full Use Support.

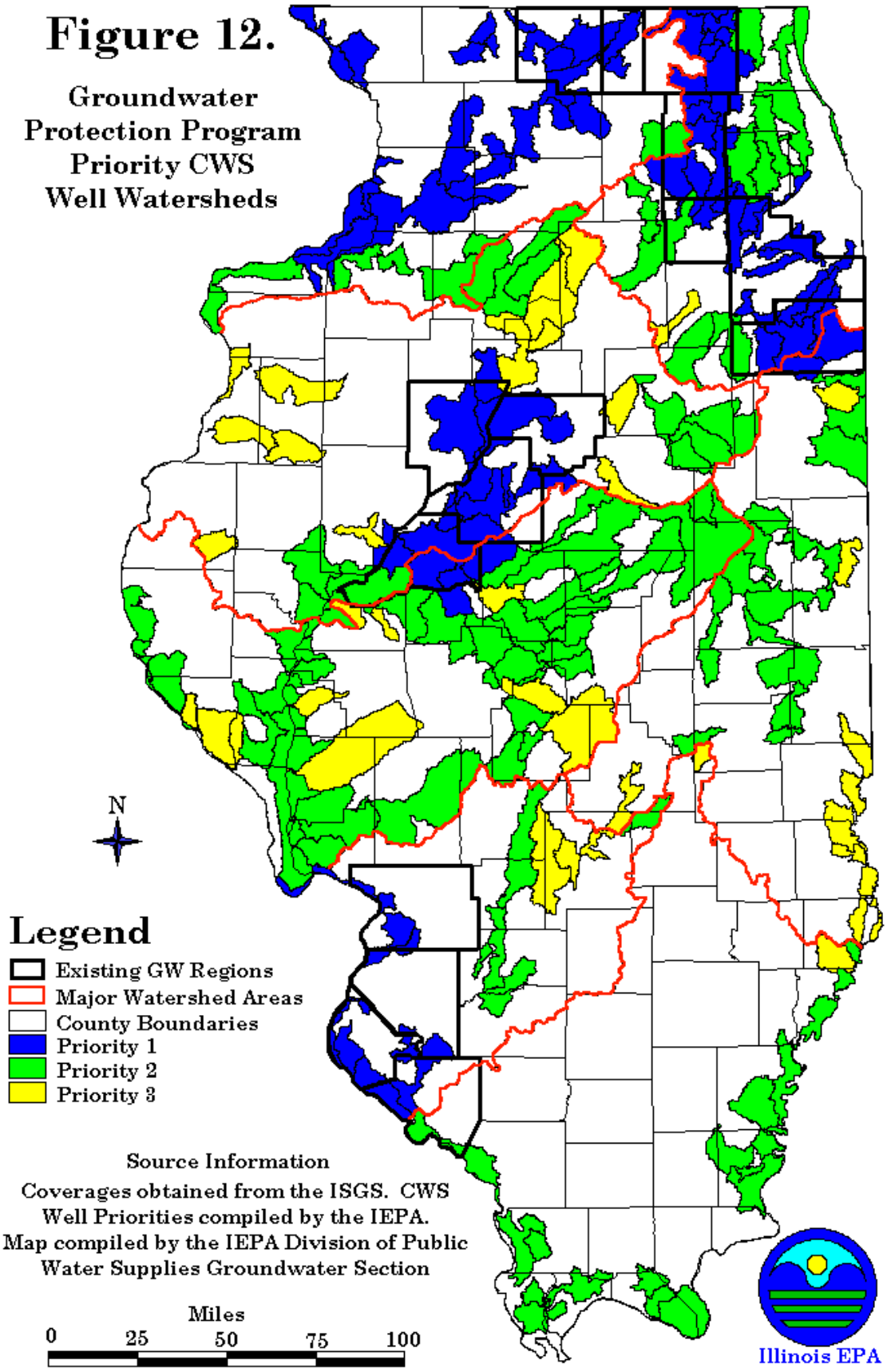
Priority 3 Unconfined CWS wells with Partial Minor and Partial Moderate Use Support.

Full use support means that no contaminants have been detected. Partial minor use support means concentrations were detected at less than 50 percent of the groundwater quality standard. Partial moderate use support means concentrations were detected at more than 50 percent of the groundwater quality standard.

GIS software has been used to combine the above prioritization criteria for groundwater data with an Illinois sub-watershed boundary coverage to create a new map. Areas were selected within these sub-watershed boundaries that contain CWS wells that met the prioritization criteria for groundwater. The majority of these wells and their associated recharge areas are located in valley train aquifer systems. The sub-watersheds located in adjacent upland areas will also be assessed in the future site specific watershed planning process because of the high potential for drainage into the valley recharge areas. A statewide map depicting the Groundwater Program Priorities and the watersheds containing them is illustrated by Figure 12.

# Figure 12.

**Groundwater Protection Program Priority CWS Well Watersheds**



**Section 5. Coordinate with the Clean Break Program and utilize P2 technical assistance in creating community based groundwater protection programs**

The Illinois EPA is the primary agency responsible for implementing this recommended goal. The Illinois EPA coordinates these efforts with the regional groundwater protection planning committees to promote the Clean Break Program and P2 technical assistance in creating community based groundwater protection programs. These programs are promoted as an excellent management approach for existing facilities located within CWS recharge areas by reducing the risk associated with these activities. Many of the graduate-level P2 interns projects, sponsored by the Illinois EPA and the regional committees, have previously been described in this Report (see Chapter VI, Section 5: Community Profiles for Marengo, North Park PWD, and Plano).

**Section 6. Within the Southern Region there needs to be more coordination between NRCS Stormwater Management Committees (Metro East Watershed Planning Committee) targeting watershed delineation and Illinois EPA**

The Illinois EPA, with assistance from members of the Southern Groundwater Protection Planning Committee, is primarily responsible for implementing this program goal. The metro-east Watershed Planning Committee has sponsored annual workshops to discuss high priority concerns including: flooding, sedimentation, water quality, and other water resource related concerns in the American Bottoms watersheds. Members of the regional committee and the Illinois EPA participate in these workshops by providing technical speakers and promoting groundwater protection issues at a demonstration booth.

The Illinois EPA also provides the Metro-East Watershed Planning Team with copies of CWS recharge area maps completed within the American Bottoms watersheds. These maps can be used to evaluate impacts related to flooding and water quality concerns occurring between surface and groundwater resources. This technical information exchange is facilitated by having the team leader of the Metro-East Watershed Planning Team participate on the regional committee. In addition, members of the regional committee and the Illinois EPA are provided with monthly meeting notices and minutes, summary of activities, and project summaries from the Metro-East Watershed Planning Team.

Although good progress has been made to coordinate the efforts of the Illinois EPA, the Southern Groundwater Protection Planning Committee, and the Metro-East Watershed Planning Committee, more work needs to be done. It is anticipated that additional coordination efforts will occur in the future to prioritize groundwater protection, watershed delineation, and stormwater management concerns.

**Section 7. Designate one new regional planning area and associated committees**

The Illinois EPA is the primary agency responsible for implementing this recommended goal. The Illinois EPA designated one new regional planning area and associated committee, the Northeastern Groundwater Protection Planning Region, in October 1995. Thus, sufficient progress has been made on this groundwater protection goal by establishing a fourth priority planning region. In addition, the Illinois EPA has been working with the Blackhawk Hills Resource Conservation and Development (RC&D) Area's Environmental Concerns Committee to provide recommendations and nominees for an additional regional planning area. This new priority planning area, termed the Northwestern Groundwater Protection Planning Region, will be designated in State Fiscal Year 1998 and will include many of the same counties represented by the Blackhawk Hills RC&D.

Section 17.2(a) of the IGPA requires the Illinois EPA, in cooperation with DNR, to establish a regional groundwater protection planning program. The Illinois EPA utilized the map *Potential for Aquifer Recharge in Illinois (Appropriate Recharge Areas)* (Keefer and Berg, 1990), groundwater pumpage data, population affected, water supply characteristics, solid waste planning efforts, and other factors as a basis for establishing priority groundwater protection planning regions.

The IGPA also required the Illinois EPA to establish a regional planning committee for each priority groundwater protection planning region. Each committee is to be appointed by the Director of the Illinois EPA for a term of two years and shall include representatives from among the following:

counties and municipalities in the region;
owners or operators of public water supplies which use groundwater in the region;
at least three members of the general public which have an interest in groundwater protection; and
the Illinois EPA and other state agencies as appropriate.

Under the IGPA, the regional planning committees are responsible for the following:

identification and advocacy of region-specific groundwater protection matters;
monitoring and reporting progress made within the region regarding implementation of groundwater protection;
maintaining a registry of groundwater contamination hazard advisories within their respective regions;
facilitating informational and educational activities relating to groundwater protection; and
recommending to the Illinois EPA that regional protection is needed for a specific area within the region.

The Illinois EPA has made significant progress in completing this protection goal. As previously mentioned, the Illinois EPA will proceed with the designation of a fifth regional planning area and committee during State Fiscal Year 1998.

**Section 8. Develop a prioritization process to determine areas in most need for the development of maximum setback zone proposals**

Section 14.3(d) of the IGPA enables the Illinois EPA to propose to the Illinois Pollution Control Board regulation establishing maximum setback zones to provide additional protection to CWS wells. Justification for a maximum setback zone proposal may include the need for protecting CWS wells utilizing a highly vulnerable source or sole source of groundwater, or a determination by the Illinois EPA that potential primary sources, potential secondary sources or potential routes represent a significant hazard to the public health or the environment. The Illinois EPA has developed a prioritization process using the Compliance Database and the Wellhead Protection Program Database Systems to analyze the following information:

aquifer properties data;
potential groundwater contamination sources and routes;
well log data;
well susceptibility ratings;
well vulnerability assessment information;
well production information;
raw and finished water quality data.

This system prioritizes CWS facilities with the greatest relative risk of contamination to obtain maximum benefit from the additional protection provided by the establishment of a maximum setback zone. The prioritization process will involve CWS facilities utilizing confined wells that are presently not part of the SDWA Phase II, IIb and V Monitoring Waiver Program.

**Section 9. Develop up to five maximum setback zone proposals in coordination with the ICCG and GAC**.

The Illinois EPA is developing a maximum setback zone proposal for approximately 14 Illinois American-Peoria Water Co. wells which serve the city of Peoria and provide water to more than 150,000 persons. The proposal is scheduled to be submitted to the Board during late 1997 or early 1998.

## 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**

IDPH has primary responsibility for inspections of approximately 5,000 non-community water systems which are performed at least once every two years. At the time of these inspections, the area surrounding the wellhead is inspected for sources of contamination. Permits for the new construction, modification or an extension of an existing non-community water system will continue to be required.

**Section 2. Continue the issuance of potable and other water well permits; and**

Approximately 7,000 permits to construct private, semi-private, non-community and non-potable water wells are issued annually by IDPH and approved local health departments. All new wells are inspected to ensure that location and construction specifications have been met as per requirements of the Illinois Water Well Construction and Pump Installation Codes.

**Section 3. Continue implementation of the groundwater monitoring well, closed loop heat pump and backflow prevention code.**

In 1994, the Illinois Water Well Construction Code was amended to include requirements pertaining to grouting and the sealing of abandoned wells. The requirements for monitoring and closed loop heat pump wells remain in effect. The Illinois Water Well Pump Installation Code requires a backflow device where a chemical injection system is connected directly to a water well used for irrigation and which is not used as a potable water supply. The goal of IDPH is to update the list of approved backflow devices as well as to keep the agricultural community informed of this requirement.

## 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

Continue to review and update the Implementation Plan and Regulatory Agenda;
Continue to hold quarterly meetings;
Provide liaison for the GAC;
Assist with development of a fully-integrating CSGWPP vision statement and proposed changes in U.S. EPA policies and programs in support of the vision statement;
Oversee, review and provide input to the preparation and implementation of a SMP;
Review and support the annual groundwater education work plan; and
Evaluate the development of Class III Special Resource Groundwater for Dedicated Nature Preserves.

**GAC Operations**

Sponsor a regional policy forum in cooperation with the Regional Planning Committees, ICCG, and Illinois EPA;
Conduct policy related meetings; and,
Provide input to programs, plans, regulatory proposals and reports as appropriate.

**Education Program for Groundwater Protection**

Coordinate and conduct a statewide education program with an annual evaluation and work plan involving local, regional and state organizations and agencies. Emphasize the integration of groundwater protection into state and local agency programs;
Support regional groundwater protection committees with special education programs based on regional needs. Increase emphasis on community programs for wellhead protection;
Through educational institutions and organizations, curriculum projects, and teacher workshops, integrate groundwater principles and groundwater protection into the curriculum for grades 3-12;
Community wellhead protection education. As groundwater recharge maps become available for community water supplies, provide educational assistance in developing community wellhead protection education programs;
Maintain an easily readable and useful newsletter and closely related electronic bulletin board for communication with newsletter editors, communicators, water professionals, committee persons, educators, and agency representatives with groundwater protection interests. Secure interesting articles from these clients for publication;
Target private well owners for educational programs involving licensed water well contractors, local health departments, and other organizations. These programs will address well abandonment, disinfection, testing, operation and maintenance methods;
Secure educational funding to expand the Illinois Middle School Groundwater Education Project to new state selected regional groundwater planning areas.

**Groundwater Evaluation Program**

Continue to share GIS coverages in an electronic format and continue to automate the groundwater resource data base 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; and
Continue to implement and improve overall groundwater quality indicators.

**Groundwater Quality Standards and Technology Control Regulations**

Evaluate the need to develop Class III: Special Resource Groundwater Standards;
Evaluate dedicated Nature Preserves for Class III designation;

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; and
The Illinois EPA should continue to work cooperatively with the IDPH to provide statewide education seminars on the implementation of the technology control and groundwater standards regulations.

**Wellhead Protection Program**

Publish wellhead protection and assessment data on the Illinois EPA Homepage;
Increase the percentage of recharge acres with full protection progress established or under development (The goal is to increase this percentage 15 percent by the year 2005.);
Continue to implement and integrate the WHPP elements into protecting the regional groundwater sources for public water supply wells;
Develop and implement source protection criteria to use in the planning, construction and location of new community water supplies;
Continue to prioritize wellhead protection efforts within the Groundwater Protection Planning Regions;
Continue to implement groundwater protection programs for CWS and assist with targeting local contacts and interest groups;
Continue integration and implementation of the WHPP under SDWA new alternative monitoring program; and
Finish the delineation of recharge areas for CWSs using reasonably available information;
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.

**Regional Groundwater Protection Planning Program**

Assist with conducting and supporting both new and follow-up efforts of encouraging local groundwater protection programs;
Evaluate the development of regulated recharge areas for the karst areas of Monroe and St. Clair counties;
Assist with coordination of Section 319 grant best management plan implementation for nonpoint sources of contamination within community well recharge areas;
Continue to develop and integrate a source water protection component under the Illinois EPA's Watershed Management Program;
Coordinate with watershed protection initiatives and groups;

Coordinate with the Clean Break Program and utilize P2 technical assistance in creating community based groundwater protection programs.

Within the Southern Region there needs to be more coordination between NRCS Stormwater Management Committees (Metro East Watershed Planning Committee) targeting watershed delineation and Illinois EPA;

Designate one new regional planning area and associated committees; and

Develop up to five maximum setback zone proposals in coordination with the ICCG and GAC.

**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 issuance of potable and other water well permits;

Continue implementation of the groundwater monitoring well, closed loop heat pump and backflow prevention code;

Initiate digitizing the location of non-CWS wells, and create an electronic inventory of potential contamination sources using the Illinois EPA's CDBS data base; and

Create statewide GIS coverage for non-CWS wells.

**APPENDIX 1 - LIST OF GROUNDWATER PROTECTION AND ASSESSMENT REPORTS, 1996-1998**


Barrows, L.J. and R.P. Cobb. 1997. Practical Implementation of Source Water Delineation. Groundwater Protection Council Annual Proceedings, Cleveland Ohio. 9 p.

Boring, W.C., 1997. An Assessment of CWS Facilities Utilizing the Macon-Christian Strip Aquifer in Central Illinois. Illinois Environmental Protection Agency Report. + 30 p.

Cobb, R.P. 1997. Costs and Benefits of Source Water Protection Video Teleconference. United States Environmental Protection Agency Research Laboratory, American Water Works Association.

Cobb, R.P. M.W. Harrell, and M.A. Justice. 1997. Well Site Survey Reports - Illinois Source Water Protection Program. Groundwater Protection Council Proceeding from Annual Conference, Cleveland, Ohio. P.10

Cobb, R.P. and W.A. Dulka. 1996. Illinois Community Examines Aquifer Protection Measures. Journal of the American Waterworks Association. P.10.

Cobb, R.P. 1996. Illinois Core Comprehensive State Groundwater Protection Program Application. Illinois Environmental Protection Agency Report. +159 p.

Cobb, R.P. 1996. Illinois Source Water Protection Program - Small System Benefits, A Groundwater Perspective. American Water Works Association Proceedings. 1996 Annual Conference, Toronto Canada. 10 p.

Cobb, R.P., H.A. Wehrmann, and R.C. Berg . January 1995. Guidance Document for Groundwater Protection Needs Assessments. Illinois Environmental Protection Agency Report. + 95 p.

Cross, J., R.J. Mollahan, M. Branham, R.P. Cobb and G. Good. 1997. Targeted Watershed Approach - A Data Driven Prioritization. Illinois Environmental Protection Agency Report. 63p.

Eicken, G., J. Cross, G. Good, A. Dulka, C. Fuller, R.P. Cobb, R. Mollahan, and W.D. McMillan. 1997. Watershed Management Plan Workshops, A Summary of Participant Comments and Illinois EPA Responses. Illinois EPA Report. 31p.

McMillan, W.D., R.P. Cobb and K.J. Cook. 1996. Groundwater - Source Water Protection/Restoration. Illinois Water Quality Report 1994-1995, Volume I. Pp. 182-232.

## APPENDIX 2-LIST OF GROUNDWATER ASSESSMENTS AND COMPLETED REPORTS, 1996 thru 1998


Clark, G.R. 1997. American Bottoms Regional Ground-Water Flow Model. Illinois Department of Natural Resources, Office of Water Resources. 159 pp.

Herzog, B.L., S.D. Wilson, D.R. Larson, E.C. Smith, T.H. Larson, and M.L. Greenslate. 1995. Hydrogeology and Groundwater Availability in Southwest McLean and Southeast Tazewell Counties Part 1: Aquifer Characterization. Illinois State Geological Survey and Illinois State Water Survey Cooperative Report 17. 70 pp.

Herzog, B.L., S.D. Wilson, D.R. Larson, E.C. Smith, T.H. Larson, and M.L. Greenslate. 1995. Hydrogeology and Groundwater Availability in Southwest McLean and Southeast Tazewell Counties Part 1: Aquifer Characterization (Appendixes). Illinois State Geological Survey and Illinois State Water Survey Cooperative Report 17A. 143 pp.

Kempton, J.P. and B.L. Herzog. In review. Mapping the Mahomet Sand and Other Aquifers of DeWitt and Piatt Counties: A Report to the Mahomet Valley Water Authority. Illinois State Geological Survey Open File Report 1996-9.

Keefer, D.A., 1995. Potential for Agricultural Chemical Contamination of Aquifers in Illinois: 1995 Revision. ISGS Environmental Geology 148. 28p.

Larson, T.H. 1996. Preliminary Geophysical Investigation of the Sand and Gravel Aquifers in the Kaskakia River Valley near Evansville, Illinois. Illinois State Geological Survey Open File Series 1996-4. 48 pp.

Larson, D.L., B.L. Herzog, R.C. Vaiden, C.A. Chenoweth, Y.Xu and R.C. Anderson. 1995. Hydrogeology of the Green River Lowland and Associated Bedrock Valleys in Northwestern Illinois. ISGS Environmental Geology 149, 20p.

U. of I. Water Resources Center, 1997. The Mahomet Bedrock Valley Aquifer System: Knowledge Needs for a Vital Resource. UIUC-WRC-97-021. 49 pp.

## APPENDIX 3 - SUMMARY OF WHPP PROGRESS BY PRIORITY GROUNDWATER PROTECTION PLANNING REGION

Northern Groundwater Protection Planning Region (Winnebago, Boone, and McHenry Counties)

| CWS Name | WHPP Element #1 | WHPP Element #2 | WHPP Element #3 | WHPP Element #4 |
|---|---|---|---|---|
| Rockford | X | X | X | |
| Rockton | X | X | X | |
| North Park PWD | X | X | X | |
| Neartown MHP | X | X | | |
| Cary | X | X | | |
| Crystal Lake | X | X | | |
| Marengo | X | X | X | X |
| Union | X | X | | |
| Loves Park | X | X | X | |
| Woodstock | X | X | X | |
| Belvidere | X | | | |

Northeastern Groundwater Protection Planning Region (Kane, Kendall, Kankakee, and Will Counties)

| CWS Name | WHPP Element #1 | WHPP Element #2 | WHPP Element #3 | WHPP Element #4 |
|---|---|---|---|---|
| East Dundee | X | X | X | |
| Sugar Grove | X | X | X | |
| St. Charles | X | X | X | |
| Sugar Grove-Prest. | X | X | X | |
| Plano | X | X | X | |
| Joliet | X | X | | |

Central Groundwater Protection Planning Region (Peoria, Woodford, Tazewell, and Mason Counties)

| CWS Name | WHPP Element #1 | WHPP Element #2 | WHPP Element #3 | WHPP Element #4 |
|---|---|---|---|---|
| Chillicothe | X | X | | |
| Peoria Heights | X | X | X | |
| IAWC - Peoria | X | X | | |
| Pleasant Valley PWD | X | X | X | |
| East Peoria | X | | | |
| Green Valley | X | | | |
| Mackinaw | X | X | X | |
| IAWC - Pekin | X | X | X | X |
| Easton | X | | | |
| Havana | X | | | |
| Manito | X | | | |

Southern Groundwater Protection Planning Region (Madison, St. Clair, Monroe, and Randolph Counties)

| CWS Name | WHPP Element #1 | WHPP Element #2 | WHPP Element #3 | WHPP Element #4 |
|---|---|---|---|---|
| Bethalto | X | X | X | |
| Edwardsville | X | X | X | |
| Roxana | X | X | X | |
| Troy | X | X | X | |
| Collinsville | X | X | X | |
| Mound PWD | X | | | |
| Red Bud | X | | | |

Key to WHPP Elements: Check indicates that this element has been completed or is in the process of being completed.

**Element #1** - This step involves the determination of recharge area for unconfined CWS wells utilizing existing hydrogeologic information. In Illinois the recharge area is based on a five-year time of travel.
**Element #2** - This step involves the determination of potential sources, potential routes and the land use zoning within the recharge areas to evaluate possible risks to the groundwater supply.

**Element #3** - Based on identified potential risk, the next step involves establishing a local team of stakeholders to evaluate and implement appropriate groundwater protection management strategies(eg., regulatory and non-regulatory).

**Element #4** - This step involves the development of a local emergency plan that addresses natural disasters, chemical contamination, and any other potential disruptions to the public water supply.

## APPENDIX 4 - SUMMARY OF STATEWIDE WHPP PROGRESS

Groundwater Protection Planning Statewide Outside of Planning Regions

| CWS Name | WHPP Element #1 | WHPP Element #2 | WHPP Element #3 | WHPP Element #4 |
|---|---|---|---|---|
| Assumption | X | X | X | X |
| Athens | X | X | X | |
| Barry | X | | | |
| Blue Mound | X | | | |
| Carmi | X | X | | |
| Colchester | X | X | | |
| Cowden | X | | | |
| Dawson | X | X | X | X |
| Edinburg | X | X | X | X |
| EJ Water Corp | X | X | X | X |
| Elkhart City | X | | | |
| Fairbury | X | X | X | X |
| Galesburg | X | X | X | X |
| Gallatin/White | X | X | X | X |
| Geneseo | X | | | |
| Gibson City | X | X | X | |
| Hutsonville | X | X | X | |
| Lacon | X | X | | |
| Macon | X | | | |
| Mechanicsburg Buffalo | X | | | |
| Milford | X | X | | |
| Millstone | X | X | X | X |
| Moweaqua | X | X | | |
| Newton | X | X | X | X |
| Niantic | X | | | |
| Pleasant Hill | X | X | | |
| Pleasant Plains | X | X | X | X |
| Pocahontas | X | | | |
| Rock Falls | X | X | X | X |
| Shelbyville | X | X | X | |
| South Jacksonville | X | X | | |
| Sparland | X | X | | |
| Stonington | X | X | X | X |
| Taylorville | X | | | |
| Union York | X | X | X | X |
| United Water- Lincoln | x | x | x | x |

Key to WHPP Elements: Check indicates that this element has been completed or is in the process of being completed.

**Element #1** - This step involves the determination of recharge area for unconfined CWS wells utilizing existing hydrogeologic information. In Illinois the recharge area is based on a five-year time of travel.
**Element #2** - This step involves the determination of potential sources, potential routes and the land use zoning within the recharge areas to evaluate possible risks to the groundwater supply.
**Element #3** - Based on identified potential risk, the next step involves establishing a local team of stakeholders to evaluate and implement appropriate groundwater protection management strategies(eg., regulatory and non-regulatory).
**Element #4** - This step involves the development of a local emergency plan that addresses natural disasters, chemical contamination, and any other potential disruptions to the public water supply.