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Water Resources Update
Illinois District Newsletter

U.S. Department of Interior
U.S. Geological Survey
District Web Site: http://il.water.usgs.gov/

November 2000

Compiled by D.M. Ayers

Message from Robert R. Holmes, Jr., Illinois District Chief

In March of this year, I anticipated writing about the severe drought occurring throughout Illinois and much of the Midwest. At that time, the flow measured at many of the more than 170 U.S. Geological Survey streamflow-gaging stations in Illinois was well below the long-term median value of flow for the month of March and had been that way since October 1999. Ground-water levels also were below normal. In May/June 2000, above normal precipitation began to fall and streamflows began to return to normal, with moderate flooding on the Rock River in northern Illinois and a peak of record discharge on the Des Plaines River at Russell, Illinois. By July, streamflow throughout the State was above the median value of flow for the month of July with ground-water levels also returning to normal.

At the onset of the drought, many water-resources agencies in the Midwest began to inventory the current available water supply (surface and ground water) and compare the supply with the projected demand under various precipitation scenarios. In addition, the effects of low flow on stream water quality had to be assessed and mitigated. The collection and analysis of hydrologic data is crucial for water-resources agencies to deal with the multifaceted problems faced during droughts. The value of data collected during a drought (or flood) is easily realized, but the value of data collected during normal periods is often missed. Consider the following excerpt from the recently released National Research Council (NRC) Report "Clean Coastal Waters: Understanding and Reducing the Effects of Nutrient Pollution". *"...The duration of any monitoring program is particularly important. Since the purpose of monitoring involves, among other things, the detection of trends, the length of monitoring must be sufficiently long to allow separation of naturally occurring trends from anthropogenically induced changes. Unfortunately, the political will to maintain long-term funding for monitoring programs is often lacking because such programs rarely (and were never intended to) produce major breakthroughs in understanding. The U.S. Geological Survey (USGS) stream monitoring program has provided excellent data on stream flow and nutrient content for many years. These long data sets allow monitoring of changes in runoff characteristics on decadal time scales and development of statistical models of discharge and load. But the gradual reduction of this network over recent years, primarily because of budget pressures, has had dramatic effects, reducing our capability to estimate flow. The data collected by USGS are invaluable, and continuation of this monitoring is essential."*

Fortunately in Illinois many people realize the value of hydrologic-data collection. We, however, must remain vigilant to protect the hydrologic-data collection network when funding sources are tight. The cost of hydrologic-data collection is high, but the cost of not collecting the data is higher.

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Conference Announcement

Illinois Water 2000
November 13-14, 2000
Holiday Inn Conference Center,
Urbana, Illinois

Conference engaging all citizens and groups interested in water resource issues in Illinois. Attention will focus on science, technology, and policy developments, while also bringing major water technical sessions, guest speakers, and a conference banquet. Specific issues to be addressed are water conservation and drought preparedness, non-point source pollution, water education, inland lakes, and urban stormwater.

Suspended-Sediment Budget and Yields for the LaGrange Pool of the Illinois River, October 1994-September 1997

by Gary P. Johnson

During October 1994 to September 1997, the U.S. Geological Survey (USGS) monitored suspended-sediment loads for the main-stem inflow, main-stem outflow, and four major tributaries of the LaGrange Pool of the Illinois River. On the basis of these data, a suspended-sediment budget and yields for the LaGrange Pool were calculated.

The main-stem inflow site, Illinois River at Pekin, drained 14,585 square miles (mi^2), which is 55 percent of the 26,743 mi^2 total drainage area of the main-stem outflow site, Illinois River at Valley City. During the study period, the Illinois River at Pekin transported an annual average suspended-sediment load of 1,510,000 tons, which computes to an annual average yield of 103 tons/mi^2 (figure 1). The Illinois River at Valley City transported an annual average suspended-sediment load of 5,010,000 tons, which computes to an annual average yield of 188 tons/mi^2. The increase in average yield between the two main-stem sites was attributed to the four major tributaries: the Mackinaw River near Green Valley (1,073 mi^2 drainage area, annual average suspended-sediment load of 355,000 tons, and annual average yield of 332 tons/mi^2), the Spoon River at Seville (1,636 mi^2 drainage area, annual average suspended-sediment load of 1,040,000 tons, and annual average yield of 638 tons/mi^2), Sangamon River at Oakford (5,093 mi^2 drainage area, annual average suspended-sediment load of 932,000 tons, and annual average yield of 183 tons/mi^2), and the LaMoine River at Ripley (1,293 mi^2 drainage area, annual average suspended-sediment load of 623,000 tons, and annual average yield of 482 tons/mi^2).

The main-stem inflow and four tributaries collectively drained 23,680 mi^2 (89 percent of the drainage area at the main-stem outflow), with an annual average suspended-sediment load of 4,460,000 tons, and annual average yield of 188 tons/mi^2. This load is equal to the outflow yield of 188 tons/mi^2 at Valley City, indicating that during the study period, sediment entered and exited LaGrange Pool at the same rate.

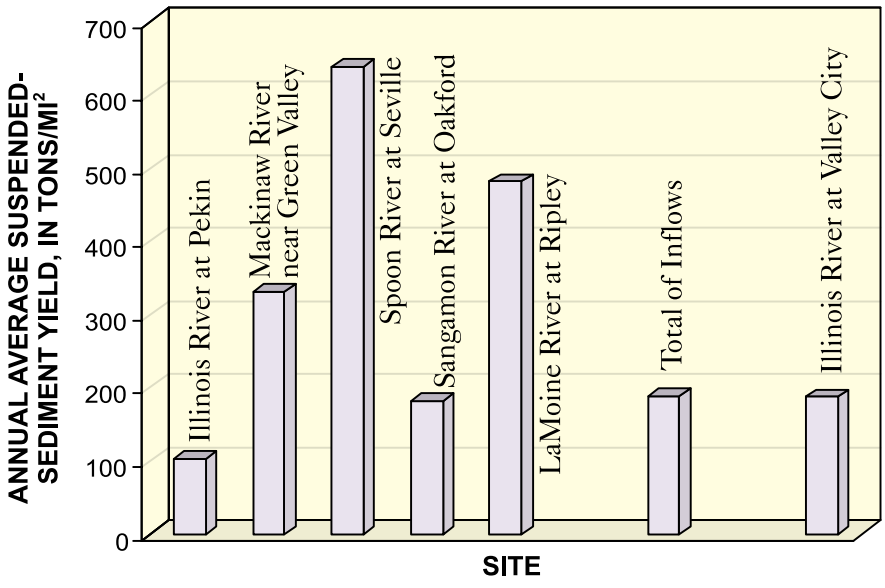


Figure 1. Annual average suspended-sediment yield of the Illinois River and major tributaries in the LaGrange Pool, Illinois River.

Hydrogeology and Simulation of Ground-Water Flow in the Aquifers underlying Belvidere, Illinois

by Patrick C. Mills

Since sampling for synthetic compounds began in 1985, volatile organic compounds (VOC's) have been detected in samples from wells open to each aquifer underlying Belvidere, Illinois (fig. 1), including samples from five municipal water-supply wells. Aquifers underlying Belvidere and throughout north-central Illinois are considered especially susceptible to ground-water contamination because of the density of industrial and waste-disposal sites and the shallow depth (less than 50 feet) to the unconsolidated sand and gravel aquifers and the fractured, carbonate aquifers. During 1992-2000, the U.S. Geological Survey, in cooperation with the U.S. Environmental Protection Agency and the Illinois Environmental Protection Agency, investigated the ground-water-flow system and distribution of contaminants in the vicinity of Belvidere. The data and conceptual models developed as part of this study have allowed Federal and State agencies and the city of Belvidere to better manage, protect, and restore the ground- and surface-water resources of the area.

The investigation included the collection and compilation of hydrogeologic and water-quality data and simulation of the ground-water-flow system by using a numerical model. Hydrogeologic data included lithologic, stratigraphic, geophysical, hydraulic-property, water-level, and streamflow data. Water-quality data included analyses of VOC's, tritium, and other constituents. Data were collected from about 250 wells and 21 surface-water sites. The data were used to describe the hydrogeologic framework of the ground-water-flow system, preferential pathways and directions of ground-water movement and contaminant distribution, ground-water/surface-water relations, and the water budget, as well as to prepare the numerical model.

Ground-water flow and contaminant distribution can be described in relation to the glacial drift (sand and gravel), the Galena-Platteville (fractured dolomite), and the Cambrian-Ordovician (sandstone) aquifers (fig. 2). The dolomite and sandstone aquifers are separated by the Glenwood Formation confining unit, which may be absent in the

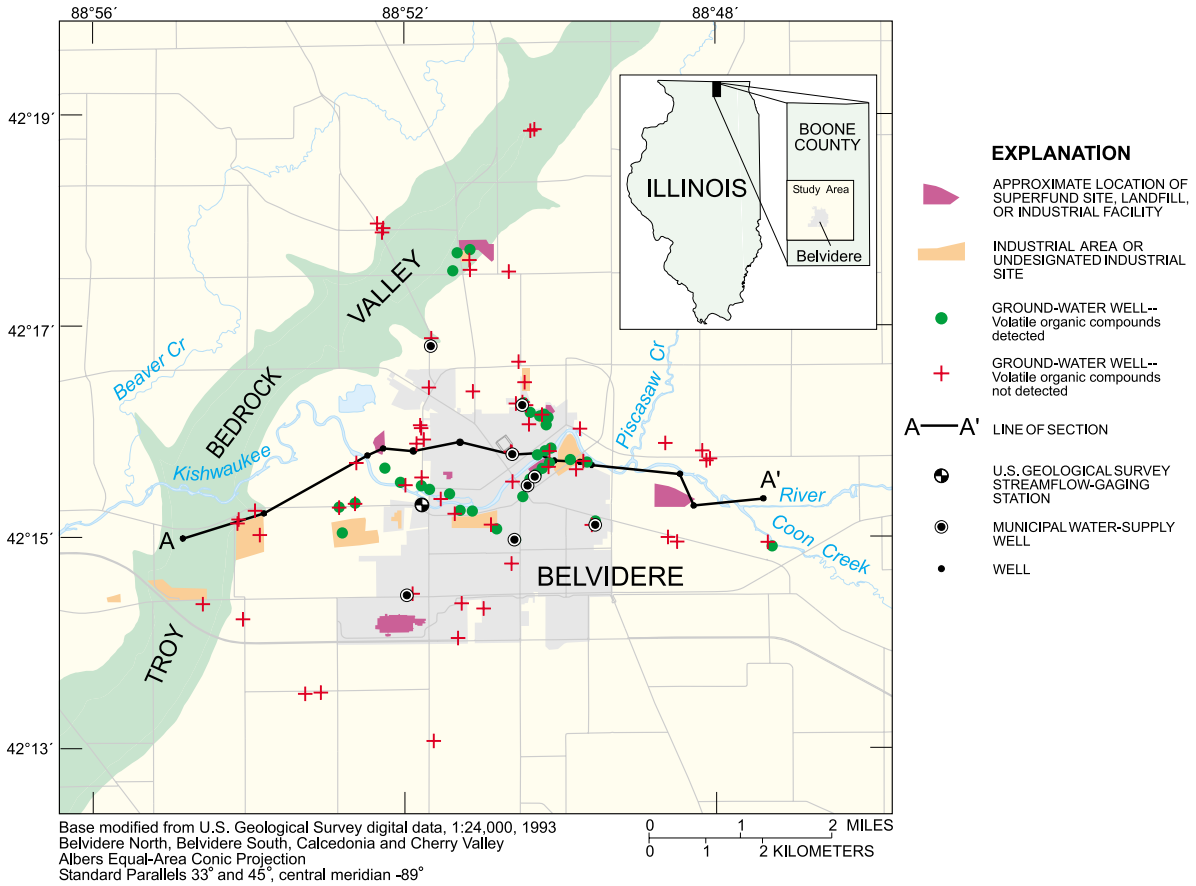


Figure 1. Study area in the vicinity of Belvidere, Ill., and hazardous-waste-disposal and industrial sites, municipal water-supply wells, selected private wells, and line of section A-A'; and wells in which volatile organic compounds were detected, July 1993.

northeast trending Troy Bedrock Valley (figs. 1 and 2).

All sections of the Kishwaukee River and its tributaries appear to be gaining streamflow by way of shallow ground-water discharge. Potentiometric levels in the glacial drift and Galena-Platteville aquifers range from about 900 feet above sea level in the uplands to 740 feet along the Kishwaukee River.

Estimated horizontal hydraulic conductivity of the glacial drift aquifer ranges from about 0.13 to 280 feet per day. The Galena-Platteville aquifer is a dual-porosity unit, with flow primarily through the fractures and bedding-plan partings. Estimated horizontal hydraulic conductivity ranges from about 0.005 to 2,500 feet per day. Estimated horizontal hydraulic conductivity of the St. Peter Sandstone aquifer ranges from about 4.7 to 17.5 feet per day.

Trichloroethene and tetrachloroethene are the principal VOC's present at levels above maximum contaminant levels, with the most detections and highest concentrations in the glacial drift aquifer. Horizontal distribution of the VOC's in the glacial drift aquifer generally is less than 1,000 feet. Most source areas (industrial or disposal sites) are near the Kishwaukee River, where shallow ground water discharges. The sandstone aquifers underlying the Glenwood Formation confining unit generally are not vulnerable to contamination. Downward movement of contaminants appears to be restricted by the confining unit and lateral movement toward the municipal wells through permeable intervals in the Galena-Platteville aquifer. Partings at about 525 and 485 feet above sea level appear to intercept several of the municipal wells. Water levels in the lower one-third of the Galena-Platteville aquifer can respond rapidly to withdrawal activity at the municipal wells. Locally, fractures that possibly penetrate the confining unit and (or) unused wells may allow movement of contaminants to the sandstone aquifers.

The ground-water-flow system underlying Belvidere was simulated to verify the conceptual model and provide additional hydrogeologic insight. The three-dimensional, steady-state model represents the glacial drift, Galena-Platteville, and Cambrian-Ordovician (sandstone) aquifers separated by the Glenwood Formation confining unit. The model was calibrated against ground-water levels measured in 1993 and ground-water discharge to selected streams. Within the limitations of the model design and available data, the simulation generally supported the conceptualized flow system.

The simulation results indicate (1) ground-water discharge typically is to the local streams, (2) the transmissivity of the glacial drift aquifer within the Troy Bedrock Valley may be less than previously conceived, and (3) the till-dominated deposits in the southern part of the study area may include some previously unrecognized water-yielding sand and gravel units.

The numerical model should be useful for further analysis of the ground-water-flow system underlying Belvidere, including preliminary delineation of the areas that contribute recharge to the principal water-supply wells. Additional hydrogeologic data, particularly near the boundaries of the study area, should enhance the accuracy and utility of the model.

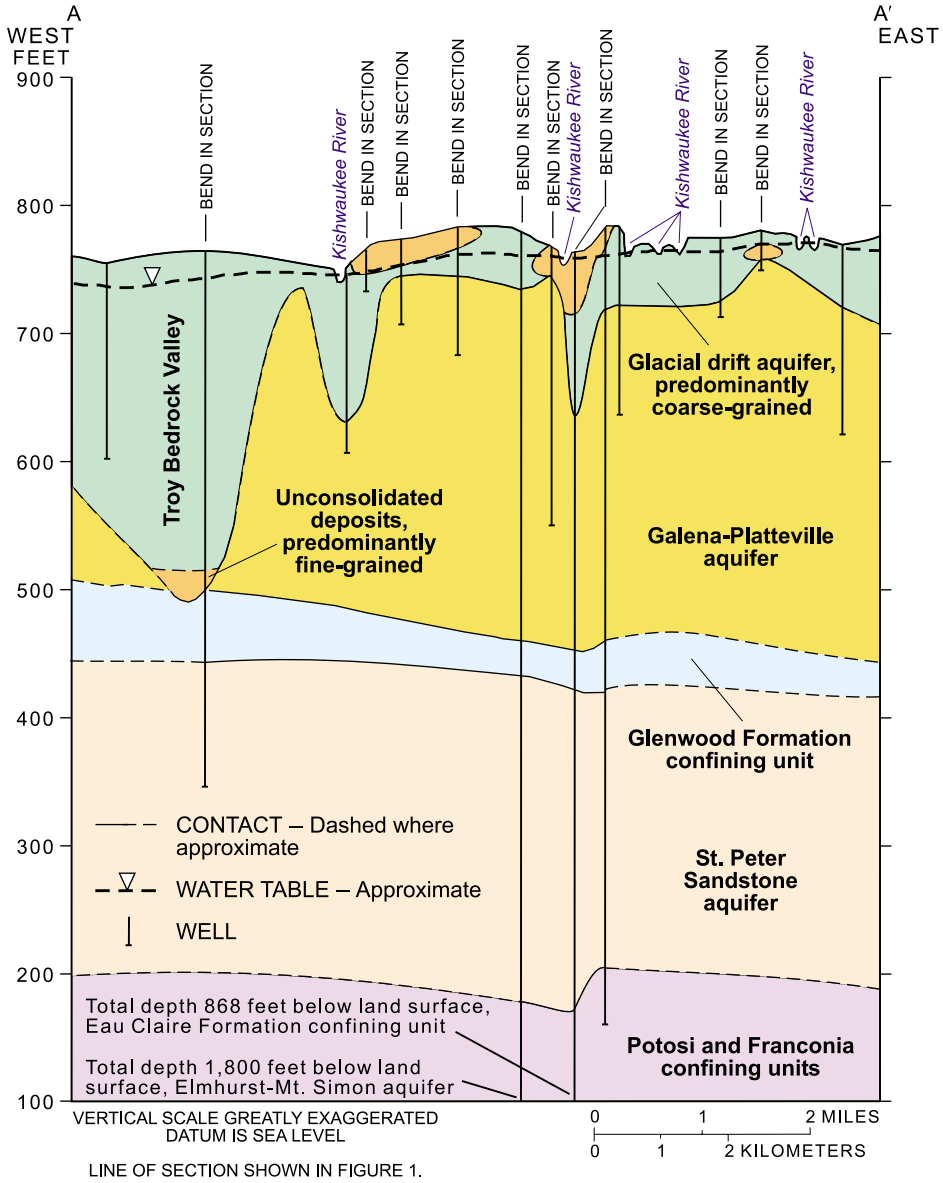


Figure 2. Hydrogeologic section A-A' through the vicinity of Belvidere, Illinois.

The Necessity for a Real-Time Streamflow Data Network: The Multitude of Uses and a Look at the Cost Issue
(Paper to be presented at the Illinois Water 2000 Conference, November 13-14, 2000)
by Robert R. Holmes, Jr., P.E.

The State of Illinois and the Midwest face many water issues, including floods, droughts, and water pollution. The U.S. Geological Survey (USGS) operates and maintains a real-time network of over 170 streamflow-gaging stations in Illinois, in cooperation with other Federal, State, and local agencies. From this network, the data are used in addressing many of the water issues that the State is facing now. Every day the data are used to operate river control structures for barge traffic, drinking-water intake pumps, and hydroelectric and nuclear power plants. For these purposes, the availability of real-time streamflow data is important and critical during times of floods and droughts. During floods, the data are used to make decisions such as operation of control structures, location and type of flood-fighting efforts, such as sandbagging; evacuation or road closures; and adjustment of computer models to forecast flood crests. During these times, the decisions made by water-management agencies can result in saving or spending multimillions of dollars; thus, agencies need accurate and up-to-date data to make these decisions. During drought conditions, these data are used to monitor and manage drinking-water supplies, water-quality conditions, and hydroelectric and nuclear power plants operations. The effect of shutting down a nuclear power plant because water is unavailable for cooling can cost the power industry hundreds of thousands of dollars per day and result in power outages.

The data collected from the USGS real-time network are archived and used in numerous ways. For example, streamflow data are used to determine the low flow characteristics of streams to facilitate determining waste-load allocation and water-supply capacity, to determine the flood characteristics of streams for bridge design and flood inundation mapping, and to estimate trends in streamflow and (along with other data) water quality.

Presently, the annual operating cost of a streamflow-gaging station in Illinois by the USGS is approximately $10,000. Although this cost is not insignificant, the benefits of timely data are great. During a single hydrologic extreme event, making the correct water-management decision may well pay for the cost of the station for many years.

The real-time data for Illinois may be viewed on the Web at http://il.water.usgs.gov/ and for the Nation at http://water.usgs.gov/real-time.html

Employee Spotlight

Debbie Adolphson, Hydrologist, Illinois District

In July 1995, Debbie Adolphson joined the U.S. Geological Survey (USGS) in Urbana, Illinois. Debbie's first assignment was for the Lower Illinois River Basin (LIRB), National Water-Quality Assessment (NAWQA) program. Her duties involved surface-water-quality sampling at various monitoring sites throughout the LIRB. In 1996, Debbie began collecting aquatic macro-invertebrates, algae, fish, bed-sediments, and following data collection; Debbie analyzed the data for presentation in various USGS reports. In 1999, Debbie transferred to the upper Illinois River Basin (UIRB) NAWQA program. She is presently doing similar work in the UIRB. Debbie also is the Illinois District Safety Officer. Her duties as Safety Officer provide many opportunities to work with all District personnel. As Safety Officer, she ensures that training, equipment, immunizations, and paperwork are kept up to date for the District Safety Program. Debbie finds job satisfaction in collecting and analyzing scientific data that can be used to maintain quality water resources for the Nation and ensuring that District personnel have a safe environment in which to work. Before joining the USGS, Debbie worked for the Bureau of Land Management in Coeur d'Alene, Idaho, as a student hydrologist. While there she helped write Environmental Impact Statements, delineate drainage basins, and conduct stream surveys. In 1995, Debbie received a B.S. in Forestry from the University of Montana.

COOPERATOR SPOTLIGHT

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
BUREAU OF WATER, GROUNDWATER SECTION

The Groundwater Section in the Bureau of Water at the Illinois Environmental Protection Agency (IEPA) operates a successful program to protect ground-water and community drinking-water resources in the State of Illinois. The program is recognized nationally, and the IEPA staff has played key roles in the development of national policies and guidance on ground-water issues. Programs, such as the National Groundwater Foundations "Groundwater Guardian and Affiliate" and the "Retired Senior Volunteer" (only nine States received a U.S. Environmental Protection Agency (USEPA) grant for this program) Programs have been integral in obtaining local government support for these efforts. Through IEPA's outreach efforts, local stakeholders have encouraged the management of wellhead protection areas by promoting the Conservation Reserve Program, agricultural best-management practices, and pollution prevention interns placement in key industries.

In September 1987, legislation was adopted for protection of Illinois ground water from contamination. The Illinois Groundwater Protection Act (IGPA) responds to the pervasive need to manage ground-water quality by a prevention-oriented process. This comprehensive act relies upon a State and local partnership by establishing the following: a unified ground-water protection program; a ground-water protection policy; enhanced cooperation; water-well protection zones; well site surveys, mapping and assessments; regional ground-water protection planning committees; comprehensive ground-water monitoring; authority for recharge area protection; the development of ground-water quality standards and technology control regulations.

The IGPA established two coordinating mechanisms to review ground-water policy and implementation efforts. The Interagency Coordinating Committee on Groundwater (ICCG), chaired by the IEPA Director, is composed of all State agencies and the U.S. Geological Survey (USGS) that have the authority to deal with ground-water related issues. The ICCG reviews and coordinates the State's ground-water protection policies, procedures, and implementation efforts pursuant to the IGPA. The Groundwater Advisory Council (GAC) is composed of nine public members appointed by the Governor. Members of the GAC serve 3-year terms and assist in efforts to protect ground-water resources by reviewing, evaluating, and making recommendations regarding State laws and regulations for ground-water protection, ground-water research, data collection and analyses, and implementation of the IGPA.

Through the ICCG and GAC, the IEPA submitted and received endorsement for its Wellhead Protection (WHP) and Core Comprehensive State Ground Water Protection (CSGWP) Programs from the USEPA in 1991 and 1997, respectively. Illinois was the first State in USEPA Region V to receive endorsement for both programs. Illinois was the seventh State in the Nation to receive approval for its Core CSGWP Program, which is intended to provide a flexible working relation among the USEPA, the State of Illinois, and local governments to achieve a more efficient and comprehensive approach to protecting ground-water resources.

In addition, the IEPA staff has continued to work with the Priority Groundwater Protection Planning Committees, established under the IGPA to implement effective local protection programs. The IEPA will propose the first maximum setback zone, regulated recharge area, and proposals dealing with water resources in karst areas (areas with sinkholes, caves, and underground drainage) to the Pollution Control Board. Concurrently, the IEPA will concurrently continue to work with local stakeholders through the regional ground-water protection unified watershed assessment and wellhead protection program to prevent the contamination of public-water supplies and restore the quality of public-water supplies.

In October 1999, Illinois received approval for their source-water assessment and protection program application from USEPA. As required under this program IEPA must delineate source-water-assessment area boundaries for all public-water supplies, inventory existing and potential sources of contamination within those boundaries, provide an analysis of the susceptibility of the water systems to contaminants, and establish a process for making the assessments available to the public.

The IEPA, Groundwater Section, works closely with the USGS Illinois District on a wide variety of course water assessment projects, including completing the recharge delineation for the city of Belvidere (complex fractured rock hydrologic setting), developing a dynamic Internet/Intranet Geographic Information System, assisting in the development of a community water supply Fact Sheet generator data base, developing county-level wellhead protection area/surface-water-based maps, developing a source-water assessment Internet interface to Consumer Confidence Report compliance data, and assisting with the development of chemical specific Fact Sheets to supplement source-water assessments.

Source Water Assessment Program for Illinois

By Terry Ortel

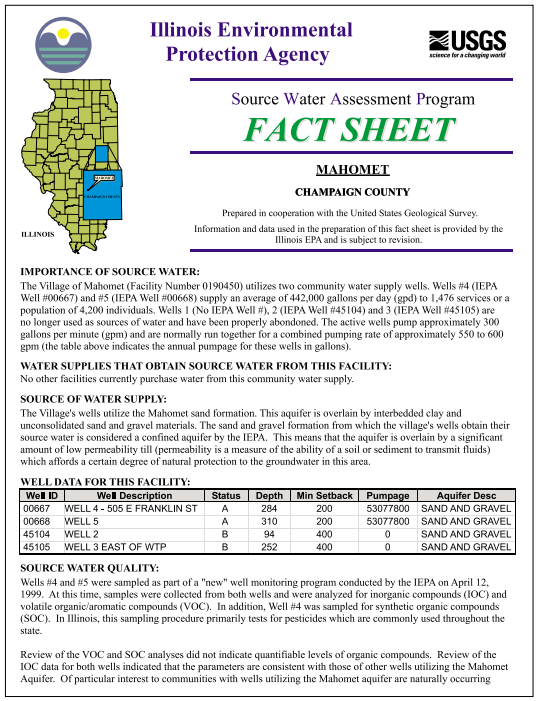
The U.S. Geological Survey (USGS), Illinois District, is working with the Illinois Environmental Protection Agency (IEPA) to provide drinking-water-quality data and analyses to the public as part of IEPA's Source Water Assessment Program (SWAP). SWAP is designed to be a proactive approach to protecting the water supply by increasing public awareness of present and potential contaminants that may be detrimental to drinking-water quality in Illinois. The primary components of SWAP are identifying areas that supply drinking water, inventorying potential sources of contamination, determining the susceptibility of the drinking-water source to contamination, and informing the public of the assessment results.

SWAP assessments will be conducted for all public-water supplied in Illinois. The public water supplies consist of approximately 1,800 community-water supplies and more than 4,100 non-community-water supplies. The source of water for these supplies are both surface water and ground water, or a combination.

The SWAP assessment of each community-water supply will be published as a Fact Sheet (see fig. 1) and made available on the World Wide Web (Web). The assessment will describe the: source of drinking water (surface water, ground water, or both), characteristics of the community-water supply wells and/or intakes, source-water quality, finished water quality, potential sources of contamination, susceptibility to potential contamination, and surface-water and/or ground-water protection efforts. The information and data used in the assessment preparation are provided by the IEPA and include searching existing State and Federal data bases, analyses, field surveys, and water-test results. The SWAP Fact Sheets for all community-water supplies are scheduled for completion by May 2003.

In addition to the published Fact Sheets, which document the source-water conditions at one point in time (the time the data are collected), the USGS and IEPA are developing a Web application for retrieving up-to-date source-water data and analyses. The Web application will include a query tool for retrieving recent source-water-assessment data published by the IEPA and also will have a geographical information system (GIS) interface for spatial data-base queries. USGS real-time data also will be accessible through the GIS interface. USGS real-time data for Illinois consists of primarily surface-water stage and discharge data, but real-time water-quality data also are available for some stations. For example, the Sangamon River at Monticello, Illinois; has real-time data available for specific conductance and water temperature, in addition to streamflow and stage data (http://il.water.usgs.gov/nwis-w/IL/data.components/rt.cgi?stat-num=05572000). Recently, telemetry was added to the USGS monitoring well near Hoopeston, Illinois; making real-time ground-water data available (http://il.water.usgs.gov/nwis-w/IL/data.components/gw.cgi?stat-num=402558087351501). This effort will allow decisionmakers and the public to obtain the most recent information regarding the source water in any given area in the State.

To learn more about the IEPA SWAP program, please visit the IEPA SWAP web page at http://www.epa.state.il.us/water/pws/groundwater/source-water-quality-program.html. Additional information on USGS Illinois District programs can be found at http://il.water.usgs.gov/index.html.



Illinois Environmental Protection Agency

USGS science for a changing world

Source Water Assessment Program

FACT SHEET

MAHOMET

CHAMPAIGN COUNTY

Prepared in cooperation with the United States Geological Survey.

Information and data used in the preparation of this fact sheet is provided by the Illinois EPA and is subject to revision.

ILLINOIS

IMPORTANCE OF SOURCE WATER:

The Village of Mahomet (Facility Number 0190450) utilizes two community water supply wells. Wells #4 (IEPA Well #00667) and #5 (IEPA Well #00668) supply an average of 442,000 gallons per day (gpd) to 1,476 services or a population of 4,200 individuals. Wells 1 (No IEPA Well #), 2 (IEPA Well #45104) and 3 (IEPA Well #45105) are no longer used as sources of water and have been properly abondoned. The active wells pump approximately 300 gallons per minute (gpm) and are normally run together for a combined pumping rate of approximately 550 to 600 gpm (the table above indicates the annual pumpage for these wells in gallons).

WATER SUPPLIES THAT OBTAIN SOURCE WATER FROM THIS FACILITY:

No other facilities currently purchase water from this community water supply.

SOURCE OF WATER SUPPLY:

The Village's wells utilize the Mahomet sand formation. This aquifer is overlain by interbedded clay and unconsolidated sand and gravel materials. The sand and gravel formation from which the village's wells obtain their source water is considered a confined aquifer by the IEPA. This means that the aquifer is overlain by a significant amount of low permeability till (permeability is a measure of the ability of a soil or sediment to transmit fluids) which affords a certain degree of natural protection to the groundwater in this area.

WELL DATA FOR THIS FACILITY:

Well ID	Well Description	Status	Depth	Min Setback	Pumpage	Aquifer Desc
00667	WELL 4 - 505 E FRANKLIN ST	A	284	200	53077800	SAND AND GRAVEL
00668	WELL 5	A	310	200	53077800	SAND AND GRAVEL
45104	WELL 2	B	94	400	0	SAND AND GRAVEL
45105	WELL 3 EAST OF WTP	B	252	400	0	SAND AND GRAVEL

SOURCE WATER QUALITY:

Wells #4 and #5 were sampled as part of a "new" well monitoring program conducted by the IEPA on April 12, 1999. At this time, samples were collected from both wells and were analyzed for inorganic compounds (IOC) and volatile organic/aromatic compounds (VOC). In addition, Well #4 was sampled for synthetic organic compounds (SOC). In Illinois, this sampling procedure primarily tests for pesticides which are commonly used throughout the state.

Review of the VOC and SOC analyses did not indicate quantifiable levels of organic compounds. Review of the IOC data for both wells indicated that the parameters are consistent with those of other wells utilizing the Mahomet Aquifer. Of particular interest to communities with wells utilizing the Mahomet aquifer are naturally occurring

Figure 1. Example Source Water Assessment Program Fact Sheet for a community water supply (only front page shown).

From the Mailbag

If you have comments about our newsletter or our Web site, please use the form on the back page. Comments also can be sent to dc_il@usgs.gov.

"I enjoyed the Water Resources Update and look forward to future updates. I would suggest nothing other than keeping me on your mailing list and continuing with your excellent work."

"I wanted to thank all of you for the timely response provided regarding my questions on the gage datum at Louisville. The information was useful in assessing the problems we were having with our model calibration. Thanks again for your time."

"Thanks for the response. I can now access the site. I guess one can always blame it on the internet!! I find this site so great when looking at water levels on the Chain O Lakes. With all the high water levels this year, it really gives me a great view of the water level status."

"... I'm writing to give you the requested feedback on the Illinois Water Resources Data CD-ROM for 1999.... What can I say but that this is an excellent resource! My boss concurs. We'd love to see this expanded to other states, especially those in our area of responsibility. We especially like the period-of-record discharge values, in "rdb" format, for each site, as these are what we use for the calibration of our model..."

Excerpts from the Water Stakeholders Listening Session, March 15, 2000, Arlington, Virginia: "Data is USGS cornerstone ... quality science is your benchmark ... costs and especially overhead charges are too high ... maintain neutrality ... a balance in quality of water issues against quantity and supply issues ... more ground-water information is needed ... USGS staff are a tremendous resource ... develop plans with the States ... don't try to be all things to all people ... focus on what makes USGS "special" ... look at fundamental processes ... keep a focus on research and development ... work to inform legislation ..."

Illinois District Publications

Listed below are publications that were recently published. District policy is to provide copies of our publications to requestors at no cost as long as the publication is in stock in the District office. To obtain copies of the following, or any other Illinois District publication, you may contact Donna Ayers at (217) 344-0037, extension 3053 or by email at dmayers@usgs.gov.

FY 2000

WRIR 99-4229, Volatile Organic Compounds in Ground Water of the Lower Illinois River Basin, by W.S. Morrow, Jr.

OFR 99-69, Water, Sediment, and Nutrient Budgets, and Bathymetric Survey of Old and New Gillespie Lakes, Macoupin County, Illinois, May 1996-April 1997, by G.P. Johnson

WRIR 97-4054-C, Altitude, Depth, and Thickness of the Galena-Platteville Bedrock Unit in the Subcrop Area of Illinois and Wisconsin, by T.A. Brown, C.P. Dunning, and J.B. Sharpe

WRIR 99-4138, Geology, Hydrology, and Ground-Water Quality of the Upper Part of the Galena-Platteville Aquifer at the Parson's Casket Hardware Superfund Site in Belvidere, Illinois, by R.T. Kay, D.J. Yeskis, J.W. Lane, Jr., P.C. Mills, P.K. Joesten, G.L. Cygan, and J.R. Ursic

WRIR 99-4152, Analysis of Nutrients, Selected Inorganic Constituents, and Trace Elements in Water from Illinois Community-Supply Wells, 1984-91, by K.L. Warner

WRIR 00-4027, Recharge Potential of Surficial and Shallow Bedrock Aquifers in the Upper Illinois River Basin, by T.L. Arnold and M.J. Friedel

WRIR 00-4088, Hydrology, Water Quality, and Nutrient Loads to Lake Catherine and Channel Lake, near Antioch, Lake County, Illinois, by R.T. Kay and others

WRIR 4101, Methodology, Data Collection, and Data Analysis for Determination of Water-Mixing Patterns Induced by Aerators and Mixers, by G.P. Johnson and others

WRIR 00-4115, Suspended Budget, Flow Distribution, and Lake Circulation for the Fox Chain of Lakes in Lake and McHenry Counties, Illinois, 1997-99, by D.L. Schrader and R.R. Holmes

COMMENTS

We would like your feedback on our newsletter. What would you like to see included in future issues? Tell us what you liked or did not like in this issue. To return: fold in half, and return to address on reverse; postage required. Thank you.

☐ Please remove my name from the newsletter mailing list.

Name and Mailing Address

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221 N. Broadway Ave., Suite 101
Urbana, Illinois 61801