WATER-RESOURCES ACTIVITIES OF THE U.S. GEOLOGICAL SURVEY IN ILLINOIS, 1990

Compiled by G.O. Balding

U.S. GEOLOGICAL SURVEY

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Urbana, Illinois

1992

U.S. DEPARTMENT OF THE INTERIOR
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WATER-RESOURCES ACTIVITIES OF THE U.S. GEOLOGICAL SURVEY

IN ILLINOIS, 1990

Compiled by G.O. Balding

ORIGIN AND MISSION OF THE U.S. GEOLOGICAL SURVEY

The U.S. Geological Survey (USGS) was established by an Act of Congress on March 3, 1879, to provide a permanent Federal agency to conduct the systematic and scientific "classification of the public lands, and examination of the geological structure, mineral resources, and products of the national domain."

Since 1879, the research and fact-finding role of the USGS has grown and has been modified to meet the changing needs of the Nation it serves. The USGS, however, has remained an impartial scientific and technical agency without developmental or regulatory responsibilities. Today's programs serve a diversity of needs and users. The current mission of the USGS is to provide geologic, topographic, and hydrologic information that contributes to the wise management of the Nation's natural resources and that promotes the safety and well-being of the public. This information is provided to the public in many forms--including reports, maps, and data bases that provide descriptions and analyses of the water, energy, and mineral resources, the land surface, the underlying geologic structure, and the dynamic processes of the Earth. To accomplish its mission, the USGS:

- Conducts and sponsors research in geology, hydrology, mapping, and related sciences.
- Produces and updates geographic, cartographic, and remotely sensed information in graphic and digital forms.
- Describes the onshore and offshore geologic framework and develops an understanding of its formation and evolution.
- Assesses energy and mineral resources, determines their origin and manner of occurrence, and develops techniques for their discovery.
- Collects and analyzes data on the quantity and quality of surface water and ground water, on water use, and on quality of precipitation.
- Assesses water resources and develops an understanding of the impact of human activities and natural phenomena on hydrologic systems.
- Evaluates hazards associated with earthquakes, volcanoes, floods, droughts, toxic materials, landslides, subsidence, and other ground failures, and develops methods for hazards prediction.

- Participates in the exploration of space and prepares geologic and other maps of the planets and their satellites.

- Publishes reports and maps, establishes and maintains earth-science data bases, and disseminates earth-science data and information.

- Provides scientific and technical assistance for the effective use of earth-science techniques, products, and information.

- Coordinates topographic, geologic, and land-use mapping, digital cartography, and water-data activities.

- Develops new technologies for the collection, coordination, and interpretation of earth-science data.

- Provides scientific support and technical advice for legislative, regulatory, and management decisions.

- Cooperates with other Federal, State, and local agencies, and with academia and industry.

As the Nation's largest earth-science research agency, the USGS maintains a long tradition of providing accurate and impartial information to all, which underscores its continued dedication to "Earth Science in the Public Service."

MISSION OF THE WATER RESOURCES DIVISION

The Water Resources Division of the USGS has the principal responsibility within the Federal Government to provide the hydrologic information and understanding needed by others to achieve the best use and management of the Nation's water resources. To accomplish this mission, the Water Resources Division in cooperation with other Federal, State, and local agencies:

- Systematically collects data needed for the continuing determination and evaluation of the quantity, quality, and use of the Nation's water resources.

- Conducts analytical and interpretive water-resources appraisals to describe the occurrence, availability, and physical, chemical, and biological characteristics of surface and ground water and their inter-relationship.

- Conducts supportive basic and problem-oriented research in hydraulics, hydrology, and related fields of science and engineering to improve the basis for field investigations and measurement techniques and to understand hydrologic systems sufficiently well to predict quantitatively their response to stress, either natural or manmade.

- Disseminates water data and the results of investigations and research through reports, maps, computerized information services, and other forms of public release.

- Coordinates the activities of all Federal agencies in the acquisition of certain water data.

- Provides scientific and technical assistance in hydrologic fields to State, local, and other Federal agencies, to licensees of the Federal Energy Regulatory Commission, and, on behalf of the U.S. Department of State, to international agencies.

- Acquires, develops, and disseminates information on water-related natural hazards such as droughts, floods, landslides, land subsidence, mudflows, and volcanoes.

- Administers the provisions of the Water Resources Research Act of 1984, which includes the State Water Resources Research Institutes and the Research Grants and Contracts programs.

- Supports the provisions of the National Environmental Policy Act of 1969 and manages USGS conduct of natural-resources surveys in response to the Comprehensive Environmental Response, Compensation, and Liability Act (Superfund Act) of 1980.

The Water Resources Division is one of three program Divisions and two support Divisions within the USGS (fig. 1). Headquarters of the Water Resources Division is located at the USGS's National Center in Reston, Va., and consists of the Office of the Chief Hydrologist, the Offices of the Assistant Chief Hydrologists for Operations, Program Coordination and Technical Support, Research and External Coordination, Scientific Information Management, and Water Assessment and Data Coordination (fig. 2).

ILLINOIS DISTRICT ORGANIZATION

The Illinois District of the USGS, Water Resources Division, consists of two support units, a special study unit, two operating sections, one Subdistrict Office, and two field headquarters (fig. 3). Personnel are based at the District Office in Urbana, the Subdistrict Office in De Kalb, and at Field Headquarters in Urbana and Mt. Vernon. The District operates with guidance from Regional and National offices in Reston, Va. Offices for research, training, equipment development, and laboratory services, located throughout the United States, provide technical assistance and advice to the District.

Publications and Data-Management Unit

This support unit assembles reports for review, prepares camera-ready copy for publication, and maintains the District's data files and library. The Unit provides data processing services, maintains computer manuals and program catalogs, does computer programming, and assists hydrologists in program selection, application, and modification.

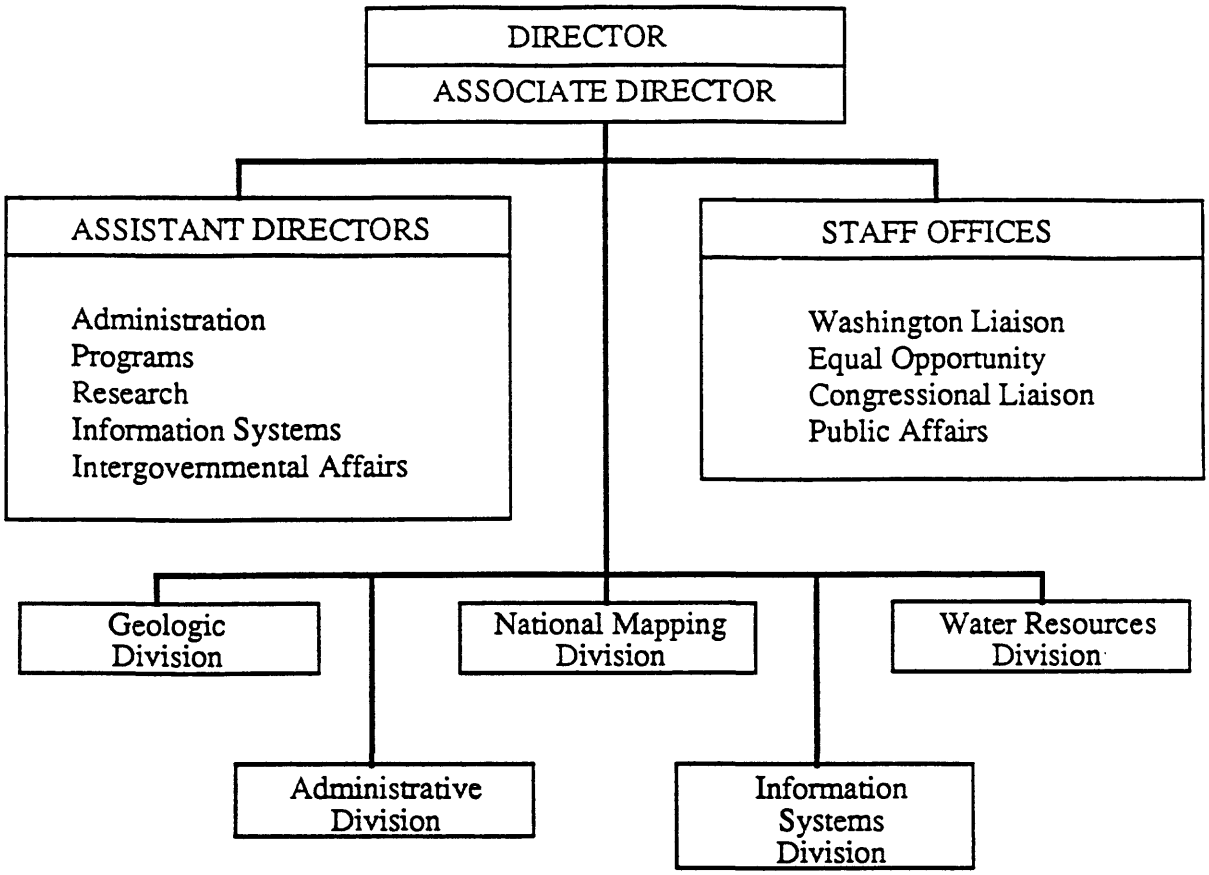


Figure 1.--U.S. Geological Survey organization chart.
Data from U.S. Geological Survey, 1991.

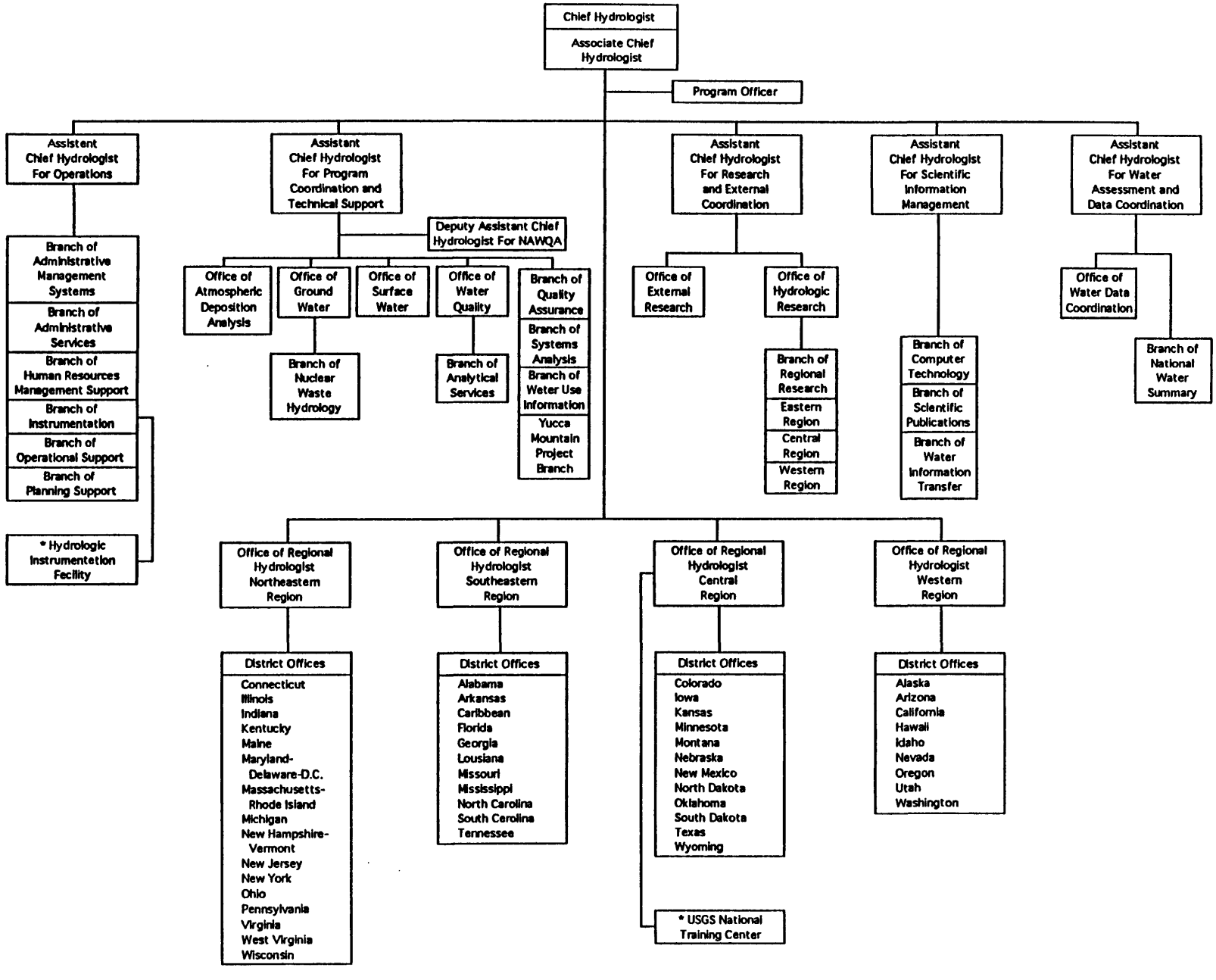
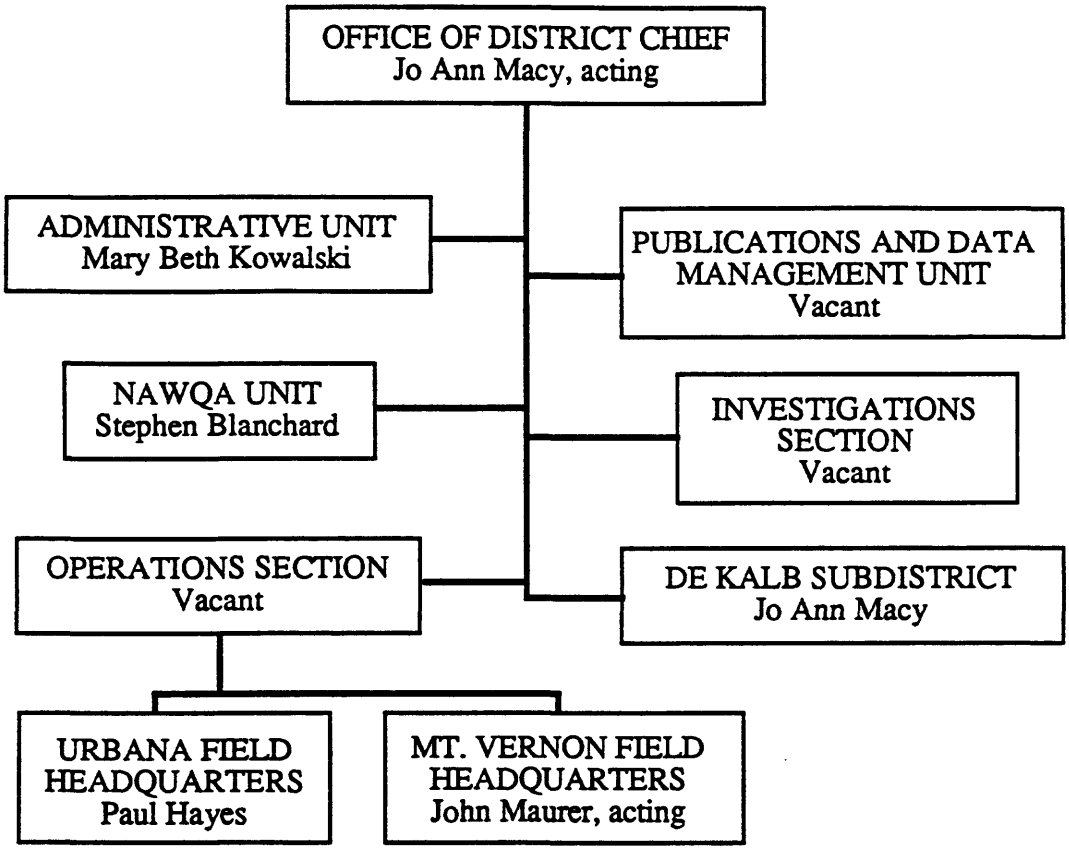


Figure 2.--Water Resources Division organization chart. Data from U.S. Geological Survey, 1991.



District Office	(217) 398-5353	U.S. Geological Survey 102 E. Main Street, 4th Floor Urbana, IL 61801
De Kalb Subdistrict Office	(815) 753-1162	U.S. Geological Survey 629 Lincoln Terrace P.O. Box 427 De Kalb, IL 60115
Urbana Field Headquarters	(217) 398-5570	U.S. Geological Survey 102 E. Main Street, 4th Floor Urbana, IL 61801
Mt. Vernon Field Headquarters	(618) 242-4495	U.S. Geological Survey Room 231, Federal Building 105 S. Sixth Street Mt. Vernon, IL 62864

Figure 3.--Illinois District organization chart and office addresses.

Administrative Unit

The Administrative Unit is responsible for the maintenance of and compliance with Federal acquisition regulations, Departmental manuals, and USGS and Division operating policies. The Unit provides support services in the areas of administrative management, budget formulation and execution, financial planning and accounting, personnel, procurement, space management, and general office procedures.

National Water-Quality Assessment Unit

The NAtional Water-Quality Assessment (NAWQA) Unit is responsible for carrying out the goals of the NAWQA program for the upper Illinois River basin NAWQA project. The goals of the NAWQA program are to (1) describe water-quality conditions and trends and (2) identify, describe, and explain causative factors for the observed conditions and trends. The upper Illinois River basin project is one of seven NAWQA pilot studies that will test, and modify as necessary, concepts and approaches in preparation for possible full implementation of the NAWQA program in the future.

Investigations Section

The Investigations Section conducts multi-discipline hydrologic investigations to determine the quantity and quality of surface and ground water and to define and evaluate the extent and availability of water resources of drainage basins, counties, and the State. The Section conducts special hydrologic research studies on current water issues such as radiohydrology, sedimentation and erosion, urban hydrology, rainfall-runoff modeling, ground-water quality, U.S. Environmental Protection Agency (USEPA) Superfund site work, water disposal, and stream quality. Special investigative techniques for water-resource evaluation include the use of test drilling, packer tests, tracers, surface and borehole geophysics, and ground-water and surface-water modeling of flow and solute movement. Personnel prepare and review reports of investigations for both scientific and lay audiences.

Operations Section

The Operations Section designs and implements a network of stream-gaging, water-quality, and sediment sites based on data needs. The Section directs the installation and maintenance of equipment, data collection and analysis, and compilation of records for publication in the annual data report. It maintains the drainage-area map file and all hydrologic-data files. The Section provides assistance in the collection of water-resources data in support of projects, conducts special data-collection efforts as needed or requested including major floods, low-flow measurements, and indirect measurements. The Section conducts special projects related to water use and coordinates the water-use program. Field offices are responsible for data collection in their designated areas (fig. 4) and report to the Chief, Operations Section.

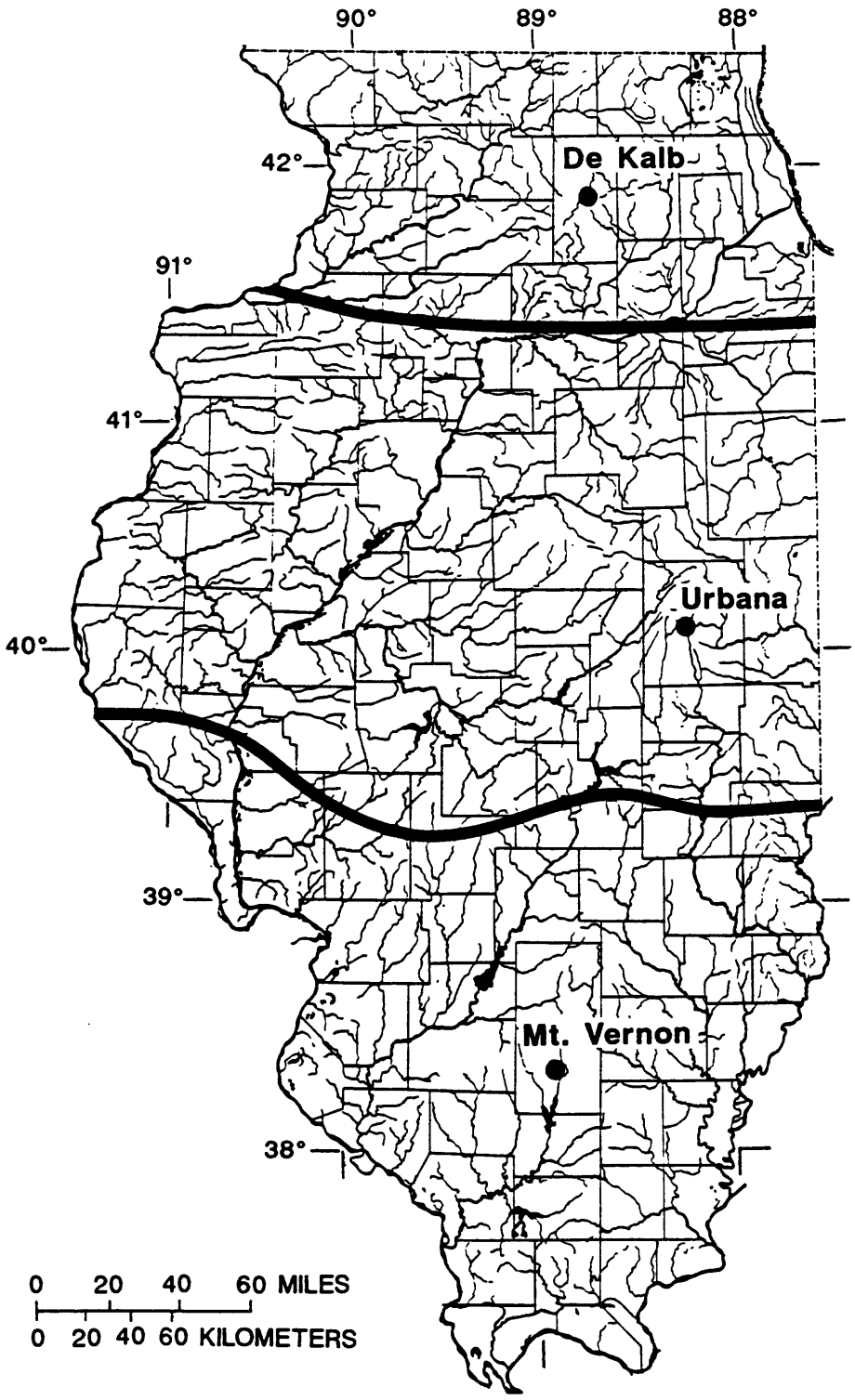


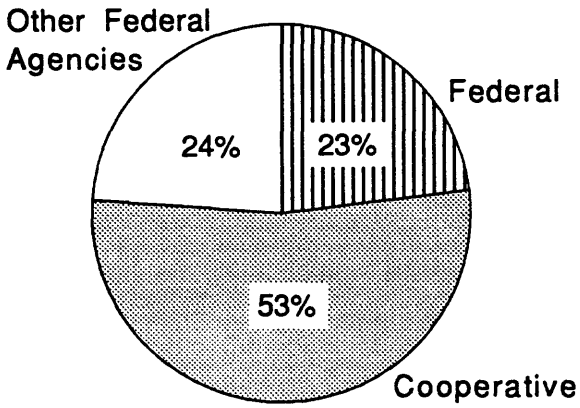
Figure 4.--De Kalb, Urbana, and Mt. Vernon areas of responsibility.

De Kalb Subdistrict Office

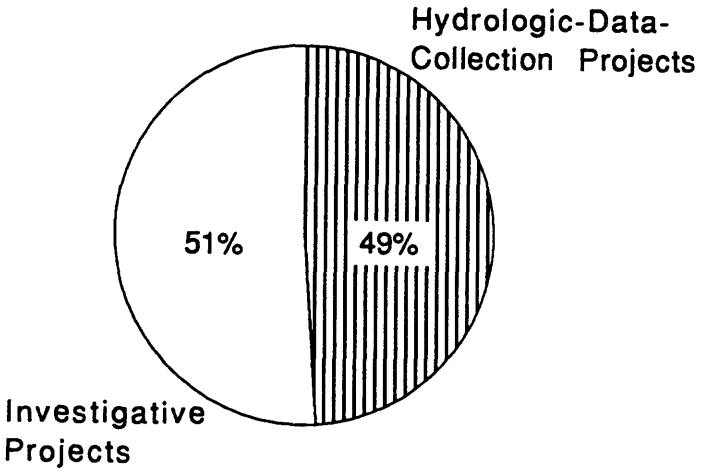
The De Kalb Subdistrict Office conducts multi-discipline hydrologic investigations to determine the quantity and quality of surface and ground water and to define and evaluate the extent and availability of water resources of drainage basins and counties in the northern third of Illinois. The Subdistrict maintains a network of stream-gaging, water-quality, and observation-well sites and directs the data collection, analysis, and compilation of records for those sites for publication in the annual data report.

ILLINOIS DISTRICT FUNDING SOURCES

Funds to support the work performed by the Illinois District, Water Resources Division, are derived from three principal sources--Federal program, Federal-State cooperative program, and other Federal agencies program. Funding from all sources in fiscal year 1990 amounted to about $3,780,000, which was distributed as follows:



The diagram below shows the percentage of the activities for fiscal year 1990 in each of the broad categories of hydrologic-data collection and water-resource investigations:



The activities are directed toward obtaining the information needed by managers and planners to achieve the best management and use of the water resources in Illinois and the Nation.

Federal Program

Funds for the Federal Program are appropriated by the Congress and are specifically identified in the annual USGS budget. These funds are used to support research, data collection, high-priority topical programs, the coordination of all Federal programs related to collection of water data, and internal support services.

Federal-State Cooperative Program

Federal funds are appropriated by the Congress and used to match those furnished by State and other tax-supported agencies on a 50-50 basis (Gilbert and Mann, 1991). These funds are used for a variety of hydrologic data-collection activities and water-resources investigations in which the Water Resources Division represents the national responsibilities and the cooperating agencies represent State and local interests. Agencies supporting water-resources activities in Illinois during fiscal year 1990 are listed in table 1.

Other Federal Agencies Program

In this program, the funds are transferred to the USGS as reimbursement for work performed at the request of another Federal agency. These funds are used for a variety of hydrologic-data collection and water-resources investigations such as stream gaging, ground-water-quality assessments, and suspended-sediment monitoring in streams.

WATER CONDITIONS

Illinois generally has adequate supplies of water suitable for most uses. The mean annual precipitation for the 1961-90 period is shown in figure 5. Water is available from several major rivers and lakes within or bordering Illinois and from ground-water sources. In the northern one-third of the State, most municipal water supplies are obtained from ground water, whereas, in the remainder of the State, municipal supplies generally are obtained from surface-water sources. In the southern two-thirds of the State, potable ground water may be obtained locally from shallow alluvium-filled valleys that were eroded into the bedrock by ancestral streams.

During 1990, runoff was normal north of a line extending from south of Quincy to the northeast corner of the State; below that line, runoff was above normal (fig. 6). For example, runoff at Pecatonica River at Freeport was 98 percent of its median while runoff at Sangamon River at Monticello and Skillet Fork at Wayne City was 178 and 144 percent, respectively.

Table 1.--Agencies supporting water-resources activities during fiscal year 1990

State Agencies

Illinois Department of Transportation
  Division of Water Resources

Illinois Environmental Protection Agency
  Division of Water Pollution Control
  Division of Public Water Supply

Illinois Department of Energy and Natural Resources
  Illinois State Water Survey

Local Agencies

Bloomington and Normal Sanitary District

Forest Preserve District of Cook County

Forest Preserve District of Du Page County

Du Page County Department of Environmental Concerns

Lake County Department of Planning, Zoning, and Environmental Quality

Conservation District of Vermilion County

The Metropolitan Water Reclamation District of Greater Chicago

City of De Kalb

City of Decatur

City of Springfield

Federal Agencies

Department of the Army
  Corps of Engineers
    Rock Island District
    St. Louis District
    Louisville District
    Chicago District

U.S. Environmental Protection Agency, Region V

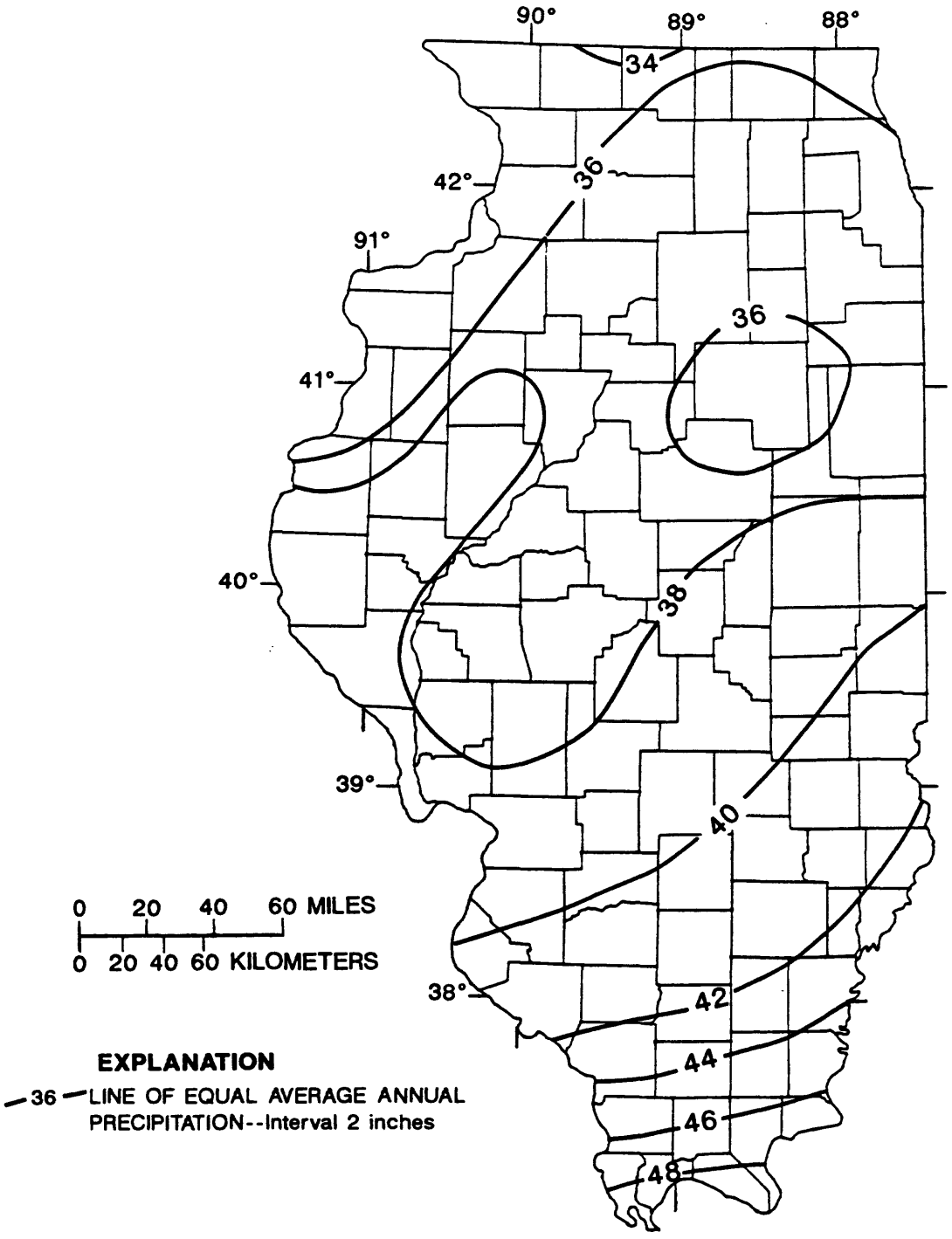


Figure 5.--Average annual precipitation in Illinois, 1961-90. Data from W.M. Wendland and others, 1992.

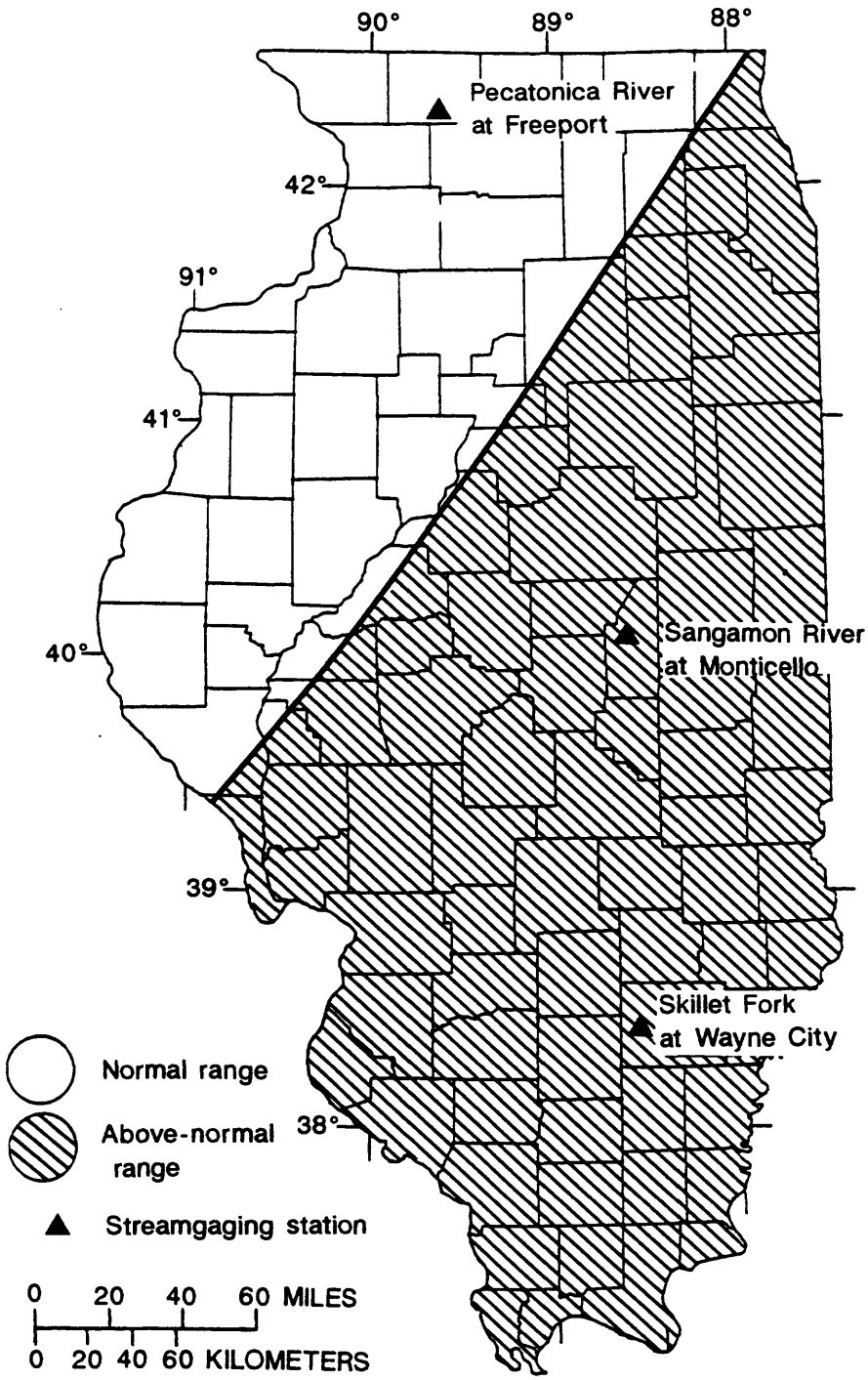


Figure 6.--Runoff during 1990. Data from U.S. Geological Survey, 1990.

DATA COLLECTION

The USGS Water Resources Division is the principal Federal agency responsible for providing hydrologic information required for the best utilization and management of the Nation's water resources. The activities of the Illinois District are structured to provide data and information required to meet these needs.

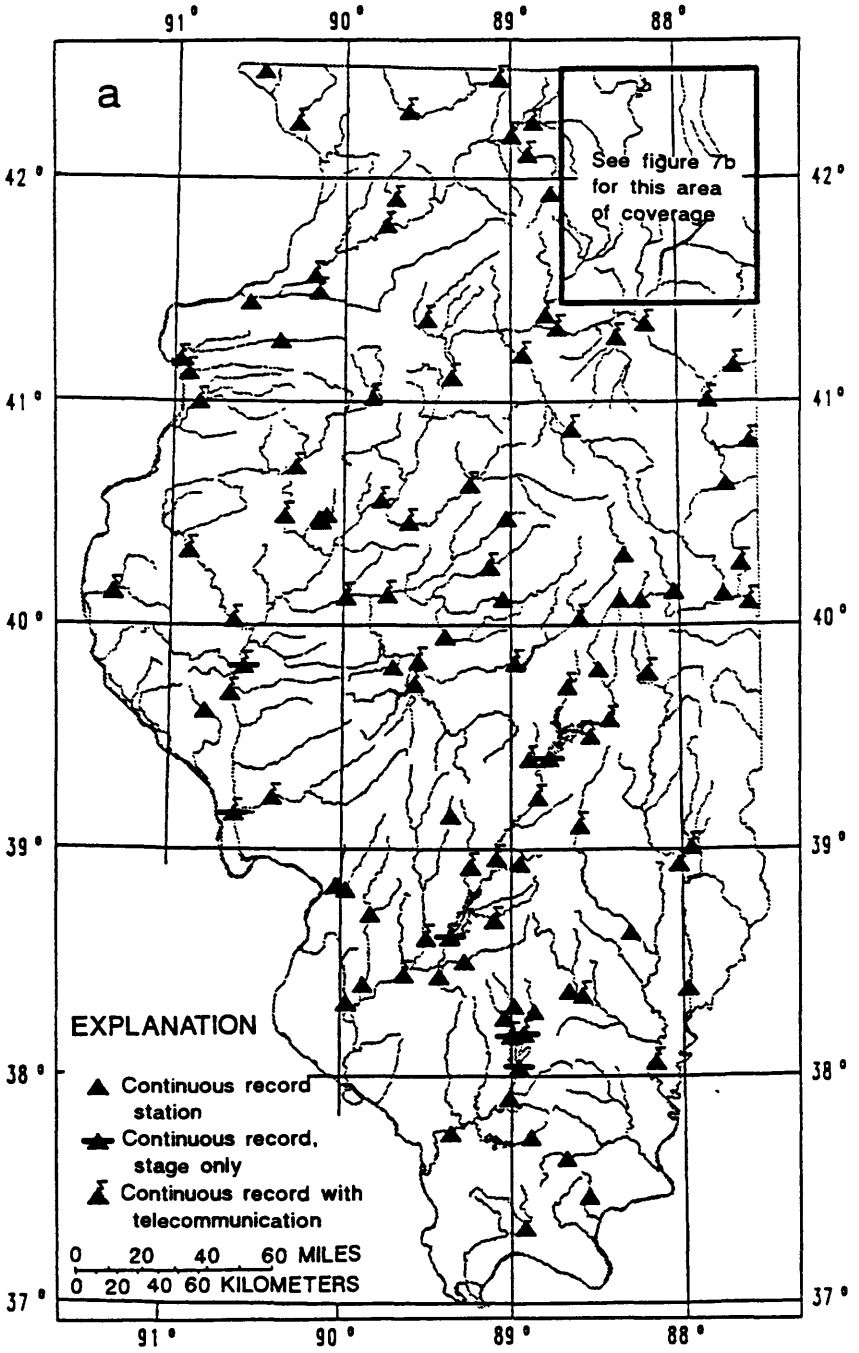
Surface-Water Data Stations

Discharge and Stage Stations

Surface-water discharge (streamflow) and stage (water level) data are collected for general hydrologic purposes such as assessments of water resources, areal analyses, determination of long-term trends, research and special studies, or for management and operational purposes. Direct measurements of discharge, to verify the stream stage-discharge relation (rating), are performed about every 8 weeks at each continuous-record discharge station. In Illinois, data on discharge and stage were obtained at the following numbers of stations:

Station classification		Number of stations
Stream stations		183
Continuous record:		
Discharge	148	
Discharge for 7 months only	2	
Stage only	10	
Partial record:		
Peak (maximum) flow only	23	
Lake, reservoir and subimpoundment stations		8
Stage and contents	3	
Stage only	5	
Total		191

Of the 148 continuous-discharge stations, 135 are part of the surface-water network and the other 13 are used for special projects. The locations of sites where discharge or stage are collected are shown in figure 7, and the types of data collected at each station are shown in table 2 (at end of the report).



Base from U.S. Geological Survey
1:250,000 and 1:1,000,000 Digital Line Graphs
Albers Equal-area Conic projection
Standard parallels 33° and 44°, central meridian -89°

Figure 7.--Discharge and stage stations in (a) Illinois except northeastern Illinois and (b) northeastern Illinois.

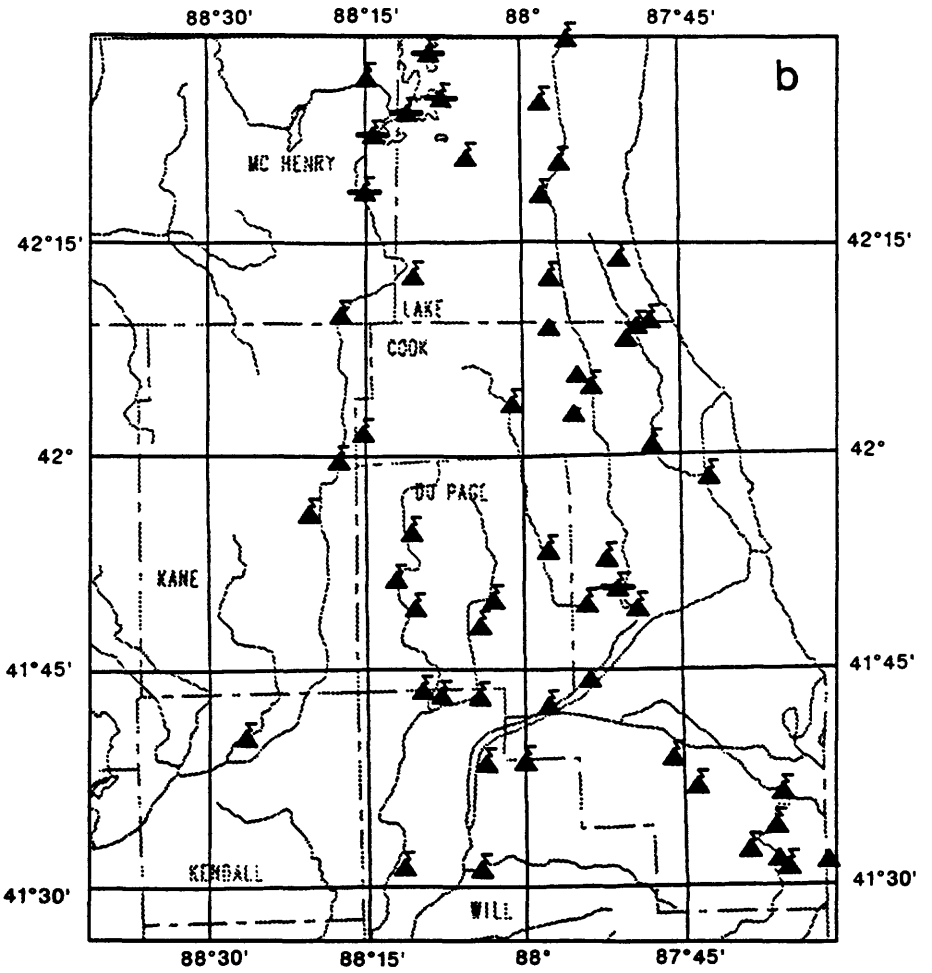


Figure 7.--Discharge and stage stations in (a) Illinois except northeastern Illinois and (b) northeastern Illinois--Continued.

Water-Quality Stations

Data collected from 155 water-quality sampling stations, operated jointly by the USGS and the Illinois Environmental Protection Agency (IEPA) during fiscal year 1990, are shown in figure 8 and are listed in table 2.

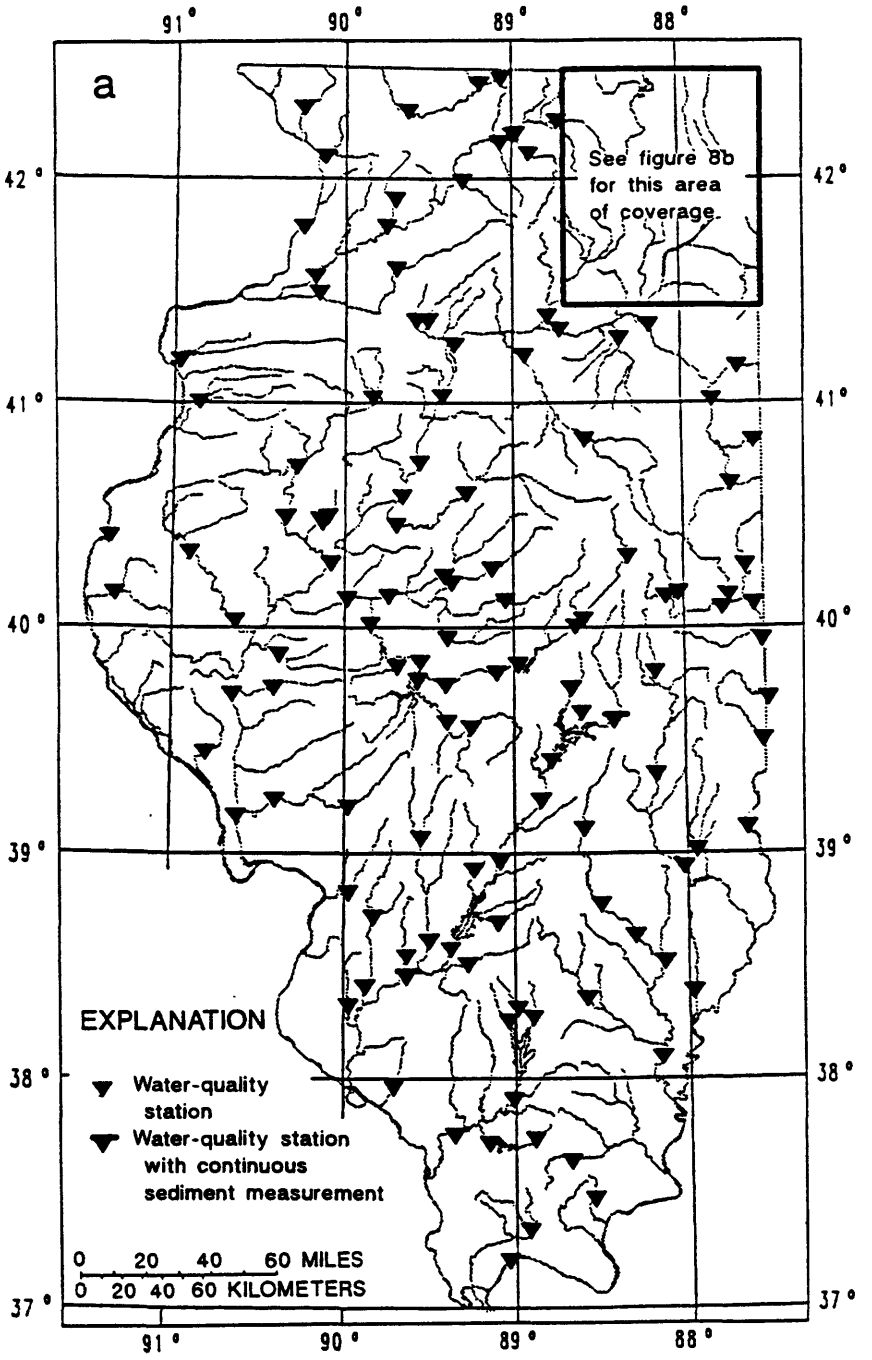
The 155-station network includes 3 stations operated in cooperation with the Metropolitan Water Reclamation District of Greater Chicago and 9 stations operated as part of the USGS's NAtional Stream Quality Accounting Network (NASQAN) program; two of these stations are operated by adjacent Districts.

Water-quality samples were collected every 6 weeks except for the NASQAN stations where samples were collected quarterly or bimonthly. The water-quality constituents of interest include the basic cations and anions and selected nutrients and trace metals. Daily or near-daily sediment samples were collected at four stations, and daily sediment-discharge records were computed. The various types of water-quality data were obtained at the following numbers of stations:

Data classification	Number of stations
Physical data:	
Water temperature	155
Specific conductance	155
pH	155
Dissolved oxygen	155
Sediment data	4
Chemical data:	
Inorganic constituents	155
Organic constituents	155
Microbiological data	155

Ground-Water Data Stations

Water levels in wells, discharges of springs and wells, and water-quality analyses are used in assessing ground-water conditions and trends; however, these hydrologic data must be integrated with other observations and ground-water system studies to understand these conditions and trends. In Illinois, the USGS measures water levels in eight observation wells. Three of the eight wells are piezometers open at different depths at one site. Data also are collected from 40 public-supply wells in the State as part of an ongoing water-quality study in cooperation with the IEPA. Ground-water-quality samples are collected annually from these wells.



Base from U.S. Geological Survey
1:250,000 and 1:1,000,000 Digital Line Graphs
Albers Equal-area Conic projection
Standard parallels 33° and 44°, central meridian -89°

Figure 8.--Water-quality stations in (a) Illinois except northeastern Illinois and (b) northeastern Illinois.

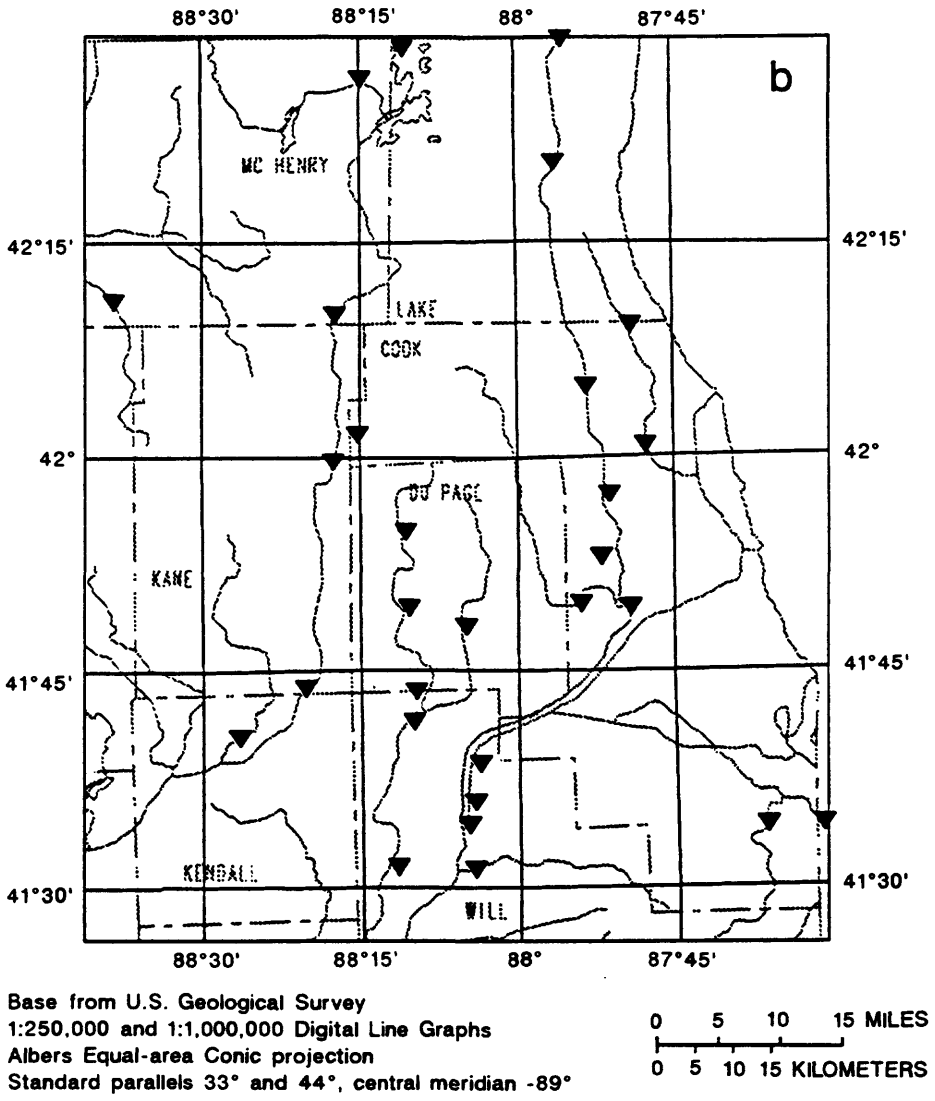


Figure 8.--Water-quality stations in (a) Illinois except northeastern Illinois and (b) northeastern Illinois--Continued.

The types of data collected for observation and project wells are as follows:

Data type	Number of wells
Water levels	8
Physical data:	
Water temperature	40
Specific conductance	40
pH	40
Chemical data:	
Inorganic constituents	40
Volatile organic compounds	40
Synthetic organic compounds	40

The ground-water stations and types of data collected at each station are listed in table 3 (at end of the report). No water-quality data are regularly collected at the eight observation wells. The number of wells, by county, are shown in figure 9.

DATA MANAGEMENT

The USGS Water Resources Division manages data from its own activities and from the activities of other water-oriented agencies.

National Water Data Storage and Retrieval System

The National WATer Data STOrage and REtrieval System (WATSTORE) of the USGS was established in November 1971 to computerize the water-data system of the USGS and to provide for more effective and efficient management of its data-related activities. The system is operated and maintained on the central computer facilities of the USGS at its National Center in Reston, Va., and on computers in District offices throughout the Nation as part of the Distributed Information System. Data may be obtained from WATSTORE through the 48 District Offices of the USGS Water Resources Division. General inquiries about WATSTORE may be directed to:

Chief Hydrologist
U.S. Geological Survey
437 National Center
Reston, VA 22092
Phone: (703) 648-5215

or

U.S. Geological Survey
Water Resources Division
102 East Main Street, 4th Floor
Urbana, IL 61801
Phone: (217) 398-5353

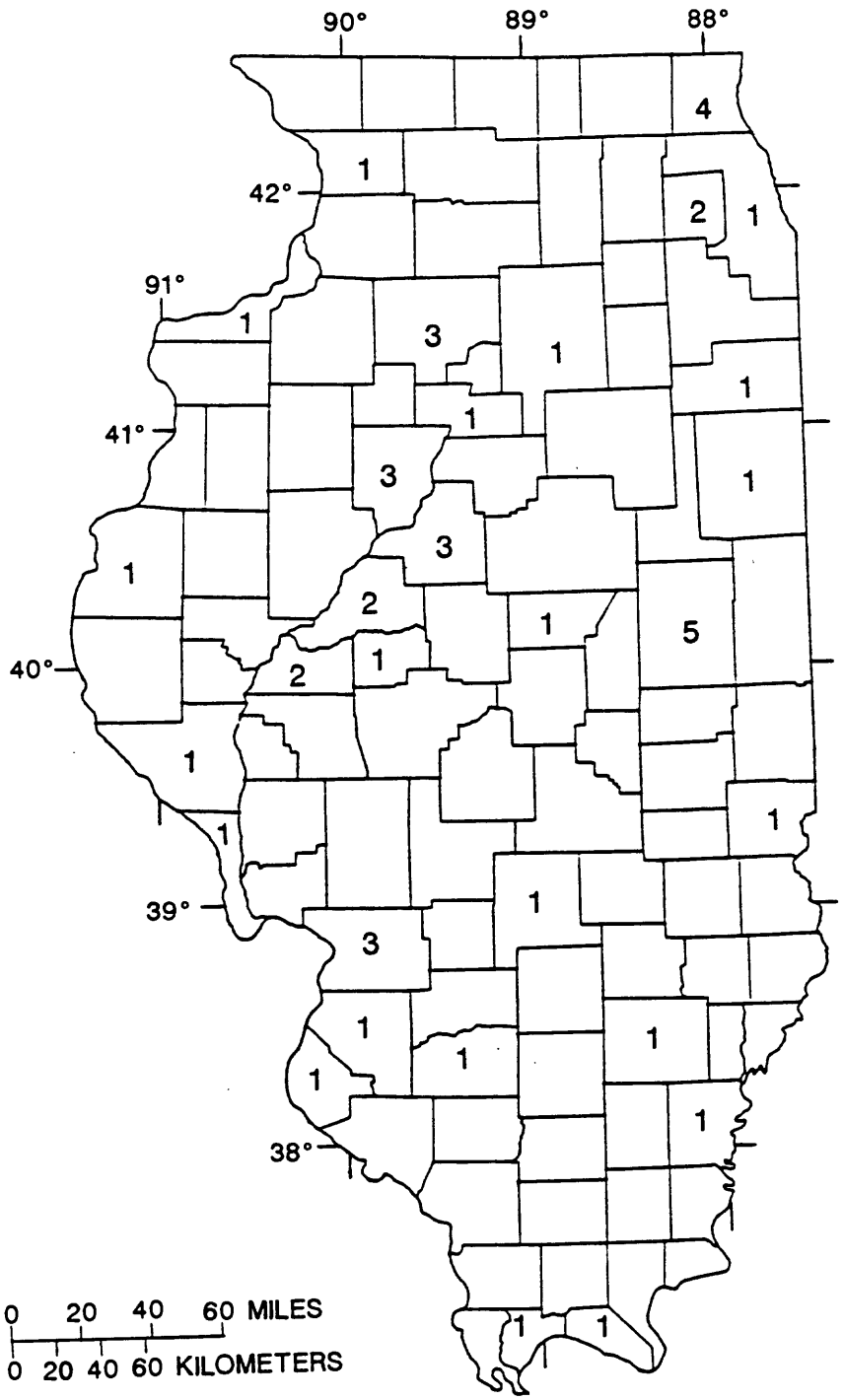


Figure 9.--Ground-water-data stations by county.

National Water Data Exchange

The NAtional Water-Data EXchange (NAWDEX) is an interagency program to facilitate the exchange of water data and to promote the improvement of water-data handling procedures. The participants in the NAWDEX program are Federal, State, and local governments and interstate, academic, and private organizations that collect, store, and use water data. NAWDEX is managed by a Program Office, which is administered by the Water Resources Division. Information on sites for which water data are available, the types of data available, and the organizations that store the data is available from NAWDEX.

Services are available through the Program Office at the USGS National Center in Reston, Va., and a nationwide network of Assistance Centers in all 50 States, the District of Columbia, and Puerto Rico, which provide local and convenient access to NAWDEX facilities. A directory (Blackwell, 1990) that provides names of organizations and persons to contact, as well as addresses, telephone numbers, and office hours for each of these organizations, is available on request.

The NAWDEX program can assist any organization or individual in identifying and locating water data. To accomplish this service, NAWDEX maintains a computerized Master Water-Data Index which identifies sites for which water data are available, the type of data available for each site, and the organization retaining the data. The NAWDEX program also maintains a Water-Data Sources Directory identifying organizations from which water data may be obtained. In addition, NAWDEX has direct access to some large water-data bases of its members and has reciprocal agreements for the exchange of services with others.

For additional information concerning the NAWDEX program or its services contact:

Program Office
National Water Data Exchange (NAWDEX)
U.S. Geological Survey
421 National Center
12201 Sunrise Valley Drive
Reston, VA 22092

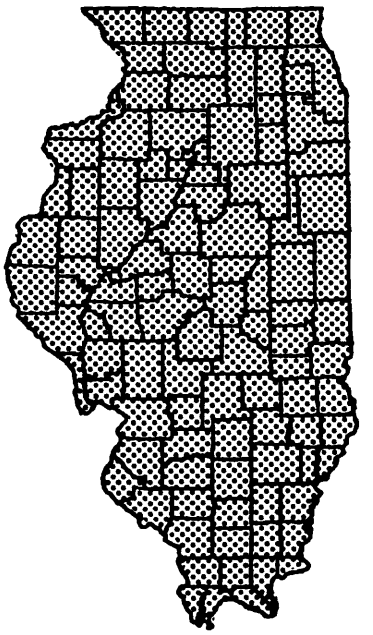
Phone: (703) 648-6848
Hours: 7:00 to 4:30 eastern time

or

NAWDEX Assistance Center
Illinois
U.S. Geological Survey
Water Resources Division
4th Floor
102 East Main Street
Urbana, IL 61801

Phone: (217) 398-5353
Hours: 8:00 to 4:30 central time

DESCRIPTIONS OF PROJECTS IN 1990



*** PROJECT TITLE *** Surface-Water Stations

*** PROBLEM *** Surface-water information is needed for purposes of surveillance, planning, design, hazard warning, operation, and management, in water-related fields such as water supply, hydroelectric power, flood control, irrigation, bridge and culvert design, wildlife management, pollution abatement, flood-plain management, and water-resources development. To provide this information an appropriate data base is necessary.

*** OBJECTIVES *** A. To collect surface-water data sufficient to satisfy needs for current-purpose uses, such as (1) assessment of water resources, (2) operation of reservoirs or industries, (3) forecasting, (4) disposal of wastes and pollution controls, (5) discharge data to accompany water-quality measurements, (6) compact and legal requirements, and (7) research or special studies.

B. To collect data necessary for analytical studies to define, for any location, the statistical properties of, and trends in, the occurrence of water in streams, lakes, etc., for use in planning and design.

*** APPROACH *** Standard methods of data collection will be used as described in the report series, "Techniques of Water Resources Investigations of the United States Geological Survey." Partial-record gaging will be used instead of complete-record gaging where it serves the required purpose.

*** SUMMARY OF RESULTS *** Routine data collection of surface-water information was done for 136 continuous-record stations, 23 partial-record stations, 9 stage-only stations, and 3 miscellaneous-measurement stations. Installed CR-10 data loggers with telephone modems at 10 continuous-record stations. Published data in the annual data report.

*** PLANS NEXT YEAR *** Continue surface-water data collection with modifications to the network. Five new continuous-discharge stations will be added for the Kane County project. Install CR-10 data loggers with telephone modems in 8-10 continuous-record stations. Publish data in the annual data report.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** G. Wayne Curtis

*** PERIOD OF PROJECT *** Continuous since July 1930

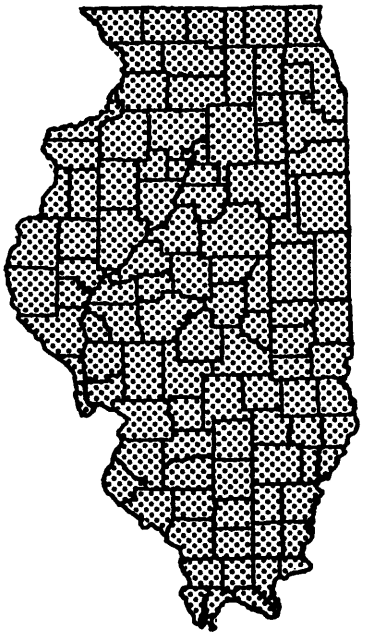
*** COOPERATORS ***

Illinois Department of Transportation, Division of Water Resources
Illinois Department of Energy and Natural Resources, State Water Survey
The Metropolitan Water Reclamation District of Greater Chicago
Bloomington and Normal Sanitary District
Conservation District of Vermilion County
Forest Preserve District of Cook County
Forest Preserve District of Du Page County
City of De Kalb
City of Decatur
City of Springfield
U.S. Army Corps of Engineers
    Rock Island District
    St. Louis District
    Louisville District
    Chicago District

*** PUBLISHED REPORTS ***

Maurer, J.C., Sterling, J.M., Richards, T.E., and Hayes, P.D., 1990, Water resources data--Illinois, water year 1989, Volume 1. Illinois except Illinois River basin: U.S. Geological Survey Water-Data Report IL-89-1, 387 p.

Sullivan, D.J., Hayes, P.D., Richards, T.E., and Maurer, J.C., 1990, Water resources data--Illinois, water year 1989, Volume 2. Illinois River basin: U.S. Geological Survey Water-Data Report IL-89-2, 467 p.



*** PROJECT TITLE *** Ground-Water Stations

*** PROBLEM *** Water-resource planning and ground-water quantity and quality assessment require a statewide base level of relatively standardized data. In Illinois, concentrated urbanization in the northeastern part around Chicago and intense farming and mining in much of the State require monitoring of ground water to assess the impact of man's activities on existing and potential water uses.

*** OBJECTIVES *** To provide high quality data from a network of monitoring stations across the State and to achieve timely dissemination of data from this network, to all potential users, in a readily usable form.

*** APPROACH *** Coordinate ground-water data-gathering efforts with State, local, and other Federal agencies in Illinois. Efforts will be directed to having all participants use current and uniform data collection and reporting procedures. Data collection is planned to meet site-specific needs and to provide a statewide baseline of information from which to evaluate the general status of the State's ground-water quantity and quality.

*** SUMMARY OF RESULTS *** Measured water levels at two wells in Du Page County, three piezometers and one well in Lake County, and one well in Bureau County. Installed a digital recorder on new observation well in Cook County. Discontinued one well in Du Page County at the end of the water year. Published data in the annual data report.

*** PLANS NEXT YEAR *** Continue water-level data collection. Add five or six observation wells, to be measured quarterly, to the network. Collect water samples from the Zion well in Lake County and from the Argonne well in Du Page County. Publish data in the annual data report.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

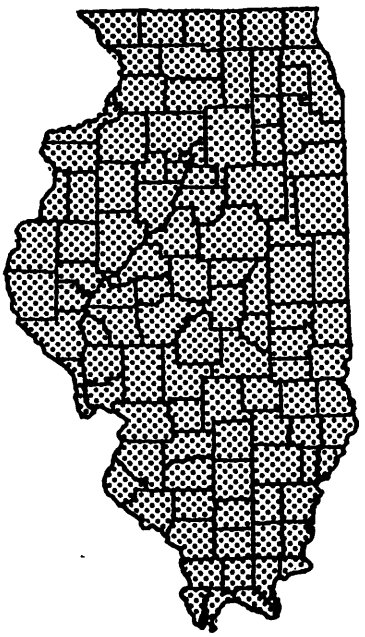
*** PROJECT CHIEF *** Charles F. Avery

*** PERIOD OF PROJECT *** Continuous since April 1982

*** COOPERATOR *** Federal Program

*** PUBLISHED REPORT ***

Sullivan, D.J., Hayes, P.D., Richards, T.E., and Maurer, J.C., 1990, Water resources data--Illinois, water year 1989, Volume 2. Illinois River basin: U.S. Geological Survey Water-Data Report IL-89-2, 467 p.



*** PROJECT TITLE *** Water-Quality Stations

*** PROBLEM *** Water-resource planning and water-quality assessment require a statewide base level of relatively standardized data. In Illinois, dense urbanization, especially in the northeastern corner, and intense farming and mining in other parts of the State require monitoring to assess the impact of man's activities on existing and potential water uses.

*** OBJECTIVES *** To provide high quality data from an extensive and coherent network of monitoring stations across the State. To achieve timely dissemination of data from this network, to all potential users, in a readily usable form.

*** APPROACH *** Coordinate surface-water-quality data-gathering efforts among the USGS and State, local, and other Federal agencies in Illinois. Efforts will be directed toward having all participants use current and uniform sampling, analytical, and data reporting procedures. Sampling and data collection are tailored to meet site-specific needs and to supply a baseline of information from which to evaluate the general nature of the State's surface-water quality.

*** SUMMARY OF RESULTS *** Quality-assurance programs applied to field data collection and direct-service laboratory activities with Illinois Environmental Protection Agency (IEPA) have continued. All data from IEPA and USGS laboratories have been reviewed and prepared for publication. Discharge values have been applied to the chemical data where possible. Published data in the annual data report.

*** PLANS NEXT YEAR *** Continue data collection and quality assurance at the same number of stations as last year. Publish data in the annual data report.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Richard H. Coupe, Jr.

*** PERIOD OF PROJECT *** Continuous since June 1967

*** COOPERATORS ***
Illinois Environmental Protection Agency, Division of Water Pollution Control
The Metropolitan Water Reclamation District of Greater Chicago
Forest Preserve District of Du Page County

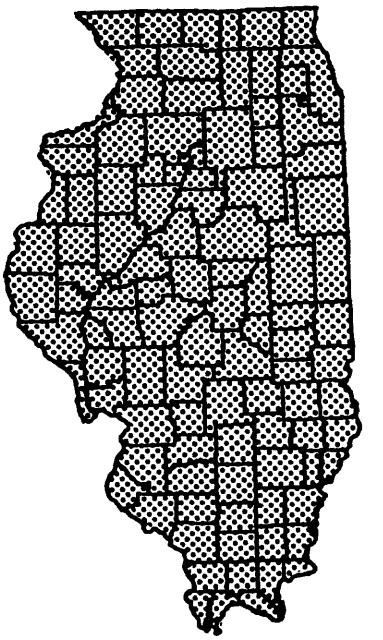
*** PUBLISHED REPORTS ***

Maurer, J.C., Sterling, J.M., Richards, T.E., and Hayes, P.D., 1990, Water resources data--Illinois, water year 1989, Volume 1. Illinois except Illinois River basin: U.S. Geological Survey Water-Data Report IL-89-1, 387 p.

Sullivan, D.J., Hayes, P.D., Richards, T.E., and Maurer, J.C., 1990, Water resources data--Illinois, water year 1989, Volume 2. Illinois River basin: U.S. Geological Survey Water-Data Report IL-89-2, 467 p.

IL004 SEDIMENT STATIONS

*** PROJECT TITLE *** Sediment Stations



*** PROBLEM *** Water-resource planning and water-quality assessment require a nationwide base level of information. Sediment concentrations and discharges in streams must be defined and monitored. A large percentage of the land in Illinois is devoted to agriculture whereby the land is exposed to erosion. Recent studies conducted under Section 208 of Public Law 92-500 have suggested sediment may be a major cause of water-quality degradation in Illinois. Other activities, such as highway construction and industrial and residential development, contribute sediment to streams. Planning and regulatory agencies need a data base to evaluate sediment transport in streams.

*** OBJECTIVES *** To provide a data bank for evaluating sediment problems in Illinois and a base from which the effectiveness of erosion control programs can be evaluated for their effect on water quality. To contribute to the national base of sediment data for use in broad Federal and State planning and action programs and to provide data for Federal management of interstate waters.

*** APPROACH *** Establish and operate a network of sediment stations on Illinois streams to develop records of daily discharge of suspended sediment. Suspended-sediment stations will be located at long-term continuous-record surface-water discharge stations and will be used to establish relations between suspended-sediment discharge and surface-water discharge. These relations will be used to estimate long-term suspended-sediment yields of selected basins and predominant land use areas. Supplementary information at most stations will include particle-size determinations of suspended-sediment and bed-material samples.

*** SUMMARY OF RESULTS *** Suspended-sediment samples were collected and analyzed, and daily suspended-sediment concentrations and loads were computed for four continuous streamflow sites. Published data in the annual data report.

*** PLANS NEXT YEAR *** Continue sediment monitoring at four continuous-streamflow stations. Publish data in the annual data report.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Richard H. Coupe, Jr.

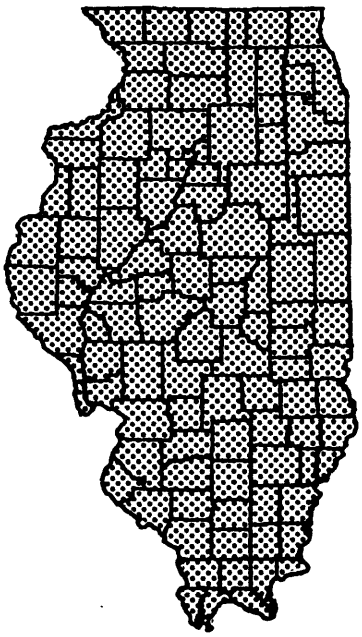
*** PERIOD OF PROJECT *** Continuous since January 1976

*** COOPERATOR ***
U.S. Army Corps of Engineers, St. Louis District

*** PUBLISHED REPORTS ***
Maurer, J.C., Sterling, J.M., Richards, T.E., and Hayes, P.D., 1990, Water resources data--Illinois, water year 1989, Volume 1. Illinois except Illinois River basin: U.S. Geological Survey Water-Data Report IL-89-1, 387 p.

Sullivan, D.J., Hayes, P.D., Richards, T.E., and Maurer, J.C., 1990, Water resources data--Illinois, water year 1989, Volume 2. Illinois River basin: U.S. Geological Survey Water-Data Report IL-89-2, 467 p.

*** PROJECT TITLE *** Water Use



*** PROBLEM *** A water supply is adequate or not depending upon present and future demands. Information is being collected in great detail describing the quantity and quality of available water in Illinois. However, water-use inventories generally have been conducted only intermittently or when a water supply has been adversely affected. Competing demands for water in Illinois dictate that adequate water-use information is essential for the proper management of available supplies.

*** OBJECTIVES *** (1) Acquire water-use information throughout the State of Illinois as a basis for present analyses and future projections. (2) Develop and maintain a water-use data base that will be responsive to the data needs of users at local, State, and national levels. (3) Establish methods of estimating water use.

*** APPROACH *** Responsibilities will be divided between the Illinois State Water Survey (ISWS), Illinois Environmental Protection Agency (IEPA), and the USGS. The ISWS will collect water withdrawal and delivery data by mailing questionnaires to water users throughout the State. The responses will be classified by water-use category (domestic, commercial, industrial, mining, fossil-fuel power, nuclear power, hydroelectric, agriculture, and irrigation) and aggregated by category and location (county, hydrologic unit, aquifer, township). These aggregated data will then be entered into the Aggregated Water Use Data System (AWUDS). The USGS will aggregate return data. This will be accomplished by manipulating data received from IEPA's computer and National Pollution Discharge Elimination System data files. The USGS will coordinate with the ISWS and the IEPA in the collection of water-use data and maintain standards that will meet National needs.

*** SUMMARY OF RESULTS *** In cooperation with the ISWS, 1988 withdrawal, delivery, and consumptive-use data were entered into AWUDS and checked. In cooperation with the IEPA, 1988 return data were entered into AWUDS and checked. Submitted the report, "Determination of Water Use in Rockford and Kankakee, Illinois" for Director's approval. Finished work on the 1990 National Guidelines report.

*** PLANS NEXT YEAR *** (1) Enter 1989 water-use data into AWUDS. (2) Obtain site-specific withdrawal and delivery data, and assign site identification numbers for entry into the State Water-Use Data System (NEWSWUDS). (3) Assign downstream-order numbers to return sites in NEWSWUDS. (4) Determine water use by aquifer.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** John K. LaTour

*** PERIOD OF PROJECT *** Continuous since March 1978

*** COOPERATORS ***

Illinois Department of Energy and Natural Resources, State Water Survey
Illinois Environmental Protection Agency

*** REPORT IN PROCESS ***

Determining Water Use for Rockford and Kankakee, Illinois

*** PUBLISHED REPORTS ***

Kirk, J.R., Jarboe, Jacquelyn, Sanderson, E.W., Sasman, R.T., and Sinclair, R.A., 1979, Water withdrawals in Illinois, 1978: Champaign, Ill., Illinois State Water Survey Circular 140, 34 p.

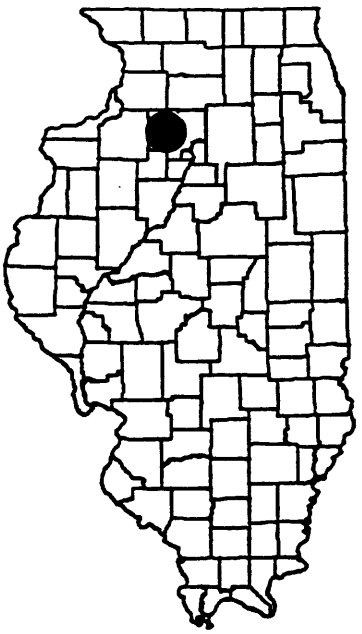
Kirk, J.R., Jarboe, Jacquelyn, Sanderson, E.W., Sasman, R.T., and Lonnquist, Carl, 1982, Water withdrawals in Illinois, 1980: Champaign, Ill., Illinois State Water Survey Circular 152, 47 p.

Kirk, J.R., Sanderson, E.W., and Sasman, R.T., 1984, Water withdrawals in Illinois, 1982: Champaign, Ill., Illinois State Water Survey Circular 161, 43 p.

Kirk, J.R., Hlinka, K.J., Sasman, R.T., and Sanderson, E.W., 1985, Water withdrawals in Illinois, 1984: Champaign, Ill., Illinois State Water Survey Circular 163, 43 p.

Kirk, J.R., 1987, Water withdrawals in Illinois, 1986: Champaign, Ill., Illinois State Water Survey Circular 167, 43 p.

IL044 SHEFFIELD UNSATURATED FLOW



*** PROJECT TITLE *** Hydrology of Unsaturated Flow through Porous Media at the Low-Level Radioactive-Waste Disposal Site near Sheffield, Illinois

*** PROBLEM *** In developing criteria to be used in selecting future radioactive-waste disposal sites and improving operations at current sites, it is necessary to understand the mechanisms that control transport of radionuclides by soil moisture flow in unsaturated porous media. Research in this area has been directed mainly towards theoretical aspects and laboratory experiments of soil moisture movement in the root zone. The tunnel at Sheffield, beneath four trenches, offers the opportunity to study moisture movement in a field situation through as much as 35 feet of unsaturated sediments. Instruments will be installed on the land surface and in the tunnel to obtain data on soil moisture movement to the water table and any radionuclide migration from trenches to the water table. Existing techniques and instrumentation will have to be modified to fit unusual conditions.

*** OBJECTIVES *** To qualify and quantify the mechanisms that control the movement of water and transport of radionuclides from disposal trenches through the unsaturated zone to the water table. The soil moisture data will provide a basis for research on burial site design and construction techniques. As an example, these data would provide the basis for evaluating new trench cap construction techniques for reducing infiltration and in the design of radionuclide waste trenches.

*** APPROACH *** Soil moisture and suction data will be obtained in the field using a neutron soil moisture probe and tensiometers. Soil moisture chemistry will be determined from samples collected with soil suction lysimeters. Gamma spectral logging will be used to monitor changes in radionuclide content of soil and soil water. Evapotranspiration will be computed using data obtained from a meteorological station. Tracers will be used to determine dispersivities. A model of unsaturated moisture flow will be used.

*** SUMMARY OF RESULTS *** Two reports received Director's approval: (1) Effects of Low-Level Radioactive-Waste Disposal on Water Chemistry in the Unsaturated Zone at a Site near Sheffield, Illinois, 1982-84, by C.A. Peters, R.G. Striegl, P.C. Mills, and R.W. Healy; and (2) Well-Construction and Hydrogeologic Data for Observation Wells in the Vicinity of a Low-Level Radioactive-Waste Disposal Site near Sheffield, Illinois, by L.J. Mansue and P.C. Mills.

*** PLANS NEXT YEAR *** Publish final report.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** North-central Illinois

*** PROJECT CHIEF *** Patrick C. Mills

*** PERIOD OF PROJECT *** October 1980 through September 1990

*** COOPERATOR *** Federal Program

*** REPORTS IN PROCESS ***

Effects of Disposal of Low-Level Radioactive Waste on Water Chemistry in the Unsaturated Zone at a Disposal Site near Sheffield, Illinois, 1982-84

Construction Data for U.S. Geological Survey Observation Wells at the Low-Level Radioactive-Waste Disposal Site near Sheffield, Illinois

Water and Tritium Movement Through the Unsaturated Zone at a Low-Level Radioactive-Waste Disposal Site near Sheffield, Illinois, 1981-85

Water and Leachate Movement Through the Unsaturated Zone at a Low-Level Radioactive-Waste Disposal Site near Sheffield, Illinois, 1986-87

*** PUBLISHED ABSTRACTS ***

Healy, R.W., 1983, Infiltration through trench caps at a low-level radioactive-waste disposal site, in Proceedings of the National Conference on Advances in Infiltration, December 12-13, 1983, Chicago, Illinois, American Society of Agricultural Engineers Publication 11-83, p. 376.

Peters, C.A., 1984, Water chemistry in the unsaturated zone at a low-level radioactive-waste disposal site near Sheffield, Illinois, in 29th Annual Midwest Groundwater Conference, October 1-3, 1984, Lawrence, Kansas.

*** PUBLISHED REPORTS ***

Healy, R.W., 1983, Preliminary results of a study of the unsaturated zone at the low-level radioactive-waste disposal site near Sheffield, Illinois, in Proceedings of the Fifth Annual Participants' Information Meeting, DOE Low-Level Waste Management Program, August 30-September 1, 1983, Denver, Colorado, CONF-8308106, p. 669-673.

Healy, R.W., Peters, C.A., deVries, M.P., Mills, P.C., and Moffett, D.L., 1983, Study of the unsaturated zone at a low-level radioactive-waste disposal site, in Proceedings of the Characterization and Monitoring of the Vadose (Unsaturated) Zone, National Water Well Association, December 8-10, 1983, Las Vegas, Nevada, p. 820-830.

Peters, C.A., 1985, Chemistry of pore water in the unsaturated zone at a low-level radioactive-waste disposal site near Sheffield, Illinois, in Proceedings of the NWWA Conference on Characterization and Monitoring of the Vadose (Unsaturated) Zone, November 19-21, 1985, Denver, Colorado, p. 272-282.

Mills, P.C., and Healy, R.W., 1987, Water and tritium movement in variably saturated glacial deposits near Sheffield, Illinois, in Proceedings of the FOCUS Conference on Midwestern Ground Water Issues, April 21-23, 1987, Indianapolis, Indiana, p. 169-186.

Mills, P.C., and deVries, M.P., 1988, Leachate movement through unsaturated sand at a low-level radioactive-waste disposal site in northwestern Illinois, in Proceedings, Session III--Disposal technology and facility development, Tenth Annual DOE Low-Level Waste Management Conference, August 30 to September 1, 1988, Denver, Colorado, p. 54-68.

Healy, R.W., 1989, Seepage through a hazardous-waste trench cover, in Beard, L.R., and others, eds., Journal of Hydrology: v. 108, no. 1-4, June 1989, p. 213-234.

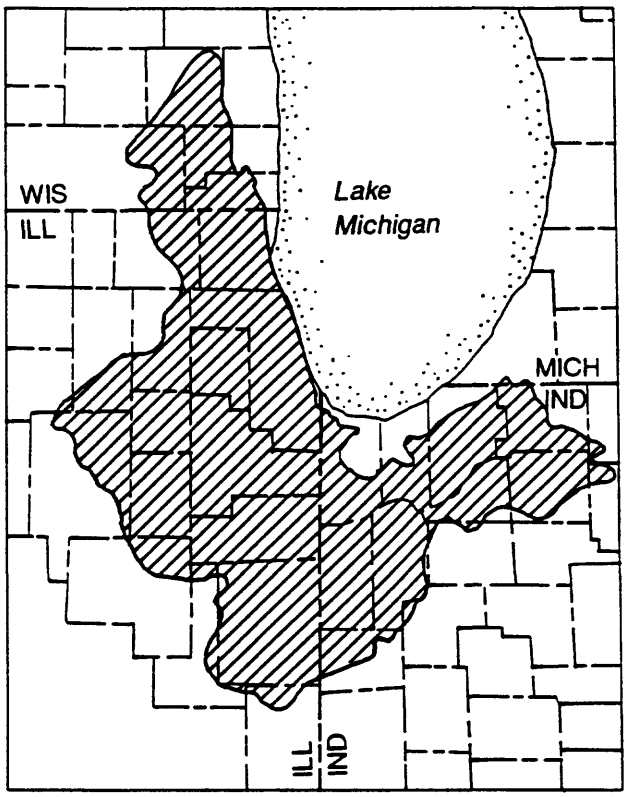
Healy, R.W., deVries, M.P., and Striegl, R.G., 1986, Concepts and data-collection techniques used in a study of the unsaturated zone at a low-level radioactive-waste disposal site near Sheffield, Illinois: U.S. Geological Survey Water-Resources Investigations Report 85-4228, 37 p.

Healy, R.W., deVries, M.P., and Sturrock, A.M., Jr., 1989, Evapotranspiration and microclimate at a low-level radioactive-waste disposal site in northwestern Illinois: U.S. Geological Survey Water-Supply paper 2327, 44 p.

Healy, R.W., Gray, J.R., deVries, M.P., and Mills, P.C., 1989, Water balance at a low-level radioactive-waste disposal site in Water Resources Bulletin: American Water Resources Association, v. 25, no. 2, p. 381-390.

*** PROJECT TITLE *** Upper Illinois River Basin Water-Quality Assessment

*** PROBLEM *** Protection of the quality of the Nation's ground-water and surface-water resources is a priority national concern. The quality of the Nation's water resources has a direct impact on public health and on the economic success of agriculture, industry, and recreation. The impacts of degraded water quality on public health or economic success may be related to short-term or long-term effects. In 1986, the USGS initiated a National Water Quality Assessment (NAWQA) program to help address problems related to degraded water quality. This program is in a pilot phase that will test, and modify as necessary, concepts and approaches in preparation for possible full implementation in the future. The upper Illinois River basin project is one of seven pilot water-quality studies initiated in the pilot phase of the NAWQA program.



*** OBJECTIVES *** (1) Provide a description of existing and past trends in surface-water-quality conditions. (2) Develop conceptual models that relate observed conditions to the sources and causes. (3) Verify the description of trends in conditions. (4) Track long-term trends in water quality. (5) Reduce the uncertainty of the description of trends. (6) Improve the understanding of the linkage between causative factors and water quality.

*** APPROACH *** A liaison committee consisting of representatives of Federal, State, and local agencies will be formed to provide a forum for the USGS to inform interested parties of NAWQA plans and findings, to seek advice, to identify existing data and reports, and to establish collaborative efforts to supplement the NAWQA program. Existing data and reports will be compiled and summarized to provide a description of past and current trends in conditions. Descriptive information that may aid in the interpretation of trends will be compiled. Simple statistical methods, such as regression analysis, will be used to relate observed trends to the descriptive information. New data will be collected from the operation of a fixed-location river-sampling station network and from synoptic surveys. Reports describing project plans, data, and findings will be published.

*** SUMMARY OF RESULTS *** The fixed-station sampling program was continued in cooperation with the Illinois Environmental Protection Agency (IEPA). Samples of water and suspended sediment were collected and analyzed for inorganic constituents on a monthly frequency. An analysis of the river cross-section survey data was performed to document mixing characteristics. A basin-wide synoptic survey was completed. This was an ecosystem survey and tissue analysis at 20 sites. Most of the statistical work for the report on the analysis of existing water-quality data was completed and several chapters written. Analyzed the availability and suitability of wastewater-treatment plant information. One report was completed. The Project Liaison Committee met once to discuss project documents, plans, and coordination.

*** PLANS NEXT YEAR *** Continue sampling at four fixed stations. Continue to compile and statistically summarize existing water-quality information. Complete draft report that describes results of analysis of existing information. Meet with the Project Liaison Committee. Begin writing project summary reports for each major constituent group.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Upper Illinois River Basin

*** PROJECT CHIEF *** Stephen F. Blanchard

*** PERIOD OF PROJECT *** April 1986 through September 1990

*** PLANNED REPORTS ***

Water-quality conditions in the study area

Water-quality conditions based on analysis of existing information

*** REPORTS IN PROCESS ***

Surface-water-quality assessment of the upper Illinois River basin in Illinois, Indiana, and Wisconsin: Geochemical data report on major and trace elemental analyses of fine-fraction streambed sediments

Surface-water-quality assessment of the upper Illinois River basin in Illinois, Indiana, and Wisconsin: Fixed-station network, water-quality data, April 1987 to September 1990

Spatial distribution of trace elements in the fine-fraction of streambed sediment in the upper Illinois River basin, 1987

*** PUBLISHED ABSTRACT ***

Terrio, P.J., 1987, Methods for selecting bottom-material sampling sites in the upper Illinois River basin, in Program and Abstracts, Illinois State Section of the American Water Resources Association, 1987 Annual Conference, April 28-29, 1987, Champaign, Illinois, p. 32.

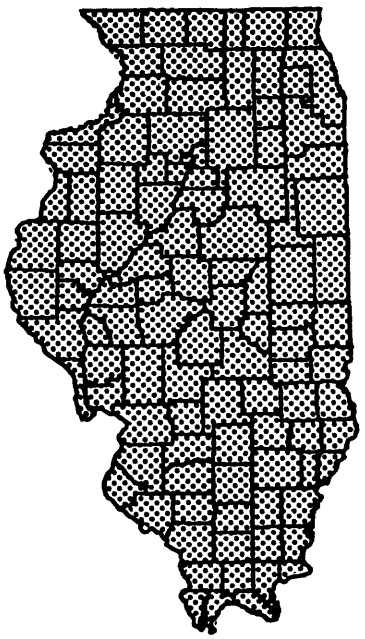
*** PUBLISHED REPORTS ***

Mades, D.M., 1987, Surface-water-quality assessment of the upper Illinois River basin in Illinois, Indiana, and Wisconsin--Project description: U.S. Geological Survey Open-File Report 87-473, 39 p.

Steffeck, D.W., and Striegl, R.G., 1989, An inventory and evaluation of biological investigations that relate to stream-water quality in the upper Illinois River basin of Illinois, Indiana, and Wisconsin: U.S. Geological Survey Water-Resources Investigations Report 89-4041, 54 p.

Zogorski, J.S., Blanchard, S.F., Romack, R.D., and Fitzpatrick, F.A., 1990, Availability and suitability of municipal wastewater information for use in a national water-quality assessment--A case study of the upper Illinois River basin in Illinois, Indiana, and Wisconsin: U.S. Geologicl Survey Open-File Report 90-375, 68 p.

IL078 ILLINOIS RAINFALL-RUNOFF WITH GIS



*** PROJECT TITLE *** Unit-Hydrograph and Rainfall-Loss Parameter Estimation Using Basin and Soil Characteristics

*** PROBLEM *** Estimates of rainfall-loss function (infiltration) parameters are required when the HEC-1 model is used to compute discharge hydrographs for ungaged basins. The current procedures to estimate infiltration parameters from basin, soil, and climatologic characteristics, as well as the rainfall-loss functions need to be evaluated to determine the transferability of parameters to ungaged basins.

*** OBJECTIVE *** To quantitatively document techniques to estimate infiltration parameters from basin, soil, and climatologic characteristics. The accuracy of current techniques and the uncertainty in the rainfall-loss functions will be quantified.

*** APPROACH *** A data set of calibrated parameters for over 600 hydrographs at 98 basins throughout Illinois were used to quantify uncertainty in rainfall-loss functions. GIS data bases of land use, soils, elevation, precipitation, and temperature were used to examine relations between infiltration parameters and these characteristics. Literature search will identify other estimation techniques for infiltration.

*** SUMMARY OF RESULTS *** Literature search on infiltration has identified dozens of infiltration-estimation equations. These are all variations on three principle approaches to estimate infiltration.

*** PLANS NEXT YEAR *** Complete and publish reports.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Arthur R. Schmidt

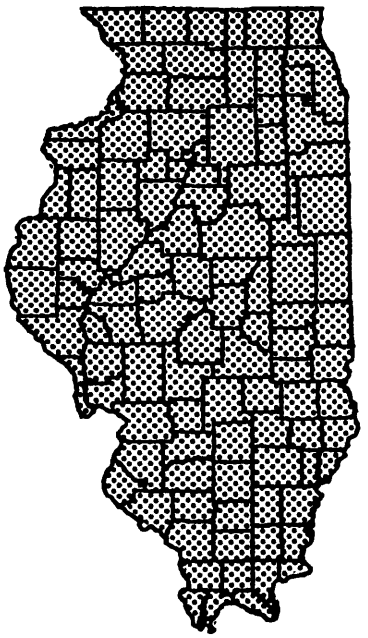
*** PERIOD OF PROJECT *** October 1986 through September 1990

*** COOPERATOR ***
Illinois Department of Transportation, Division of Water Resources

*** PLANNED REPORT ***
Techniques to Estimate Unit-Hydrograph and Rainfall-Loss Parameters

IL080 U.S. ENVIRONMENTAL PROTECTION AGENCY PROJECTS

*** PROJECT TITLE *** USGS/USEPA Interagency Agreement Projects



*** PROBLEM *** The U.S. Environmental Protection Agency (USEPA), Region V, has requested that the USGS, Illinois District, provide technical assistance on several Superfund sites within the State. The technical assistance varies from reviewing technical reports submitted to USEPA by their consultants to designing and conducting hydrogeologic investigations at Superfund sites.

*** OBJECTIVE *** To provide technical consultation, training, and quality assurance and to conduct research for the USEPA under the conditions of the joint interagency agreement.

*** APPROACH *** Design, conduct, and analyze hydrogeologic and water-quality data activities at the Byron Salvage Yard and Parson's Casket Superfund sites. Analyze data collected during investigations at the ACME Solvents and Pagel's Pit sites. Provide technical review on results of work at the ACME Solvents and Pagel's Pit sites. Write a report disclosing results of USGS data analysis of hydrogeologic conditions at ACME Solvents and Pagel's Pit sites.

*** SUMMARY OF RESULTS *** (1) Completed oversight of water-quality data collection and aquifer testing at ACME Solvents and Pagel's Pit sites. Completed analysis of data collected to date and wrote an Administrative Report to USEPA. Report is being prepared for Headquarter's approval. (2) Provided technical review of reports and work plans at the ACME and Pagel's Pit sites.

(3) Completed personnel detail to provide technical support for ground-water investigations at Hazardous-Waste Disposal Sites, USEPA, Region V, Chicago. (4) Completed field work for study of ground-water/surface-water interactions, Byron Salvage Yard area. (5) Began field work on studies of hydrogeology and contaminant distribution in fractured dolomite aquifers at Byron Salvage Yard and Parson's Casket sites.

*** PLANS NEXT YEAR *** (1) Submit ACME Solvents/Pagel's Pit report for Headquarter's approval. (2) Complete report writing for ground-water/surface-water study at the Byron site. (3) Finish data collection and analysis for fractured dolomite aquifer studies at Byron and Parson's Casket sites. (4) Write report drafts and submit for review.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Robert T. Kay

*** PERIOD OF PROJECT *** Continuous since March 1986

*** COOPERATOR ***
U.S. Environmental Protection Agency, Region V

*** PLANNED REPORTS ***
Ground-Water/Surface-Water Interactions, Byron Salvage Yard Area

Hydrogeology, Aquifer Tests, Water-Quality Sampling, Byron Salvage Yard

*** PUBLISHED ABSTRACT ***

Ryan, B.J., Kay, R.T., and Wallace, K.A., 1987, Hydraulic testing in two aquifers at a Superfund site near Byron, Illinois, in Program with Abstracts, 32nd Annual Midwest Ground Water Conference, October 28-30, 1987, Madison, Wisconsin.

*** PUBLISHED REPORTS ***

Kay, R.T., Ryan, B.J., Mears, E.J., and Yeskis, D.J., 1987, Hydrogeology of the Byron/Johnson Salvage Yard Superfund site near Byron, Illinois, in Proceedings of the ASCE Water Resources Symposium, October 21-22, 1987, Rosemont, Illinois.

Kay, R.T., Olson, D.N., and Ryan, B.J., 1989, Hydrogeology and results of aquifer tests in the vicinity of a hazardous-waste disposal site near Byron, Illinois: U.S. Geological Survey Water-Resources Investigations Report 89-4081, 55 p.

Kay, R.T., and Earle, J.D., 1990, Determination of hydraulic properties in the vicinity of a landfill near Antioch, Illinois: U.S. Geological Survey Water-Resources Investigations Report 89-4124, 28 p.

*** PROJECT TITLE *** Great Lakes Basin Ground-Water Contamination

*** PROBLEM *** The Great Lakes and their drainage basins contain the world's largest available supply of fresh water. There are many possible sources of contamination to the Great Lakes via ground water, but no comprehensive data base contains or evaluates the vast amount of information available for use in protecting this vital water resource. National interest and concern in the Great Lakes establishes a need to address this problem.

*** OBJECTIVE *** To delineate areas in the United States having significant potential for ground-water contamination.

*** APPROACH *** Available existing information and maps will be collected and evaluated for the purpose of defining and delineating areas of high contamination potential. The parameter maps will be developed on a geographic information system and will initially include public-supply wells and known contamination sites. A bibliography of projects, reports, and publications that pertain to ground-water contamination of the Great Lakes will be developed on an automated system.

*** SUMMARY OF RESULTS *** Finished writing report that includes over 1,000 references to ground water in the Great Lakes basin.

*** PLANS NEXT YEAR *** Publish report.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** United States portion of the Great Lakes basin

*** PROJECT CHIEF *** Kelly L. Warner

*** PERIOD OF PROJECT *** January 1987 through September 1990

*** COOPERATORS ***
Department of State, Office of the Secretary
International Joint Commission

*** REPORT IN PROCESS ***
Bibliography of Hydrogeologic Studies and an Application of a Geographic Information System, Great Lakes basin, United States

IL083 RAINFALL-RUNOFF IN DU PAGE COUNTY

*** PROJECT TITLE *** Rainfall-Runoff Relations in Large and Small Watersheds in Du Page County, Illinois

*** PROBLEM *** Little information about the variation in time and space of rainfall and corresponding storm runoff exists in Du Page County. The development of a comprehensive, county-wide storm-water management program in Du Page County requires an understanding of rainfall-runoff relations. Actual runoff data are needed for developing rainfall-runoff relations.

*** OBJECTIVES *** (1) Determine rainfall-runoff relations in three small watersheds using observed data and rainfall-runoff modeling. (2) Analyze differences in rainfall-runoff relations between watersheds and relate differences to causative factors such as land use.

*** APPROACH *** Streamflow and meteorologic data will be collected in three small watersheds in northeastern Illinois. Continuous records of stage and discharge will be collected in each watershed. At least three rain gages per watershed will be installed. Other pertinent data, such as land use and soil type, will be obtained from existing sources. These data will be used to calibrate a continuous-simulation, rainfall-runoff model for each watershed. A subset of the data collected will be set aside for verification.

*** SUMMARY OF RESULTS *** Data collection continued throughout the year. In May 1990, the second largest rainfall-runoff event to date was observed. Heavy rainfall resulted in record peaks at several stream-gaging stations. Analysis of storms from 1986 to present began. Characteristics of each of these storms were computed. A report describing data-collection methods and results of the analysis of storm events is 40-percent complete. Rainfall-runoff modeling using the Hydrological Simulation Program--Fortran (HSPF) model continued.

*** PLANS NEXT YEAR *** Continue data collection and analysis through water year 1991. Compute and publish streamflow records for 1990 and 1991 water years. Calibrate and verify the HSPF model for each of the watersheds. Begin writing report.

*** HEADQUARTERS LOCATION *** Urbana, Illinois

*** FIELD LOCATION *** Du Page County, Illinois

*** PROJECT CHIEF *** Kevin A. Oberg

*** PERIOD OF PROJECT *** October 1987 through September 1991

*** COOPERATOR ***

Du Page County Department of Environmental Concerns

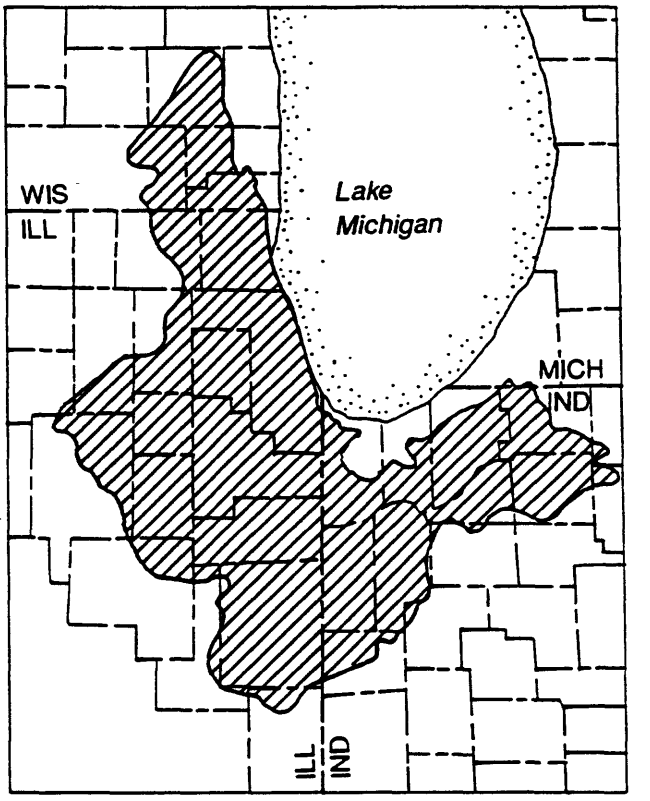
*** PLANNED REPORTS ***

Observed Rainfall-Runoff Relations in Three Small Watersheds in Du Page County, Illinois

Simulated Rainfall-Runoff Relations for Small and Large Watersheds in Du Page County, Illinois

IL084 NATIONAL WATER-QUALITY ASSESSMENT BIOLOGICAL RESPONSE STUDY

*** PROJECT TITLE *** Analysis of Existing Biological Data for the Upper Illinois River Basin



*** PROBLEM *** Implementation of the surface-water component of the National Water-Quality Assessment (NAWQA) program requires the use of biological information to aid in the interpretation of water-quality data and enhance the understanding of changes in stream quality. Although the incorporation of biological monitoring into water-quality assessments is generally accepted as being important, there is no consensus as to the specific kinds of biological information that are necessary to accurately evaluate changes in stream quality. Although descriptively accurate, biological information may be quantitatively intangible for evaluating changes in water.

*** OBJECTIVES *** To analyze existing data to describe relations between the chemical measure of water quality and the distribution, abundance, community structure, and organism health of aquatic macrobiota. To obtain a better understanding of the kinds of biological information and analyses that might be useful for regional water-quality assessments.

*** APPROACH *** Assemble existing biological data from some 200 different sources identified in an earlier inventory. Construct a computerized biological data base. Analyze the relation between biological information regarding distribution, abundance, community structure, organism health, and bioaccumulation

of chemicals and water-chemistry data. Several techniques including ordination and classification of the biological data will be used. Interpret findings based on the physical habitat, toxicological information, and biological relations. Publish a report describing the project findings.

*** SUMMARY OF RESULTS *** Assembled fish community and water-quality data; determined its spatial and temporal coverage. Selected subset of comparable data, constructed computerized data base, and conducted preliminary analyses.

*** PLANS NEXT YEAR *** Complete statistical analyses and write report.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Upper Illinois River Basin

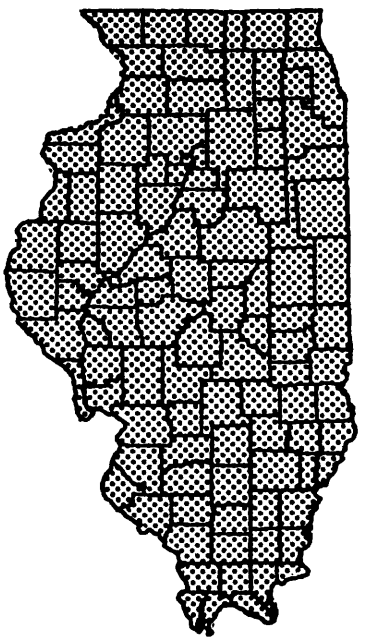
*** PROJECT CHIEF *** Peter M. Ruhl

*** PERIOD OF PROJECT *** January 1988 through September 1991

*** PLANNED REPORT ***
Project Results

IL086 ILLINOIS GROUND-WATER QUALITY

*** PROJECT TITLE *** A Statistical and Graphical Description of Illinois Ground-Water Quality



*** PROBLEM *** The public water-supply well information collected by the Illinois Environmental Protection Agency and USGS is the largest statewide ground-water-quality data base. This information has never been statistically or graphically summarized. The new Illinois Ground Water Protection Act mandates new and continued assessment of Illinois ground-water quality.

*** OBJECTIVE *** To statistically and graphically present ambient Illinois ground-water quality based on water-quality information from public water-supply wells.

*** APPROACH *** The National Water Information System statistical packages and a Geographic Information System will give accurate tabular and graphic representation of Illinois ground water. Other explanatory statistics may be applied. Correlations and spatial trends will be explored. A statewide ground-water-quality network will be designed and statistically evaluated.

*** SUMMARY OF RESULTS *** Statistical summaries and maps of constituents were developed. Initiated quarterly sampling of approximately 40 public-supply wells across the State. These wells, which are spatially and stratigraphically distributed, are being sampled for a wide range of inorganics and organics. These 40 sites will be included in the statewide ambient network. Published data in the annual data report.

*** PLANS NEXT YEAR *** The entire data set of public-supply wells that have principal aquifers will be evaluated to determine the best sample representation for depicting Illinois ground-water quality. The trend sites will be sampled quarterly. Publish data in the annual data report.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Kelly L. Warner

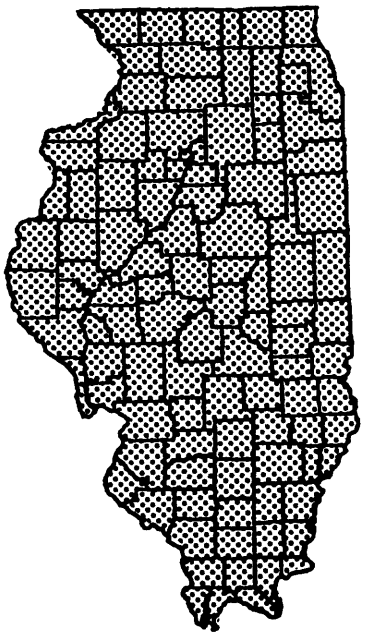
*** PERIOD OF PROJECT *** Continuous since August 1988

*** COOPERATOR ***
Illinois Environmental Protection Agency

*** PUBLISHED REPORTS ***
Maurer, J.C., Sterling, J.M., Richards, T.E., and Hayes, P.D., 1990, Water resources data--Illinois, water year 1989, Volume 1. Illinois except Illinois River basin: U.S. Geological Survey Water-Data Report IL-89-1, 387 p.

Sullivan, D.J., Hayes, P.D., Richards, T.E., and Maurer, J.C., 1990, Water resources data--Illinois, water year 1989, Volume 2. Illinois River basin: U.S. Geological Survey Water-Data Report IL-89-2, 467 p.

IL087 RETURN FLOWS IN STREAMFLOW



*** PROJECT TITLE *** Quantity and Seasonal Variation of Return Flow in Selected Headwaters in Illinois, 1988-89

*** PROBLEM *** The effect of return flows on streamflow is not well known. The quantity of water returned to streams by water users must be known to determine effects on streamflow and stream-water quality. During drought, return flows may constitute a major part of the streamflow. If contaminated, these returns could prevent the use of streamflow as a water supply. Information about water returns could provide the understanding necessary to better manage water sources and to help resolve water-supply and water-quality problems in Illinois.

*** OBJECTIVES *** (1) Create a return-flow data base to complement the water-use data program. (2) Describe the amount of return flow contained in streamflow.

*** APPROACH *** Discharge monitoring report data for about 500 commercial, industrial, and public-supply facilities will be entered from hard copies into DBASE software on a microcomputer. Data will be entered and merged into the USGS's State Water-Use Data System (NEWSWUDS) with 770 other sites currently entered by the Illinois Environmental Protection Agency (IEPA). Five headwaters of streams in Illinois will be studied. A headwater reach above the most upstream USGS continuous-record gaging station will be considered a potential study reach. Return data will be retrieved from NEWSWUDS by geographic location for the headwater reaches above these gages. Study reaches will be those where return-flow data are available. The quantities of return flow will be compared to the gaged streamflow for similarities. Also determined will be whether returns have a seasonal variation.

*** SUMMARY OF RESULTS *** Entered 1988 water-return data for 498 facilities into NEWSWUDS. Selected five study reaches and identified water returns within those reaches. Preliminary investigations show that returns and streamflow seem to be related at Thorn Creek above Glenwood, Illinois.

*** PLANS NEXT YEAR *** (1) Enter 1989 return data into NEWSWUDS. (2) Evaluate the quantity of returns to streamflow. (3) Finish report.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** John K. LaTour

*** PERIOD OF PROJECT *** April 1989 through September 1991

*** COOPERATOR ***
Illinois Environmental Protection Agency

*** PLANNED REPORT ***
Quantity and Seasonal Variation of Return Flows in Selected Headwaters in Illinois, 1988-89

IL089 RAINFALL-RUNOFF IN LAKE COUNTY

*** PROJECT TITLE *** Rainfall-Runoff Relations in Eight Watersheds in Lake County, Illinois

*** PROBLEM *** Lake County is an urbanizing county north of Chicago. State legislation, partly prompted by recent record flooding, has given the county responsibility for stormwater management. To address this responsibility, the county needs knowledge of the rainfall-runoff relations for its watersheds, and how these relations may be influenced by changing land-use and engineering constraints.

*** OBJECTIVES *** (1) Determine the rainfall-runoff relations for eight watersheds in Lake County. (2) Define the rainfall-runoff relations for major land-use categories and soil types prevalent in the county.

*** APPROACH *** (1) Establish a network of rainfall- and streamflow-gaging stations. (2) Calibrate and verify a distributed-parameter, rainfall-runoff model using the collected data. (3) Relate the hydrologic and hydraulic characteristics of the watersheds to the rainfall-runoff relations of the watersheds by regression analysis.

*** SUMMARY OF RESULTS *** Streamflow data from the five gaging stations continues to be collected. Initial analysis of storm events in the five watersheds has begun. An agreement on expanding the gaging-station network to include streamflow and rainfall data from four very small (less than 1 square mile) watersheds, each consisting of a different homogeneous landcover category, was reached. The four landcover categories to be gaged are single-family residential, estate-type residential, office-industrial park, and commercial strip.

*** PLANS NEXT YEAR *** Information on the physical characteristics of the gaged basins will continue to be collected to aid in the calibration of a rainfall-runoff model. Stage-discharge relations for the gaging stations will be maintained. Streamflow and rainfall gages will be installed on four additional small basins to aid in the modeling effort. The additional basins to be gaged will consist of very small drainage areas (less than 1 square mile) and homogeneous land-cover categories defined from last year's results.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

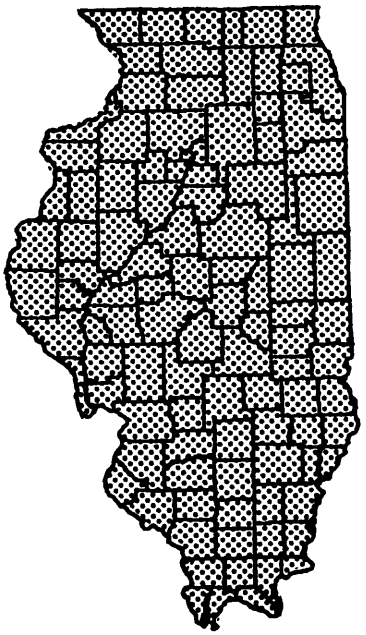
*** FIELD LOCATION *** Lake County, Illinois

*** PROJECT CHIEF *** James J. Duncker

*** PERIOD OF PROJECT *** June 1989 through September 1993

*** COOPERATORS ***
Lake County Department of Planning, Zoning, and Environmental Quality
Illinois Department of Transportation, Division of Water Resources

*** PLANNED REPORT ***
Rainfall-Runoff Relations in Lake County, Illinois



*** PROJECT TITLE *** Identification of Trends in Historic Streamflow Data for Illinois

*** PROBLEM *** Quantitative hydrology has traditionally accepted stationarity of hydrologic processes. Many standard statistical procedures used in hydrology are based on an assumption of stationarity. Recently, nonstationarity of the surface-water record has been recognized. In Illinois, no studies to date have evaluated historic streamflow data to identify and describe trends and variability, that is, nonstationarity, of the hydrologic processes.

*** OBJECTIVES *** To identify and quantify spatial and temporal trends, cycles, and changes in a variety of streamflow characteristics recorded at gages for watersheds in Illinois.

*** APPROACH *** Exploratory data analyses will be used to identify any discernible trends, as well as the spatial and temporal extent of observed trends. Spatial correlation analysis will identify the spatial extent of observed trends. Time-series analysis will give a more detailed description of the observed temporal trends. All analyses will initially be done at a gross scale with temporal and spatial resolution refined as the analysis progresses.

*** SUMMARY OF RESULTS *** Analyzed daily, mean monthly, mean annual, and 1-, 7-, 30-, 90-, and 120-day high- and low-flow discharges for 28 gaging stations having lengths of record ranging from 20-70 years. Twenty gaging stations showed statistically significant trends in some of these flow parameters. Eighteen gaging stations showed increasing trends, while two showed decreasing trends. Most of the records were at gaging stations in northeastern Illinois. Flow-duration analyses showed increasing trends in discharge; however, this was less than the variability of extreme events.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Arthur R. Schmidt

*** PERIOD OF PROJECT *** February through September 1990

*** COOPERATOR ***
Illinois Department of Transportation, Division of Water Resources

IL091 FLOOD FREQUENCY IN URBAN WATERSHEDS

*** PROJECT TITLE *** Techniques for Flood-Frequency Analysis in Changing Watersheds

*** PROBLEM *** Currently recommended procedures for flood-frequency analysis were not intended for use in urbanizing watersheds that are significantly regulated. One of the assumptions of these procedures is that peak floods are "random homogeneous events." This often is not the case with urban flood discharges, particularly in watersheds that have rapidly urbanized. Recent studies have shown that standard flood-frequency procedures may give conflicting or inconsistent results, especially when simulating different watershed conditions with a state-of-the-art rainfall-runoff model. Alternative watershed conditions, such as increased storage or increased imperviousness, are simulated and analyzed relative to some base condition of interest. When flood-frequency curves computed for each alternative are compared, inconsistencies often occur, such as intersecting frequency curves.

*** OBJECTIVES *** To explore, develop, and evaluate techniques for determining accurate flood-frequency estimates in rapidly changing urban watersheds.

*** APPROACH *** This study will be approached in three parts. In the first part, possible adjustments to the log-Pearson Type III distribution (LP-3) will be investigated. These may include a scheme to censor annual peaks or relating the peaks for an alternative simulation to some base (unregulated) condition, and scaling the base frequency curve accordingly. It is likely that this approach will have some of the same limitations as LP-3. In the second part of the approach, techniques for generating rainfall records for input to a rainfall-runoff model will be developed. At least two techniques will be explored: stochastic rainfall modeling and compilation of a large set of extreme storms. Data from several dense rain-gage networks in Illinois may be used for the latter. This approach has the advantage of incorporating information regarding the variability of rainfall both temporally and spatially. In the third part, the most accurate and consistent technique will be determined. Accuracy of the techniques will be evaluated using the Hydrological Simulation Program--Fortran (HSPF) watershed model, calibrated and verified for a watershed in northeastern Illinois, and Monte Carlo simulations. Finally, a tool for using the technique(s) in rainfall-runoff models will be developed. This tool will allow users to easily apply these techniques for watershed simulation. The tool will be demonstrated using HSPF and an example watershed in northeastern Illinois.

*** SUMMARY OF RESULTS *** One technique for adjusting the log-Pearson Type III distribution was developed. In this technique, the peak discharges for regulated or urbanized conditions are related to the peak discharges of a base condition (usually an undeveloped condition). Using this relation and the flood-frequency curve for the base condition, the flood-frequency curve for the regulated or developed condition may be computed. In addition, an evaluation of the importance of having a detailed spatial representation of rainfall when using a rainfall-runoff model to simulate flood peaks was performed. Data from a dense rain-gage network in Illinois was used as input to a calibrated rainfall-runoff model. The flood-frequency curves computed using all of the rain gages were compared to those computed using fewer rain gages as input to the rainfall-runoff model. Results indicate that it is more important to have one rain gage with a long period of record than many rain gages, when the goal is to use peaks simulated from a rainfall-runoff model for flood-frequency analysis.

*** PLANS NEXT YEAR *** Another technique for adjusting log-Pearson Type III distribution using flood volumes and peak-to-volume relationship will be explored. Testing of a flood-routing model using field data will be initiated. Evaluation of the different techniques will be initiated, and software for applying the technique(s) will be written.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Du Page County, Illinois

*** PROJECT CHIEF *** Kevin A. Oberg

*** PERIOD OF PROJECT *** October 1989 through September 1992

*** COOPERATORS **
Du Page County, Department of Environmental Concerns
Illinois Department of Transportation, Division of Water Resources

*** PLANNED REPORT ***
Techniques For Flood-Frequency Analysis in Urban Watersheds

IL092 RAINFALL-RUNOFF IN KANE COUNTY

*** PROJECT TITLE *** Rainfall-Runoff Relations in Kane County

*** PROBLEM *** Kane County is an urbanizing county 35 miles west of Chicago. Recent State legislation, partly prompted by recent record flooding, has given the county responsibility for stormwater management. To address this responsibility, the county needs knowledge of the rainfall-runoff relations for its watersheds, and how these relations may be influenced by changing land-use and engineering constraints.

*** OBJECTIVES *** (1) Determine the rainfall-runoff relations for several watersheds in Kane County. (2) Define the rainfall-runoff relations for major land-use categories and soil types prevalent in the county.

*** APPROACH *** Establish a network of rainfall- and streamflow-gaging stations. Calibrate and verify a distributed-parameter rainfall-runoff model using the collected data. Relate the hydrologic and hydraulic characteristics of the watersheds to the rainfall-runoff relations of the watersheds with regression analysis.

*** SUMMARY OF RESULTS *** Streamgaging sites have been selected and record is being collected. Hydrologic response units have been selected and modeling strategies have been reviewed.

*** PLANS NEXT YEAR *** Compute and publish discharge record.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Kane County, Illinois

*** PROJECT CHIEF *** Audrey L. Ishii

*** PERIOD OF PROJECT *** June 1990 through September 1994

*** COOPERATOR ***
Illinois Department of Transportation, Division of Water Resources

*** PLANNED REPORTS ***
Rainfall-Runoff Relations in Kane County, Illinois

(p. 53 follows)

PUBLICATIONS

PUBLICATIONS

Because the number of publications pertaining to water resources in Illinois is large, the publications listed below were selected to show the types of information available. The list, however, does include all publications produced by the Illinois District Office. Many of these publications are available for inspection at the District Office in Urbana and at large public and university libraries.

General Information

The USGS announces all its publications in a monthly catalog "New Publications of the U.S. Geological Survey." Free subscriptions to this list are available from U.S. Geological Survey, 582 National Center, Reston, VA 22092. All publications are for sale unless specifically stated otherwise (prices, which are subject to change, are not included in this report). Prepayment is required and information on price and availability should be obtained from listed sales offices before placing an order. The "U.S. Geological Survey Yearbook" provides a comprehensive description of the Federal Government's largest earth-science agency; copies may be purchased at the address where professional papers are sold (see below). Summaries of research in progress and results of completed investigations are published each fiscal year, beginning in 1978, in the professional paper series "Geological Survey Research." A pamphlet entitled "List of Geological Survey Geologic and Water-Supply Reports and Maps for Illinois," which includes reports on the geology of Illinois and other water-resources reports, is available free, upon request, from U.S. Geological Survey, Books and Open-File Reports Section, Federal Center, Box 25425, Denver, CO 80225 (phone 303-236-7476).

Water-Resources Information

A monthly summary of the national water situation is presented in "National Water Conditions." It is available free, on request, from the Hydrologic Information Unit, U.S. Geological Survey, 419 National Center, Reston, VA 22092.

Beginning with the 1971 water year, a new publication series entitled "U.S. Geological Survey Water-Data Reports," combined under one cover streamflow data, water-quality data for surface and ground water, and ground-water level data for each State. For Illinois, the title is "Water Resources Data for Illinois - Water Year 19XX: U.S. Geological Survey Water-Data Report IL-XX-1 and IL-XX-2" (XX represents water year published).

Prior to the 1971 water year, records of streamflow, ground-water levels, and quality of water were published in Geological Survey Water-Supply Papers as explained below.

Streamflow Records

Records of daily flows of streams prior to 1971 were published in reports from the Water-Supply Paper series "Surface-Water Supply of the United States," which were released in numbered parts as determined by natural drainage basins. Until 1961 this was an annual series; monthly and yearly summaries of these data were compiled in two reports: "Compilation of Records of Surface Waters of the United States through September 1950" and "Compilation of Records of Surface Waters of the United States, October 1950 to September 1960." For the period 1961-70, 5-year compilations were published. Data for Illinois are published in Parts 3, 4, and 5.

Quality-of-Water Records

Data on quality of surface water prior to 1971 were published annually in the Water-Supply Paper series "Quality of Surface Waters of the United States," which also was released in numbered parts as determined by natural drainage basins. Data for Illinois are in Parts 3, 4, and 5.

Ground-Water Records

Ground-water levels and artesian pressures in observation wells prior to 1975 were reported by geographic areas in a 5-year Water-Supply Paper series. Data for Illinois are in "Ground-Water Levels in the United States, North-Central States."

Flood Information

Methods for estimating the magnitude and frequency of floods for streams in Illinois are given in Water-Resources Investigations Report 87-4207, "Technique for Estimating Flood-Peak Discharges and Frequencies on Rural Streams in Illinois," by G.W. Curtis.

Professional Papers

Professional Papers are comprehensive formal reports of significant and lasting scientific interest and include results of resource studies and of geologic, hydrologic, or topographic investigations. Professional Papers are sold by the U.S. Geological Survey, Books and Open-File Reports Section, Federal Center, Box 25425, Denver, CO 80225 (phone 303-236-7476).

P 218 Geology and mineral resources of the Hardin and Brussels quadrangles (in Illinois), by W.W. Rubey. 1952.

P 448-H Low-flow characteristics of streams in the Mississippi embayment in Tennessee, Kentucky, and Illinois, by P.R. Speer, W.J. Perry, J.A. McCabe, O.G. Lara, and others, with a section on Quality of the Water by H.G. Jeffery. 1965.

P 492 Thermal springs of the United States and other countries of the world--A summary, by G.A. Waring. 1965.

P 813-A Summary appraisals of the Nation's ground-water resources--Ohio Region, by R.M. Bloyd, Jr. 1974.

P 813-B Summary appraisals of the Nation's ground-water resources--Upper Mississippi Region, by R.M. Bloyd, Jr. 1975.

P 813-J Summary appraisals of the Nation's ground-water resources--Great Lakes Region, by W.G. Weist, Jr. 1977.

P 1100 Geological Survey Research, 1978, by the U.S. Geological Survey. 1978.

Water-Supply Papers

Water-Supply Papers are formal reports dealing with all aspects of hydrology, including quality, recoverability, and use of water resources; statistical reports on streamflow, floods, ground-water levels, and water quality; and collections of short papers on related topics. Water-Supply Papers are sold by the U.S. Geological Survey, Books and Open-File Reports Section, Federal Center, Box 25425, Denver, CO 80225 (phone 303-236-7476).

W 334 The Ohio Valley flood of March-April 1913, including comparisons with some earlier floods, by A.H. Horton and H.J. Jackson. 1913.

W 838 Floods of Ohio and Mississippi Rivers, January-February 1937, by N.C. Grover, with a section on Flood Deposits of the Ohio River, January-February 1937, by G.R. Mansfield. 1938.

W 1260-C Floods of 1952 in the basins of the Upper Mississippi River and Red River of the North. 1955.

W 1299 The industrial utility of public water supplies in the United States, 1952--Part 1, States east of the Mississippi River, by E.E. Lohr and S.K. Love. 1954.

W 1370-B Floods of October 1954 in the Chicago area, Illinois and Indiana, by W.S. Daniels and M.D. Hale. 1958.

W 1473 Study and interpretation of the chemical characteristics of natural water, 2d edition, by J.D. Hem. 1970.

W 1669-O Ground-water conditions at Argonne National Laboratory, Illinois, 1948-60, by D.B. Knowles, W.J. Drescher, and E.F. LeRoux. 1963.

W 1669-S Yearly variations in runoff for the conterminous United States, 1931-60, by M.W. Busby. 1963.

W 1797 Has the United States enough water?, by A.M. Piper. 1965.

W 1800 The role of ground water in the national water situation, by C.L. McGuinness. 1963.

W 1812 Public water supplies of the 100 largest cities in the United States, 1962, by C.N. Durfor and Edith Becker. 1964.

W 1838 Reservoirs in the United States, by R.O.R. Martin and R.L. Hanson. 1966.

W 1871 Water data for metropolitan areas in the United States--A summary of data from 222 areas compiled by W.J. Schneider. 1968.

W 1899-I Streamflow from the United States into the Atlantic Ocean during 1931-60, by C.D. Bue. 1970.

W 1990 Annotated bibliography on artificial recharge of ground water, 1955-67, by D.C. Signor, D.J. Growitz, and William Kam. 1970.

W 2002 Water in urban planning, Salt Creek basin, Illinois, by A.M. Spieker. 1970.

W 2005 Model hydrographs, by W.D. Mitchell. 1972.

W 2020 Subsurface waste disposal by means of wells--A selective annotated bibliography, by D.R. Rima, E.B. Chase, and B.M. Myers. 1971.

W 2078 Some chemical characteristics of mine drainage in Illinois, by L.G. Toler. 1982.

W 2226 Low-level radioactive-waste burial at the Palos Forest Preserve, Illinois: Geology and hydrology of the glacial drift, as related to the migration of tritium, by J.C. Olimpio. 1984.

W 2250 National Water Summary 1983--Hydrologic events and issues, by U.S. Geological Survey. 1984.

W 2262 A system for measuring surface runoff and collecting sediment samples from small areas, by J.R. Gray and M.P. deVries, in Meyer, E.L., ed., Selected papers in the hydrologic sciences. 1984.

W 2269 Traveltime and longitudinal dispersion in Illinois streams, by J.B. Graf. 1986.

W 2275 National Water Summary 1984--Hydrologic events, selected water-quality trends, and ground-water resources, by U.S. Geological Survey. 1985.

W 2300 National Water Summary 1985--Hydrologic events and surface-water resources, by U.S. Geological Survey. 1986.

W 2301 Relations between quality of urban runoff and quality of Lake Ellyn at Glen Ellyn, Illinois, by R.G. Striegl and E.A. Cowan. 1987.

W 2325 National Water Summary 1986--Hydrologic events and ground-water quality, by U.S. Geological Survey. 1988.

W 2327 Evapotranspiration and microclimate at a low-level radioactive-waste disposal site in northwestern Illinois, by R.W. Healy, M.P. deVries, and A.M. Sturrock, Jr. 1989.

W 2333 Tritium migration from a low-level radioactive-waste disposal site near Chicago, Illinois, by J.R. Nicholas and R.W. Healy. 1988.

W 2350 National Water Summary 1987--Hydrologic events and water supply and use, by U.S. Geological Survey. 1990.

Circulars

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Using a geographic information system to relate human and natural factors to stream-water quality in the upper Illinois River basin in Illinois, Indiana, and Wisconsin, by F.A. Stanke, p. 96.

Occurrence and distribution of nutrients and dissolved oxygen in the upper Illinois River basin in Illinois, Indiana, and Wisconsin--results of a 1988 low-flow synoptic survey, by P.J. Terrio, p. 100-101.

89-625. Water-resources activities of the U.S. Geological Survey in Illinois, 1989, by M.L. Garrelts. 1990.

90-375. Availability and suitability of municipal wastewater information for use in a National water-quality assessment--A case study of the upper Illinois River basin in Illinois, Indiana, and Wisconsin, by J.S. Zogorski, S.F. Blanchard, R.D. Romack, and F.A. Fitzpatrick. 1990.

Water-Resources Investigations/Open-File Reports

The following Water-Resources Investigations/Open-File Reports are available from the District Office, U.S. Geological Survey, 4th Floor, 102 East Main Street, Urbana, IL 61801 (phone 217-398-5353).

76-87. Index to water-resources data for Illinois, by D.E. Winget, 1976.

81-403. Hydrology of Area 35, Eastern Region, Interior Coal Province, Illinois and Kentucky, by E.E. Zuehls, G.L. Ryan, D.B. Peart, and K.K. Fitzgerald, 1981.

81-636. Hydrology of Area 25, Eastern Region, Interior Coal Province, Illinois, by E.E. Zuehls, G.L. Ryan, D.B. Peart, and K.K. Fitzgerald, 1981.

82-858. Hydrology of Area 29, Eastern Region, Interior Coal Province, Illinois, by K.K. Fitzgerald, C.A. Peters, and E.E. Zuehls, 1983.

82-1005. Hydrology of Area 30, Eastern Region, Interior Coal Province, Illinois and Indiana, by D.J. Wangsness and others, 1983.

83-544. Hydrology of Area 28, Eastern Region, Interior Coal Province, Illinois, by E.E. Zuehls, K.K. Fitzgerald, and C.A. Peters, 1984.

84-707. Hydrology of Area 27, Eastern Region, Interior Coal Province, Illinois, by E.E. Zuehls. 1987.

85-342. Hydrology of Area 31, Eastern Region, Interior Coal Province, Illinois and Indiana, by E.E. Zuehls. 1987.

Miscellaneous Reports

The following miscellaneous reports were developed in cooperation with other State of Illinois agencies and published by those agencies. The reports are available for inspection only at the District Office of the U.S. Geological Survey. Information about these reports may be obtained from the District Chief, U.S. Geological Survey, WRD, 4th Floor, 102 East Main Street, Urbana, IL 61801 (phone 217-398-5353).

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The annual State Water-Data Report contains surface- and ground-water data for Illinois that has been collected by the USGS in cooperation with other Federal, State, and local agencies. The water-data reports listed below are available free of charge, while supplies last, from the District Chief, U.S. Geological Survey, 102 E. Main Street, Urbana, IL 61801. They may also be purchased as hard copy or microfiche from the National Technical Information Service (NTIS), U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161 (phone 703 487-4650). The NTIS ordering number is given in parentheses at the end of the citation.

IL-71-1. Water Resources Data for Illinois--Water Year 1971, by U.S. Geological Survey, 1972. (PB 288019/AS)

IL-72-1. Water Resources Data for Illinois--Water Year 1972, by U.S. Geological Survey, 1973. (PB 288018/AS)

IL-73-1. Water Resources Data for Illinois--Water Year 1973, by U.S. Geological Survey, 1974. (PB 288020/AS)

IL-74-1. Water Resources Data for Illinois--Water Year 1974, by U.S. Geological Survey, 1975. (PB 288021/AS)

IL-75-1. Water Resources Data for Illinois--Water Year 1975, by U.S. Geological Survey, 1976. (PB 254434/AS)

IL-76-1. Water Resources Data for Illinois--Water Year 1976, by U.S. Geological Survey, 1977. (PB 266379/AS)

IL-77-1. Water Resources Data for Illinois--Water Year 1977, by U.S. Geological Survey, 1978. (PB 283562/AS)

IL-78-1. Water Resources Data for Illinois--Water Year 1978, Volume 1, Illinois except Illinois River basin, by U.S. Geological Survey, 1979. (PB 296416/AS)

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IL-79-1. Water Resources Data for Illinois--Water Year 1979, Volume 1, Illinois except Illinois River basin, by U.S. Geological Survey, 1980. (PB80-207004)

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IL-81-1. Water Resources Data - Illinois--Water Year 1981, Volume 1, Illinois except Illinois River basin, by U.S. Geological Survey, 1982. (PB83-119966)

IL-81-2. Water Resources Data - Illinois--Water Year 1981, Volume 2, Illinois River basin, by U.S. Geological Survey, 1982. (PB83-119974)

IL-82-1. Water Resources Data - Illinois--Water Year 1982, Volume 1, Illinois except Illinois River basin, by R.L. Stahl, K.K. Fitzgerald, T.E. Richards, and P.D. Hayes, 1983. (PB84-120112)

IL 82-2. Water Resources Data - Illinois--Water Year 1982, Volume 2, Illinois River basin, by T.E. Richards, P.D. Hayes, R.L. Stahl, and K.K. Fitzgerald, 1983. (PB84-120120)

IL 83-1. Water Resources Data - Illinois--Water Year 1983, Volume 1, Illinois except Illinois River basin, by R.L. Stahl, K.K. Fitzgerald, T.E. Richards, and P.D. Hayes, 1984. (PB85-125755)

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IL-84-2. Water Resources Data - Illinois--Water Year 1984, Volume 2, Illinois River basin, by K.K. Fitzgerald, P.D. Hayes, T.E. Richards, and R.L. Stahl, 1985. (PB86-135316)

IL-85-1. Water Resources Data - Illinois--Water Year 1985, Volume 1, Illinois except Illinois River basin, by R.L. Stahl, K.K. Fitzgerald, T.E. Richards, and P.D. Hayes, 1986. (PB87-105631)

IL-85-2. Water Resources Data - Illinois--Water Year 1985, Volume 2, Illinois River basin, by K.K. Fitzgerald, P.D. Hayes, T.E. Richards, and R.L. Stahl, 1986. (PB87-105649)

IL-86-1. Water Resources Data - Illinois--Water Year 1986, Volume 1, Illinois except Illinois River basin, by R.L. Stahl, K.K. Fitzgerald, T.E. Richards, and P.D. Hayes, 1987. (PB88-117189)

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Conference Abstracts and Papers and Journal Articles

The following abstracts and reports by Geological Survey personnel were printed in non-Geological Survey publications. Typically, they summarize the principal conclusions of an author's current work but contain little supporting data. These publications are not available from the U.S. Geological Survey.

Hydrogeology of a low-level radioactive-waste disposal site near Sheffield, Illinois, by J.R. Erickson, published in the program of the North-Central Section, Geological Society of America, 14th annual meeting, April 10-11, 1980, Bloomington, Indiana, p. 225.

Anisotropic ground-water movement and tritium migration in glacial drift beneath a low-level radioactive-waste burial site, Argonne, Illinois, by J.C. Olimpio, published in the program of the North-Central Section, Geological Society of America, 14th annual meeting, April 10-11, 1980, Bloomington, Indiana, p. 253.

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Hydrogeologic controls on the extent and rate of tritium migration from a low-level radioactive-waste disposal facility near Sheffield, Illinois, by J.B. Foster, R.W. Healy, Keros Cartwright, and T.M. Johnson, in Abstracts with Programs, 1983, 17th annual meeting, North-Central Section, The Geological Society of America, April 28-29, 1983, Madison, Wisconsin, Vol. 15, No. 4.

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Predicting ground-water drainage to surface mines, by L.S. Weiss and D.L. Galloway, in Proceedings of Water for Resource Development, ASCE Hydraulics Division Specialty Conference, August 14-17, 1984, Coeur d' Alene, Idaho, p. 184-188.

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Hydraulic characteristics of a jointed dolomite beneath a low-level radioactive-waste disposal site, by J.R. Nicholas and A.M. Shapiro, in EOS Transactions, American Geophysical Union, v. 67, no. 16, April 22, 1986.

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Rainfall-loss parameter estimation for Illinois, by L.S. Weiss and A.L. Ishii, in Proceedings of Water Forum '86: World Water Issues in Evolution, August 4-6, 1986, Long Beach, California, p. 682-689.

Illinois ground-water observation network, by D.C. Voelker and M.G. Sherrill, in Proceedings of the 31st Annual Midwest Ground Water Conference, October 27-29, 1986, Little Rock, Arkansas.

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Diffusion of radioactive carbon dioxide in the unsaturated zone near buried low-level radioactive waste, by R.G. Striegl, in Ground Water, v. 25, no. 5, September-October 1987, p. 613.

Hydrogeology of the Byron/Johnson Salvage Yard Superfund site near Byron, Illinois, by R.T. Kay, B.J. Ryan, E.J. Mears, and D.J. Yeskis, in Proceedings of the ASCE Water Resources Symposium, October 21-22, 1987, Rosemont, Illinois.

Hydraulic testing in two aquifers at a Superfund site near Byron, Illinois, by B.J. Ryan, R.T. Kay, and K.A. Wallace, in Program with Abstracts, 32nd Annual Midwest Ground Water Conference, October 28-30, 1987, Madison, Wisconsin.

Suspended sediment and metals removal from urban runoff by a small lake, by R.G. Striegl, in Water Resources Bulletin, v. 23, no. 6, December 1987, p. 985-996.

Instrumentation and field methods for hydraulic and tracer tests in discrete fractures in northeastern Illinois, by M.P. deVries, in Program and Abstracts, International Conference on Fluid Flow in Fractured Rocks, May 15-18, 1988, Atlanta, Georgia.

Overview of a hydrogeologic study of fractured dolomite in northeastern Illinois, by J.R. Nicholas, in Program and Abstracts, International Conference on Fluid Flow in Fractured Rocks, May 15-18, 1988, Atlanta, Georgia.

Leachate movement in unsaturated sand underlying low-level radioactive waste trenches in northwestern Illinois, by P.C. Mills and M.P. deVries, in Abstracts, Tenth Annual Low-Level Waste Management Conference, August 30 to September 1, 1988, Denver, Colorado.

Leachate movement through unsaturated sand at a low-level radioactive-waste disposal site in northwestern Illinois, by P.C. Mills and M.P. deVries, in Proceedings, Session III: Disposal technology and facility development, Tenth Annual DOE Low-Level Waste Management Conference, August 30 to September 1, 1988, Denver, Colorado, p. 54-68.

Review of aquaculture models for predicting and exploiting processes at the sediment water interface, by J.A. Colman, in Abstracts, Progress Through Unity, Aquaculture '89, February 12-16, 1989, Los Angeles, California.

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Seepage through a hazardous-waste trench cover, by R.W. Healy, in Journal of Hydrology, v. 108, no. 1-4, June 1989, p. 213-234.

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Geochemistry and transport of $^{14}CO_2$ near buried low-level radioactive waste, by R.G. Striegl, R.W. Healy, and A.L. Ishii, in Abstracts of Papers, 196th ACS National Meeting, American Chemical Society, September 25-30, 1988, Los Angeles, California.

Wetland hydrologic and hydraulic research: Where we have been and where we need to go, by R.P. Novitzki, in Abstracts, Annual Conference of the Illinois Section of the American Water Resources Association, October 2, 1989, Peoria, Illinois.

Using a geographic information system to relate human and natural factors to stream water quality in the upper Illinois River basin in Illinois, Indiana, and Wisconsin, by F.A. Stanke, in Abstracts, Annual Conference of the Illinois Section of the American Water Resources Association, October 2, 1989, Peoria, Illinois.

Diffusion and consumption of methane in an unsaturated zone in north-central Illinois, by R.G. Striegl and A.L. Ishii, in Journal of Hydrology, v. 111, no. 1-4, November 1989, p. 133-143.

WHERE TO OBTAIN ADDITIONAL INFORMATION ON U.S. GEOLOGICAL SURVEY PROGRAMS IN ILLINOIS

In addition to the reports and abstracts listed above, further information may be obtained regarding water, maps, and geology by contacting the following offices of the U.S. Geological Survey:

WATER

District Chief
U.S. Geological Survey
4th floor
102 East Main Street
Urbana, Illinois 61801

Phone: (217) 398-5353

MAPS

Chief, Mid-Continent Mapping Center
Earth Science Information Center
U.S. Geological Survey
1400 Independence Road
Rolla, Missouri 65401

Phone: (314) 341-0851

GEOLOGY

Geologic Inquiries Group
U.S. Geological Survey
907 National Center
Reston, Virginia 22092

Phone: (703) 648-4383

GENERAL INFORMATION

Public Inquiries Office
U.S. Geological Survey
503 National Center
Room 1-C-402
12201 Sunrise Valley Drive
Reston, Virginia 22092

Phone: (703) 648-6892

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TABLES 2 and 3

Table 2.--Surface-water stations for which data are collected by the Illinois District of the U.S. Geological Survey

Abbreviations for types of data collected are:

- C - Crest stage - peak-stage and peak-discharge record only.
- CQ - Chemical quality.
- D - Discharge - continuous record of stage and discharge.
- D7 - Discharge - continuous record of stage and discharge for months of March through September.
- DS - Discharge with auxiliary slope gage - continuous record of stage and discharge.
- R - Lake contents - furnished by U.S. Army Corps of Engineers, St. Louis District.
- S - Stage - continuous record of stage.
- S/8 - Stage at 0800 hours.
- SD - Suspended sediment.

Station No.	Station name	Type of data
03336645	Middle Fork Vermilion River above Oakwood, Ill.	D,CQ
03336900	Salt Fork near St. Joseph, Ill.	D,CQ
03337000	Boneyard Creek at Urbana, Ill.	D
03337700	Saline Branch near Mayview, Ill.	CQ
03338097	Salt Fork near Oakwood, Ill.	CQ
03338780	North Fork Vermilion River near Bismarck, Ill.	D,CQ
03339000	Vermilion River near Danville, Ill.	D,CQ
03339147	Little Vermilion River near Georgetown, Ill.	CQ
03341414	Brouilletts Creek near St. Bernice, Ind.	CQ
03341540	Sugar Creek near Elbridge, Ill.	CQ
03341920	Wabash River at Hutsonville, Ill.	CQ
03343395	Embarras River at Camargo, Ill.	CQ
03343400	Embarras River near Camargo, Ill.	D
03344000	Embarras River near Diona, Ill.	C,CQ
03344500	Range Creek near Casey, Ill.	C
03345500	Embarras River at Ste. Marie, Ill.	D,CQ
03346000	North Fork Embarras River near Oblong, Ill.	D,CQ
03378000	Bonpas Creek at Browns, Ill.	D,CQ
03378635	Little Wabash River near Effingham, Ill.	D,CQ
03378900	Little Wabash River at Louisville, Ill.	C,CQ
03379500	Little Wabash River below Clay City, Ill.	D,CQ
03379600	Little Wabash River at Blood, Ill.	CQ
03380475	Horse Creek near Keenes, Ill.	D
03380500	Skillet Fork at Wayne City, Ill.	D,CQ
03381495	Little Wabash River at Main Street at Carmi, Ill.	CQ

Table 2.--Surface-water stations for which data are collected by the Illinois District of the U.S. Geological Survey--Continued

Station No.	Station name	Type of data
03381500	Little Wabash River at Carmi, Ill.	DS
03382100	South Fork Saline River near Carrier Mills, Ill.	D,CQ
03384450	Lusk Creek near Eddyville, Ill.	D,CQ
03385000	Hayes Creek at Glendale, Ill.	C
03612000	Cache River at Forman, Ill.	D,CQ
03612500	Ohio River at Lock and Dam 53, near Grand Chain, Ill.	CQ
05414820	Sinsinawa River near Menominee, Ill.	D
05418950	Apple River near Elizabeth, Ill.	CQ
05419000	Apple River near Hanover, Ill.	D
05420100	Plum River at Savanna, Ill.	CQ
05420500	Mississippi River at Clinton, Iowa	CQ
05435500	Pecatonica River at Freeport, Ill.	D,CQ
05435800	Pecatonica River at Harrison, Ill.	CQ
05437500	Rock River at Rockton, Ill.	D,CQ
05438201	Kishwaukee River at GP Rd at Garden Prairie, Ill.	CQ
05438250	Coon Creek at Riley, Ill.	C,CQ
05438500	Kishwaukee River at Belvidere, Ill.	D
05438600	Kishwaukee R above South Branch nr Perryville, Ill.	CQ
05439000	South Branch Kishwaukee River at De Kalb, Ill.	D
05439500	South Branch Kishwaukee River nr Fairdale, Ill.	D,CQ
05440000	Kishwaukee River near Perryville, Ill.	D,CQ
05440520	Killbuck Creek near New Milford, Ill.	CQ
05442020	Kyte River at Daysville, Ill.	CQ
05443500	Rock River at Como, Ill.	D7,CQ
05444000	Elkhorn Creek near Penrose, Ill.	D,CQ
05446000	Rock Creek at Morrison, Ill.	C
05446500	Rock River near Joslin, Ill.	D,CQ
05447100	Green River near Deer Grove, Ill.	CQ
05447500	Green River near Geneseo, Ill.	D,CQ
05448000	Mill Creek at Milan, Ill.	D
05466000	Edwards River near Orion, Ill.	D
05466500	Edwards River near New Boston, Ill.	D,CQ
05467000	Pope Creek near Keithsburg, Ill.	D7
05468500	Cedar Creek at Little York, Ill.	C
05469000	Henderson Creek near Oquawka, Ill.	D,CQ
05474500	Mississippi River at Keokuk, Iowa	CQ
05495500	Bear Creek near Marcelline, Ill.	D,CQ
05502020	Hadley Creek near Barry, Ill.	C
05512500	Bay Creek at Pittsfield, Ill.	D
05513000	Bay Creek at Nebo, Ill.	CQ

Table 2.--Surface-water stations for which data are collected by the Illinois District of the U.S. Geological Survey--Continued

Station No.	Station name	Type of data
05520500	Kankakee River at Momence, Ill.	D,CQ
05525000	Iroquois River at Iroquois, Ill.	D,CQ
05525500	Sugar Creek at Milford, Ill.	D,CQ
05526000	Iroquois River near Chebanse, Ill.	D,CQ
05527500	Kankakee River near Wilmington, Ill.	D,CQ
05527800	Des Plaines River at Russell, Ill.	D,CQ
05527950	Mill Creek at Old Mill Creek, Ill.	D
05528000	Des Plaines River near Gurnee, Ill.	D,CQ
05528030	Bull Creek near Libertyville, Ill.	D
05528230	Indian Creek at Prairie View, Ill.	D
05528500	Buffalo Creek near Wheeling, Ill.	D
05529000	Des Plaines River near Des Plaines, Ill.	D,CQ
05529500	McDonald Creek near Mount Prospect, Ill.	D
05530000	Weller Creek at Des Plaines, Ill.	D
05530590	Des Plaines River near Schiller Park, Ill.	CQ
05530990	Salt Creek at Rolling Meadows, Ill.	D
05531300	Salt Creek at Elmhurst, Ill.	D
05531500	Salt Creek at Western Springs, Ill.	D,CQ
05532000	Addison Creek at Bellwood, Ill.	D,CQ
05532300	Salt Creek at Brookfield, Ill.	S
05532500	Des Plaines River at Riverside, Ill.	D,CQ
05533000	Flag Creek near Willow Springs, Ill.	D
05533400	Sawmill Creek near Lemont, Ill.	D
05534050	Des Plaines River at Lockport, Ill.	CQ
05534500	North Branch Chicago River at Deerfield, Ill.	D,CQ
05535000	Skokie River at Lake Forest, Ill.	D
05535070	Skokie River near Highland Park, Ill.	D
05535500	West Fork of N Br Chicago River at Northbrook, Ill.	D
05536000	North Branch Chicago River at Niles, Ill.	D,CQ
05536105	N Branch Chicago River at Albany Ave. at Chicago, Ill.	D
05536195	Little Calumet River at Munster, Ind.	CQ
05536215	Thorn Creek at Glenwood, Ill.	D
05536235	Deer Creek near Chicago Heights, Ill.	D
05536255	Butterfield Creek at Flossmoor, Ill.	D
05536265	Lansing ditch near Lansing, Ill.	D
05536275	Thorn Creek at Thornton, Ill.	D,CQ
05536290	Little Calumet River at South Holland, Ill.	D
05536340	Midlothian Creek at Oak Forest, Ill.	D
05536500	Tinley Creek near Palos Park, Ill.	D
05536995	Chicago Sanitary and Ship Canal at Romeoville, Ill.	CQ

Table 2.--Surface-water stations for which data are collected by the Illinois District of the U.S. Geological Survey--Continued

Station No.	Station name	Type of data
05537000	Chicago Sanitary and Ship Canal at Lockport, Ill.	CQ
05537500	Long Run near Lemont, Ill.	D
05539000	Hickory Creek at Joliet, Ill.	D,CQ
05539900	West Branch Du Page River near West Chicago, Ill.	D,CQ
05540060	Kress Creek at West Chicago, Ill.	D
05540095	West Branch Du Page River near Warrenville, Ill.	D,CQ
05540130	West Branch Du Page River near Naperville, Ill.	D
05540160	East Branch Du Page River near Downers Grove, Ill.	D
05540195	St. Joseph Creek at Route 34 at Lisle, Ill.	D
05540210	East Branch Du Page River at Rt. 34 at Lisle, Ill.	CQ
05540250	East Branch Du Page River at Bolingbrook, Ill.	D
05540275	Spring Brook at 87th Street near Naperville, Ill.	D,CQ
05540290	Du Page River near Naperville, Ill.	CQ
05540500	Du Page River at Shorewood, Ill.	D,CQ
05542000	Mazon River near Coal City, Ill.	D,CQ
05543500	Illinois River at Marseilles, Ill.	D,CQ
05546700	Fox River near Channel Lake, Ill.	CQ
05547000	Channel Lake near Antioch, Ill.	S
05547500	Fox Lake near Lake Villa, Ill.	S
05547755	Squaw Creek at Round Lake, Ill.	D
05548000	Nippersink Lake at Fox Lake, Ill.	S
05548280	Nippersink Creek near Spring Grove, Ill.	D,CQ
05548500	Fox River at Johnsburg, Ill.	S
05549000	Boone Creek near McHenry, Ill.	C
05549500	Fox River near McHenry, Ill.	S
05549850	Flint Creek near Fox River Grove, Ill.	D
05550000	Fox River at Algonquin, Ill.	D,CQ
05550500	Poplar Creek at Elgin, Ill.	D,CQ
05551000	Fox River at South Elgin, Ill.	D,CQ
05551200	Ferson Creek near St. Charles, Ill.	D
05551540	Fox River at Montgomery, Ill.	CQ
05551700	Blackberry Creek near Yorkville, Ill.	D,CQ
05552500	Fox River at Dayton, Ill.	D,CQ
05554000	North Fork Vermilion River near Charlotte, Ill.	C
05554490	Vermilion River at McDowell, Ill.	CQ
05554500	Vermilion River at Pontiac, Ill.	D
05555300	Vermilion River near Leonore, Ill.	D,CQ
05556200	Illinois River at Hennepin, Ill.	CQ
05556500	Big Bureau Creek at Princeton, Ill.	D,CQ
05557000	West Bureau Creek at Wyanet, Ill.	C,CQ

Table 2.--Surface-water stations for which data are collected by the Illinois District of the U.S. Geological Survey--Continued

Station No.	Station name	Type of data
05557500	East Bureau Creek near Bureau, Ill.	C
05558300	Illinois River at Henry, Ill.	D
05558995	Illinois River at Lacon, Ill.	CQ
05559900	Illinois River at Water Company at Peoria, Ill.	CQ
05563000	Kickapoo Creek near Kickapoo, Ill.	C
05563500	Kickapoo Creek at Peoria, Ill.	C
05563800	Illinois River at Pekin, Ill.	CQ
05567000	Panther Creek near El Paso, Ill.	C
05567500	Mackinaw River near Congerville, Ill.	D
05567510	Mackinaw River below Congerville, Ill.	CQ
05568000	Mackinaw River near Green Valley, Ill.	D
05568005	Mackinaw River below Green Valley, Ill.	CQ
05568500	Illinois River at Kingston Mines, Ill.	DS
05568800	Indian Creek near Wyoming, Ill.	D,CQ
05569500	Spoon River at London Mills, Ill.	D,CQ
05570000	Spoon River at Seville, Ill.	D,CQ
05570360	Evelyn Branch near Bryant, Ill.	D,CQ
05570370	Big Creek near Bryant, Ill.	D,CQ
05570380	Slug Run near Bryant, Ill.	D,CQ
05570520	Illinois River at Power Company at Havana, Ill.	CQ
05570910	Sangamon River at Fisher, Ill.	D,CQ
05572000	Sangamon River at Monticello, Ill.	D,CQ
05572125	Sangamon R at Allerton Park nr Monticello, Ill.	CQ
05573540	Sangamon River at Route 48 at Decatur, Ill.	D,CQ
05573650	Sangamon River near Niantic, Ill.	CQ
05573800	Sangamon River at Roby, Ill.	CQ
05574500	Flat Branch near Taylorville, Ill.	CQ
05575500	South Fork Sangamon River at Kincaid, Ill.	C,CQ
05576000	South Fork Sangamon River near Rochester, Ill.	DS
05576022	South Fork Sangamon River below Rochester, Ill.	CQ
05576500	Sangamon River at Riverton, Ill.	D,CQ
05577500	Spring Creek at Springfield, Ill.	D
05577505	Spring C at Burns Lane Bridge at Springfield, Ill.	CQ
05578000	Sangamon River at Petersburg, Ill.	CQ
05578500	Salt Creek near Rowell, Ill.	D,CQ
05579500	Lake Fork near Cornland, Ill.	D,CQ
05580000	Kickapoo Creek at Waynesville, Ill.	D,CQ
05580500	Kickapoo Creek near Lincoln, Ill.	C,CQ
05580950	Sugar Creek near Bloomington, Ill.	D
05581500	Sugar Creek near Hartsburg, Ill.	C,CQ

Table 2.--Surface-water stations for which data are collected by the Illinois District of the U.S. Geological Survey--Continued

Station No.	Station name	Type of data
05582000	Salt Creek near Greenview, Ill.	D,CQ
05583000	Sangamon River near Oakford, Ill.	D,CQ
05584400	Drowning Fork at Bushnell, Ill.	C
05584500	La Moine River at Colmar, Ill.	D,CQ
05585000	La Moine River at Ripley, Ill.	D,CQ
05585275	Indian Creek at Arenzville, Ill.	CQ
05585500	Illinois River at Meredosia, Ill.	S/8
05586000	North Fork Mauvaise Terre Creek nr Jacksonville, Ill.	C
05586040	Mauvaise Terre Creek near Merritt, Ill.	CQ
05586100	Illinois River at Valley City, Ill.	D,CQ,SD
05586500	Hurricane Creek near Roodhouse, Ill.	C
05586690	Macoupin Creek near Macoupin, Ill.	CQ
05587000	Macoupin Creek near Kane, Ill.	D,CQ
05587060	Illinois River at Hardin, Ill.	S/8,CQ
05587900	Cahokia Creek at Edwardsville, Ill.	D,CQ
05588000	Indian Creek at Wanda, Ill.	D
05590000	Kaskaskia Ditch at Bondville, Ill.	D
05590800	Lake Fork at Atwood, Ill.	D
05591200	Kaskaskia River at Cooks Mills, Ill.	D,CQ,SD
05591500	Asa Creek at Sullivan, Ill.	CQ
05591550	Whitley Creek near Allenville, Ill.	D
05591700	West Okaw River near Lovington, Ill.	D,CQ
05591950	Lake Shelbyville near Shelbyville, Ill.	R
05592000	Kaskaskia River at Shelbyville, Ill.	D,CQ
05592050	Robinson Creek near Shelbyville, Ill.	D
05592100	Kaskaskia River near Cowden, Ill.	D,CQ
05592500	Kaskaskia River at Vandalia, Ill.	D,CQ
05592575	Hickory Creek near Brownstown, Ill.	D
05592800	Hurricane Creek near Mulberry Grove, Ill.	D,CQ
05592900	East Fork Kaskaskia River near Sandoval, Ill.	D,CQ
05592990	Carlyle Lake near Carlyle, Ill.	R
05593000	Kaskaskia River at Carlyle, Ill.	D
05593010	Kaskaskia River below Carlyle, Ill.	CQ
05593520	Crooked Creek near Hoffman, Ill.	D,CQ
05593575	Little Crooked Creek near New Minden, Ill.	D
05593600	Blue Grass Creek near Raymond, Ill.	C
05593785	Shoal Creek near Walshville, Ill.	CQ
05593900	East Fork Shoal Creek near Coffeen, Ill.	D
05594000	Shoal Creek near Breese, Ill.	D,CQ
05594090	Sugar Creek at Albers, Ill.	CQ

Table 2.--Surface-water stations for which data are collected by the Illinois District of the U.S. Geological Survey--Continued

Station No.	Station name	Type of data
05594100	Kaskaskia River near Venedy Station, Ill.	D,CQ,SD
05594450	Silver Creek near Troy, Ill.	D,CQ
05594800	Silver Creek near Freeburg, Ill.	D,S/8,CQ
05595200	Richland Creek near Hecker, Ill.	D,S/8,CQ
05595540	Marys River at Welge, Ill.	CQ
05595700	Big Muddy River near Mt. Vernon, Ill.	S,CQ
05595730	Rayse Creek near Waltonville, Ill.	D,S/8,CQ
05595765	Big Muddy Subimpoundment near Waltonville, Ill.	S/8
05595820	Casey Fork at Mt. Vernon, Ill.	D,S/8
05595830	Casey Fork at Route 37 near Mt. Vernon, Ill.	CQ
05595860	Casey Fork Subimpoundment near Bonnie, Ill.	S/8
05595950	Rend Lake near Benton, Ill.	R
05597000	Big Muddy River at Plumfield, Ill.	DS,CQ
05597500	Crab Orchard Creek near Marion, Ill.	D,CQ
05598050	Crab Orchard C below CO Lake nr Carterville, Ill.	CQ
05599500	Big Muddy River at Murphysboro, Ill.	DS,CQ,SD
05600000	Big Creek near Wetaug, Ill.	C
07022000	Mississippi River at Thebes, Ill.	CQ

Table 3.--Ground-water stations, by county, for which data are collected by the Illinois District of the U.S. Geological Survey

Abbreviations for type of data collected are:
L - Water level.
Q - Water quality.

Station number	Local well name	Ownership	Type of data
	BUREAU COUNTY		
412220089280301	16N9E-16.8e	Private	L
412232089275101	Princeton Well No. 5	Municipal	Q
412242089125101	Ladd Well No. 1	Municipal	Q
	CALHOUN COUNTY		
390921090370101	Hardin Well No. 1	Municipal	Q
	CARROLL COUNTY		
415737090061001	Thomson Well No. 4	Municipal	Q
	CASS COUNTY		
395311090224202	Arenzville Well No. 2	Municipal	Q
400300090092801	Chandlerville Well No. 2	Municipal	Q
	CHAMPAIGN COUNTY		
400739088173501	Northern Illinois Water Corp. Well 58	Private	Q
400740088170601	Northern Illinois Water Corp. Well 57	Private	Q
400758088174101	Northern Illinois Water Corp. Well 60	Private	Q
400832088190601	Northern Illinois Water Corp. Well 54	Private	Q
401841088094701	Rantoul Well No. 7	Municipal	Q
	CLARK COUNTY		
392822087594101	Westfield Well No. 7	Municipal	Q
	COOK COUNTY		
414239087543801	37N12E-7.7e	County	L

Table 3.--Ground-water stations, by county, for which data are collected by the Illinois District of the U.S. Geological Survey--Continued

Station number	Local well name	Ownership	Type of data
	DE WITT COUNTY		
400647088481101	Weldon Well No. 5	Municipal	Q
	DU PAGE COUNTY		
414217087592801	37N11E-9.8c	Federal	L
414236087583301	37N11E-9.2f1	Federal	L
	FAYETTE COUNTY		
390759089073102	Ramsey Well No. 6	Municipal	Q
	HANCOCK COUNTY		
401407091034101	Bowen Well No. 2	Municipal	Q
	IROQUOIS COUNTY		
404629087453801	Watseka Well No. 7	Municipal	Q
	KANKAKEE COUNTY		
410127087425201	St. Anne Well No. 3	Municipal	Q
	LAKE COUNTY		
422803087475301	46N12E-14.6g1	Federal	L
422803087475302	46N12E-14.6g2	Federal	L
422803087475303	46N12E-14.6g3	Federal	L
422803087475304	46N12E-14.6g4	Federal	L
	LA SALLE COUNTY		
413255089064801	Mendota Well No. 3	Municipal	Q

Table 3.--Ground-water stations, by county, for which data are collected by the Illinois District of the U.S. Geological Survey--Continued

Station number	Local well name	Ownership	Type of data
	MADISON COUNTY		
384740090022701	Edwardsville Well No. 8	Municipal	Q
384955090055801	Hartford Well No. 4	Municipal	Q
385117090063701	Wood River Well No. 6	Municipal	Q
	MARSHALL COUNTY		
410633089211801	Henry Well No. 4	Municipal	Q
	MASON COUNTY		
401754090032001	Havana Well No. 5	Municipal	Q
401811089361801	San Jose Well No. 4	Municipal	Q
	MASSAC COUNTY		
370843088435301	Metropolis Well No. 2	Municipal	Q
	MENARD COUNTY		
400041089503601	Petersburg Well No. 1	Municipal	Q
	MONROE COUNTY		
381749090185301	Valmeyer Well No. 4	Municipal	Q
	PEORIA COUNTY		
404209089383301	Pleasant Valley Well No. 4	Municipal	Q
404625089580201	Elmwood Well No. 1	Municipal	Q
405536089300401	Chillicothe Well No. 7	Municipal	Q
	PIKE COUNTY		
392607090524301	Pleasant Hill Well No. 4	Municipal	Q

Table 3.--Ground-water stations, by county, for which data are collected by the Illinois District of the U.S. Geological Survey--Continued

Station number	Local well name	Ownership	Type of data
	PULASKI COUNTY		
373617089120301	Mounds Well No. 1	Municipal	Q
	ROCK ISLAND COUNTY		
412555090265401	Coal Valley Well No. 3	Municipal	Q
	ST. CLAIR COUNTY		
383916090023501	Mound Well No. 1	Municipal	Q
	TAZEWELL COUNTY		
402941089390901	South Pekin Well No. 5	Municipal	Q
403159089221801	Mackinaw Well No. 4	Municipal	Q
404222089243201	Washington Well No. 7	Municipal	Q
	WASHINGTON COUNTY		
382803089325201	Okawville Well No. 4	Municipal	Q
	WAYNE COUNTY		
383036088255001	Cisne Well No. 3	Municipal	Q
	WHITE COUNTY		
380549088042101	Carmi Well No. 3	Municipal	Q