

WATER-RESOURCES ACTIVITIES OF THE U.S. GEOLOGICAL SURVEY
IN ILLINOIS, 1991

Compiled by G.O. Balding

U.S. GEOLOGICAL SURVEY

Open-File Report 92-452



Urbana, Illinois

1992

U.S. DEPARTMENT OF THE INTERIOR
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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:

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

- o Participates in the exploration of space and prepares geologic and other maps of the planets and their satellites.
- o Publishes reports and maps, establishes and maintains earth-science data bases, and disseminates earth-science data and information.
- o Provides scientific and technical assistance for the effective use of earth-science techniques, products, and information.
- o Coordinates topographic, geologic, and land-use mapping, digital cartography, and water-data activities.
- o Develops new technologies for the collection, coordination, and interpretation of earth-science data.
- o Provides scientific support and technical advice for legislative, regulatory, and management decisions.
- o 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:

- o Systematically collects data needed for the continuing determination and evaluation of the quantity, quality, and use of the Nation's water resources.
- o 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.
- o 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.
- o Disseminates water data and the results of investigations and research through reports, maps, computerized information services, and other forms of public release.

- o Coordinates the activities of all Federal agencies in the acquisition of certain water data.
- o 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.
- o Acquires, develops, and disseminates information on water-related natural hazards such as droughts, floods, landslides, land subsidence, mudflows, and volcanoes.
- o 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.
- o 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 Sub-district 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.

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.

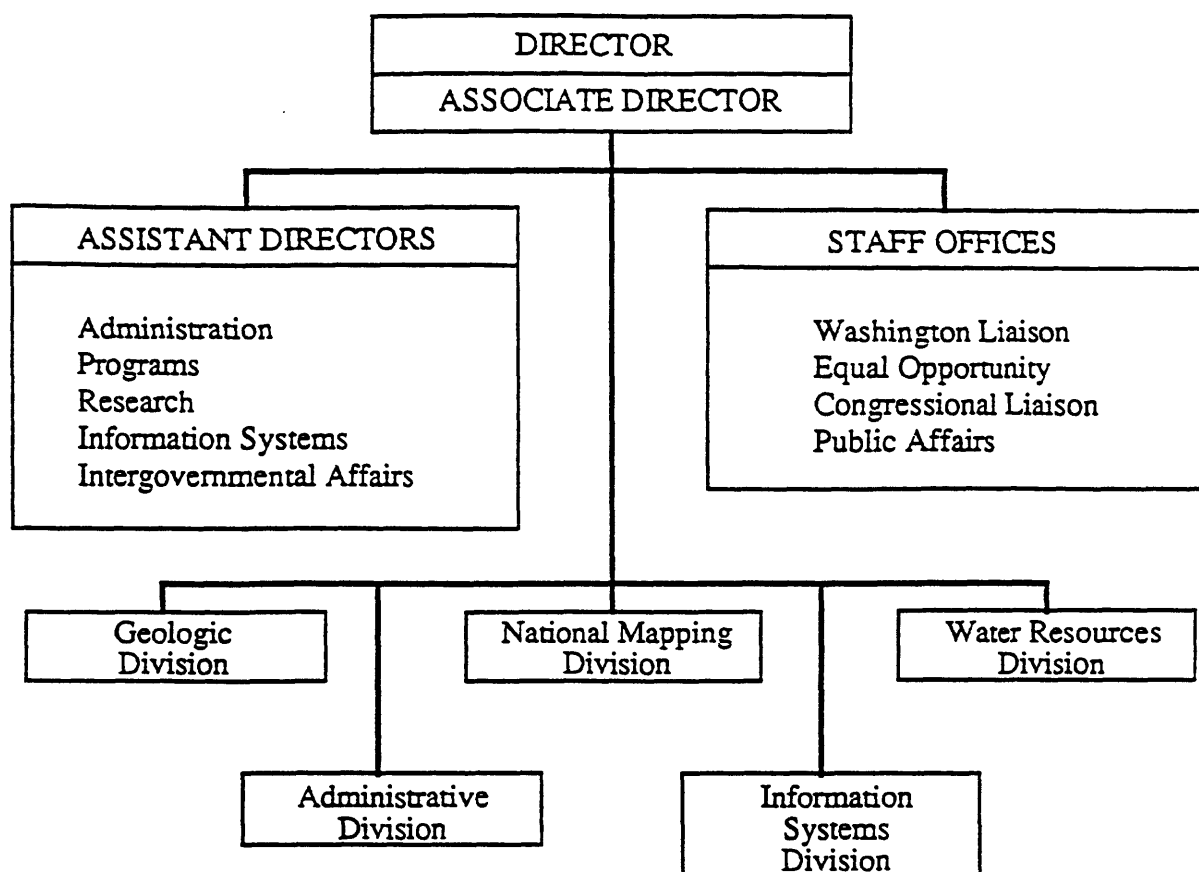


Figure 1.--U.S. Geological Survey organization chart.
Data from U.S. Geological Survey, 1991b.

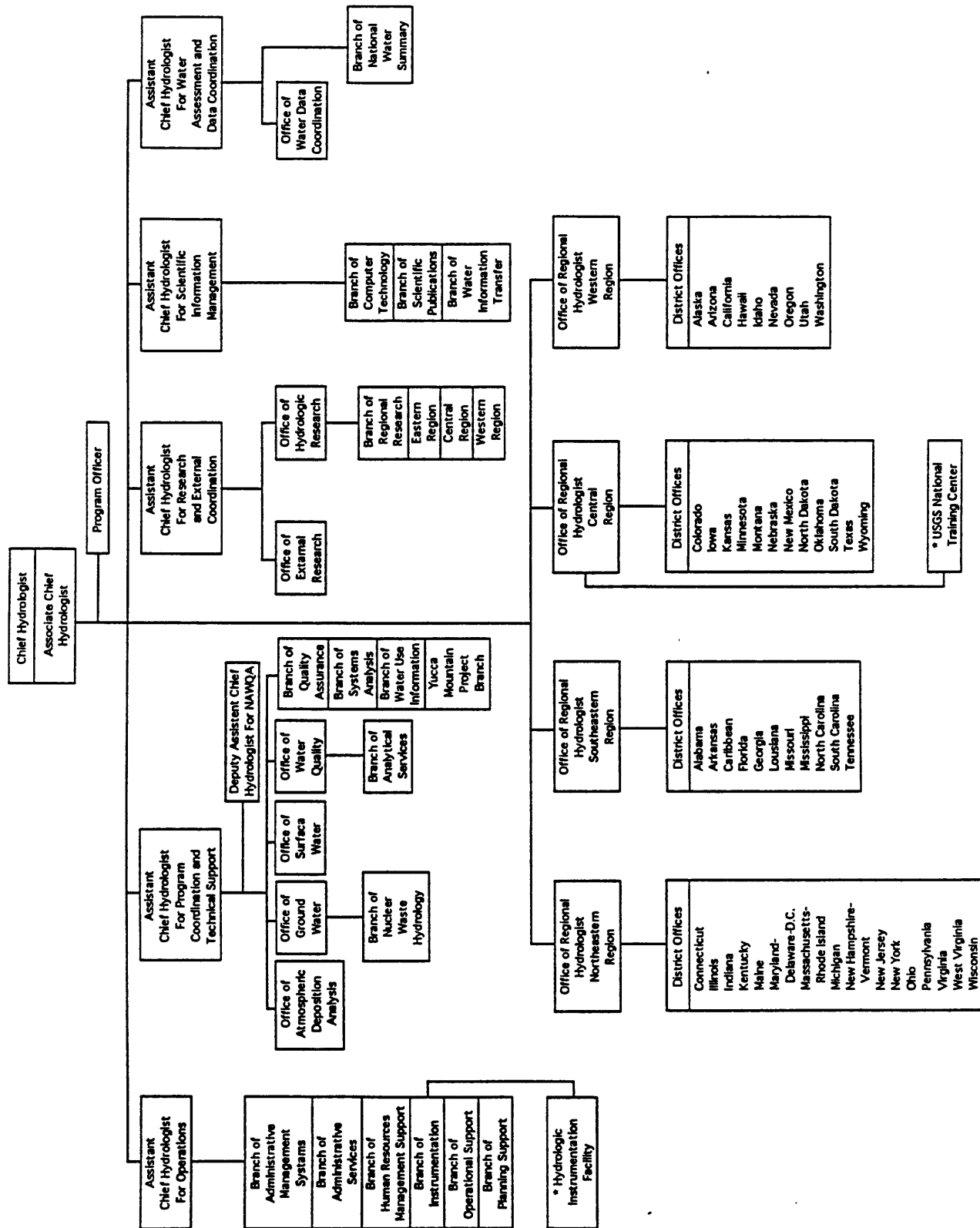
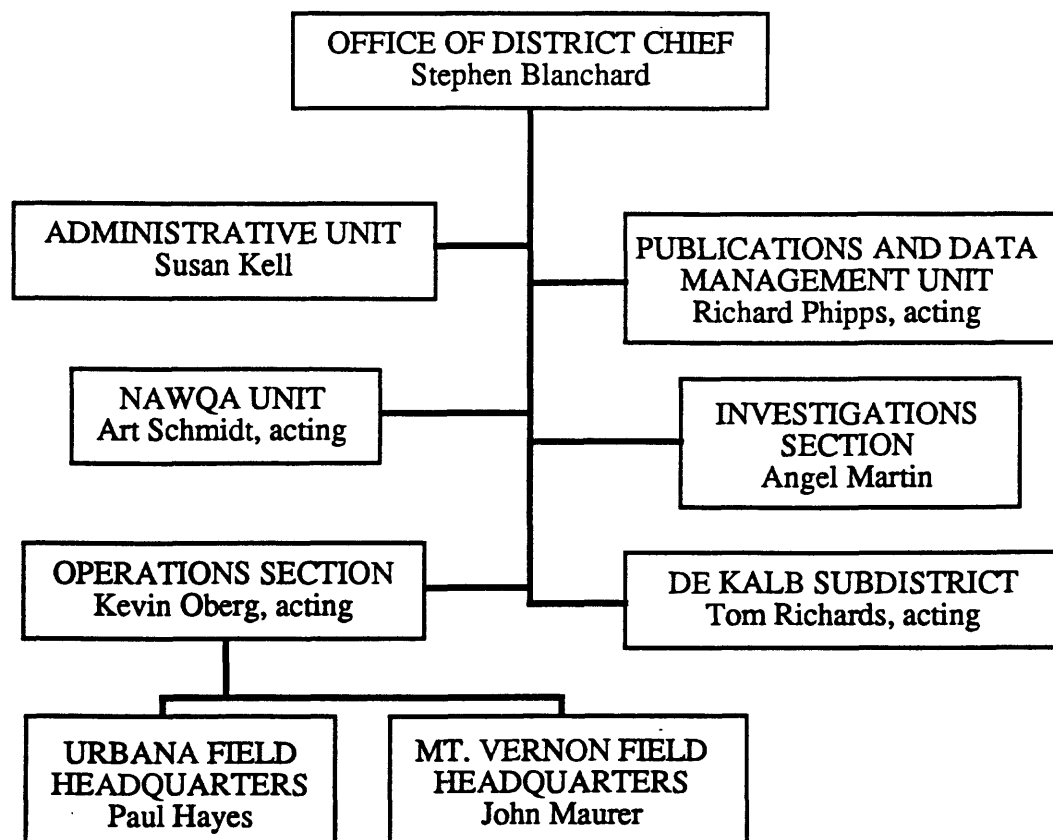


Figure 2.--Water Resources Division organization chart. Data from U.S. Geological Survey, 1991b.



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.

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.

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 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.

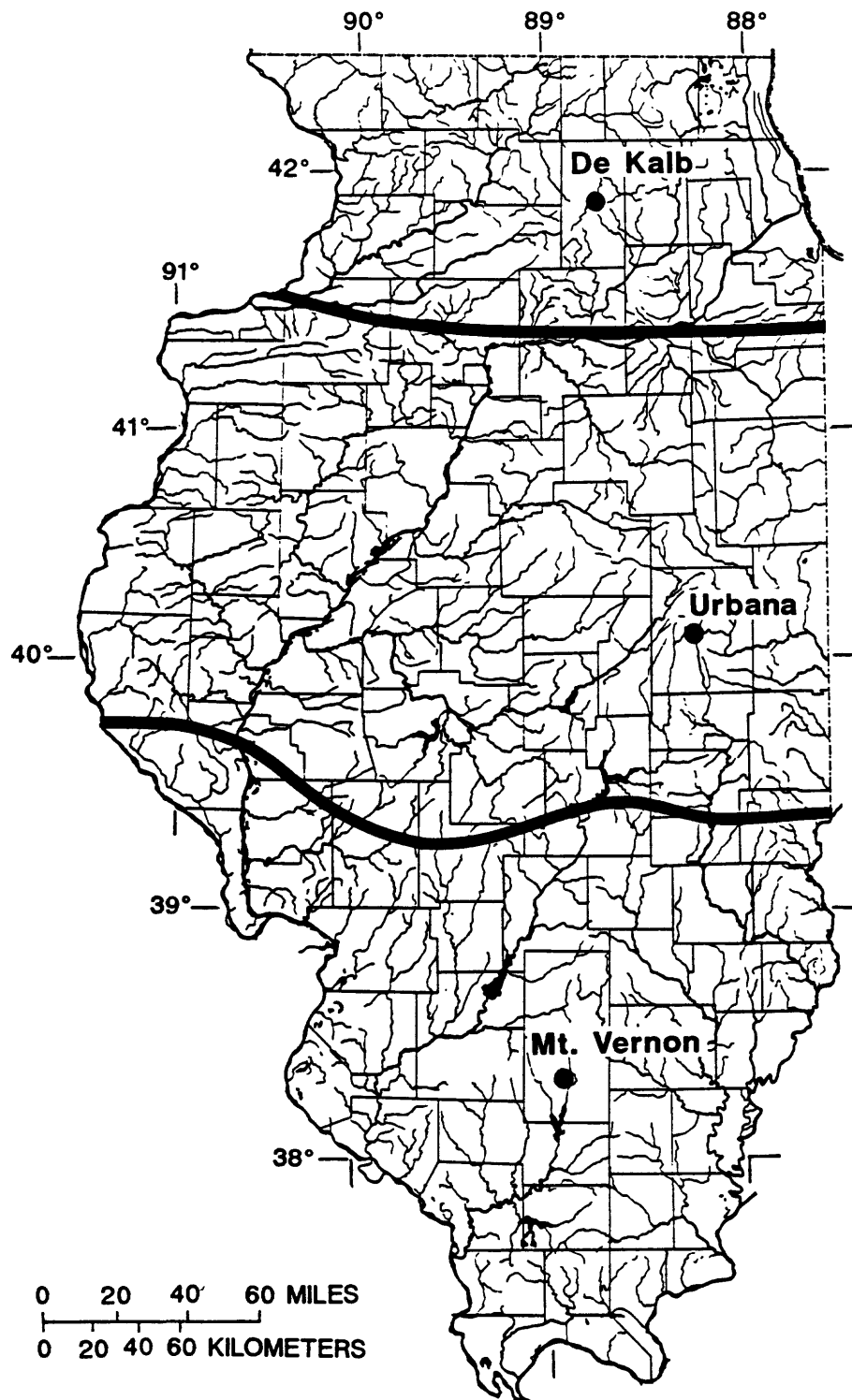


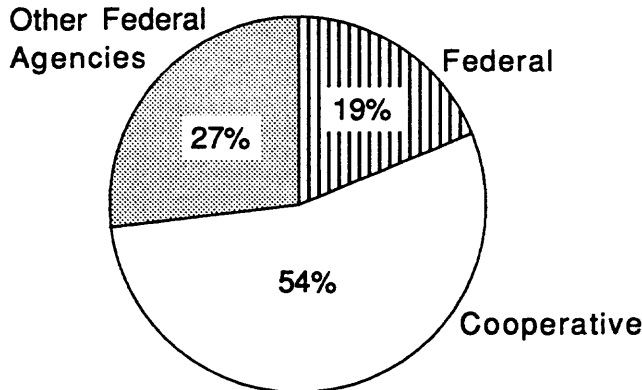
Figure 4.--Subdistrict and field headquarters areas of responsibility.

De Kalb Subdistrict Office

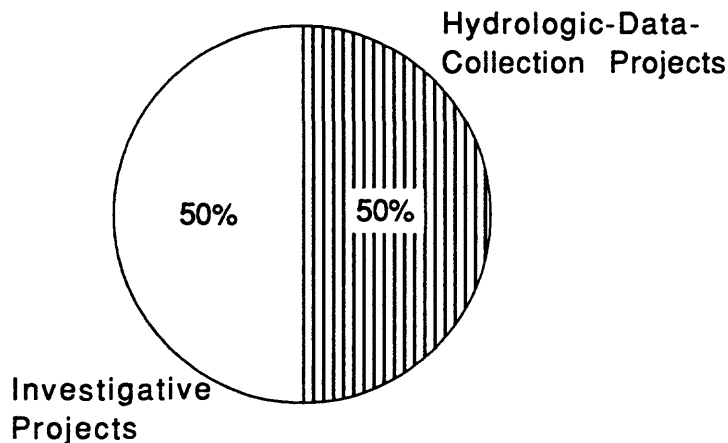
The De Kalb Subdistrict Office conducts multi-discipline hydrologic investigations to determine the quantity and quality of surface and ground water and to define and evaluate the extent and availability of water resources of drainage basins and counties in the northern third of Illinois. The Subdistrict 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 1991 amounted to about \$4,020,000, which was distributed as follows:



The diagram below shows the percentage of the activities for fiscal year 1991 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 use and management 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 1991 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 1991, runoff was above normal in the west-central part of the State and normal throughout the rest of the State (fig. 6). Runoff at Pecatonica River at Freeport and Skillet Fork at Wayne City was 100 percent of their median while runoff at Sangamon River at Monticello was 169 percent of its median.

Table 1.--Agencies supporting water-resources activities
during fiscal year 1991

State Agencies

Illinois Department of Transportation
Division of Water Resources

Illinois Environmental Protection Agency
Division of Water

Illinois Department of Energy and Natural Resources
Illinois State Water Survey

Illinois State Geological Survey

Illinois Department of Conservation

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 Storm Water Management

Conservation District of Vermilion County

The Metropolitan Water Reclamation District of Greater Chicago
Division of Research and Development

Northeastern Illinois Planning Commission

City of De Kalb

City of Decatur

City of Springfield

Universities

Northern Illinois University

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

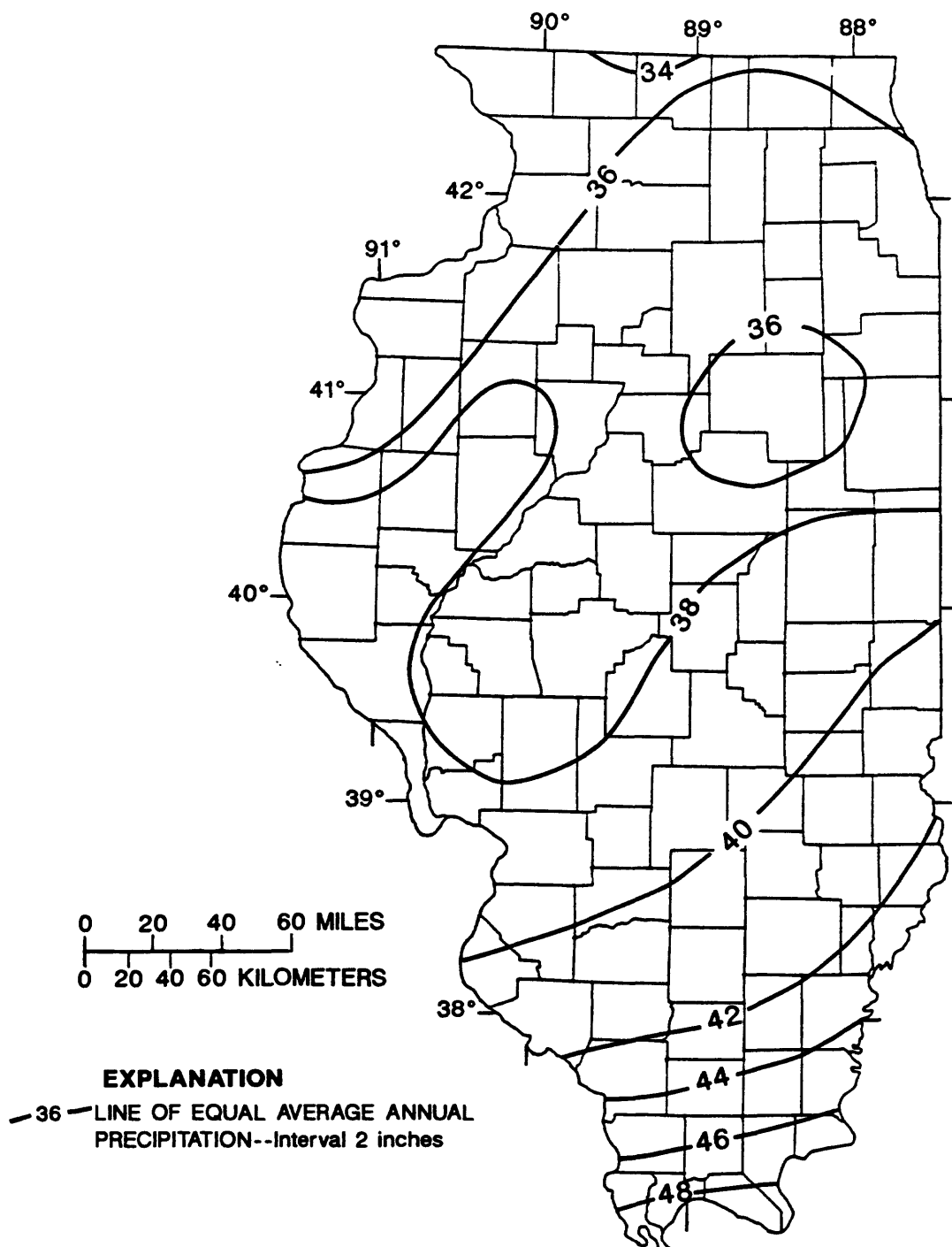


Figure 5.--Average annual precipitation in Illinois, 1961-90.
Data from W.M. Wendland and others, 1992.

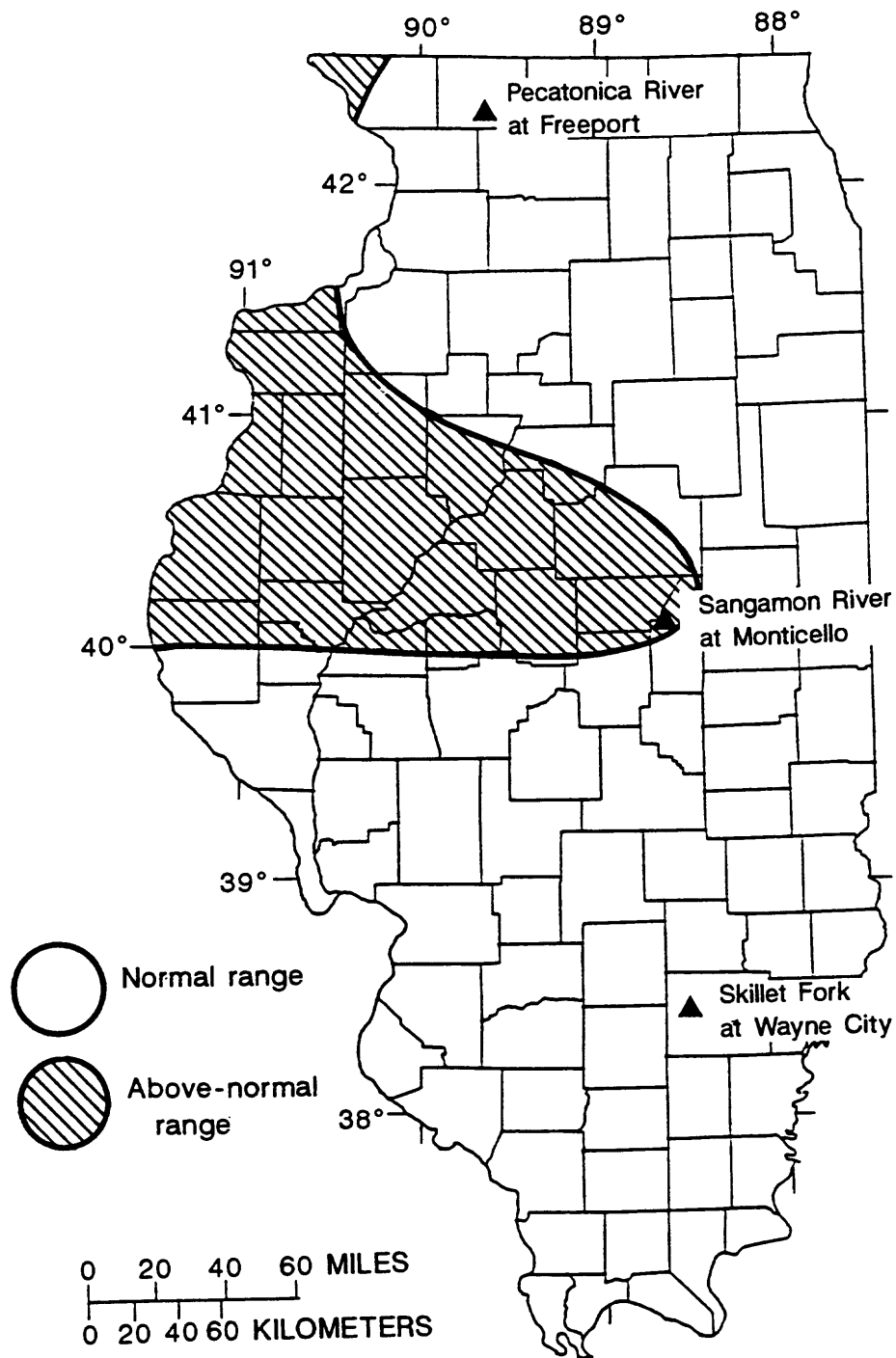


Figure 6.--Runoff during 1991. Data from U.S. Geological Survey, 1991a.

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.

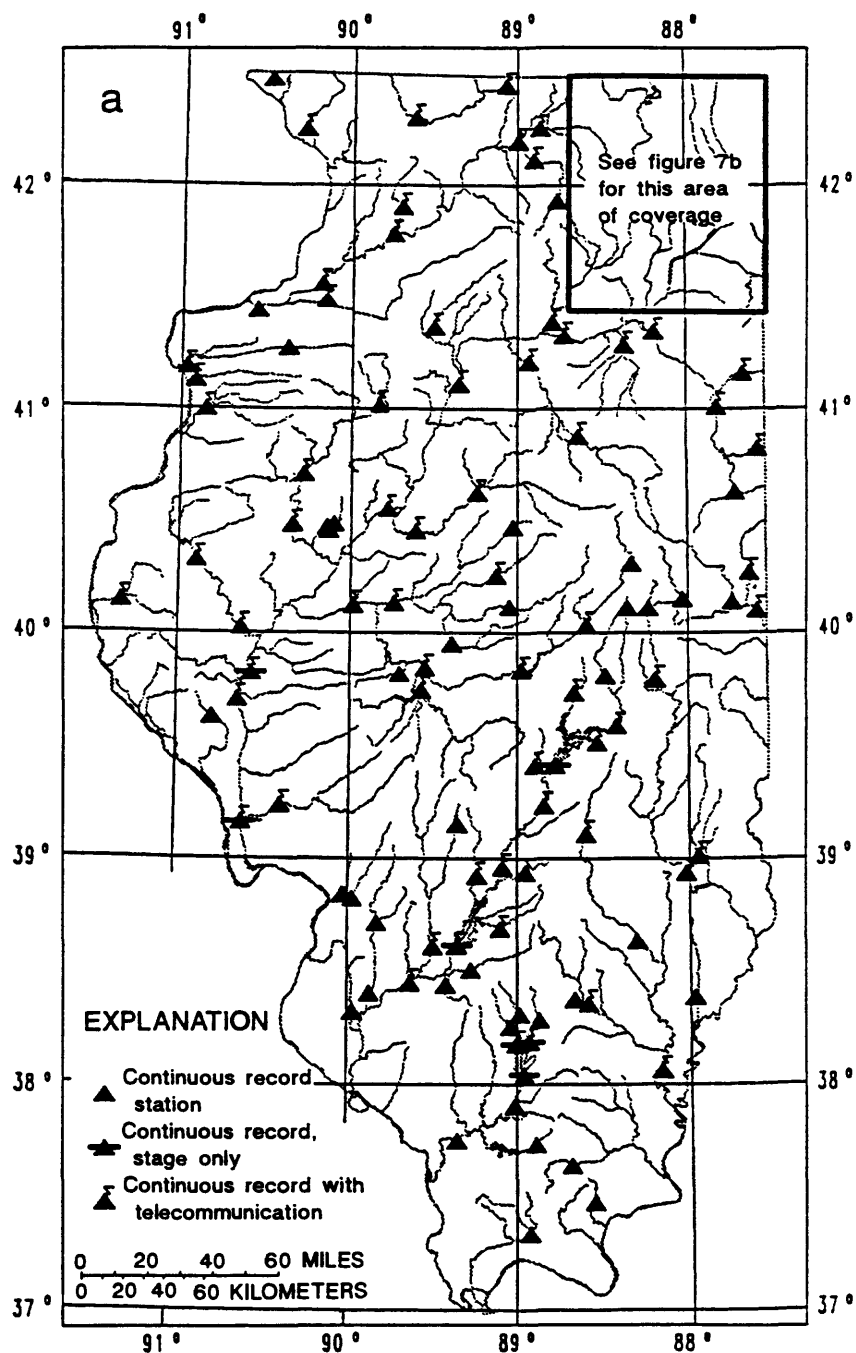
Surface-Water Data Stations

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:

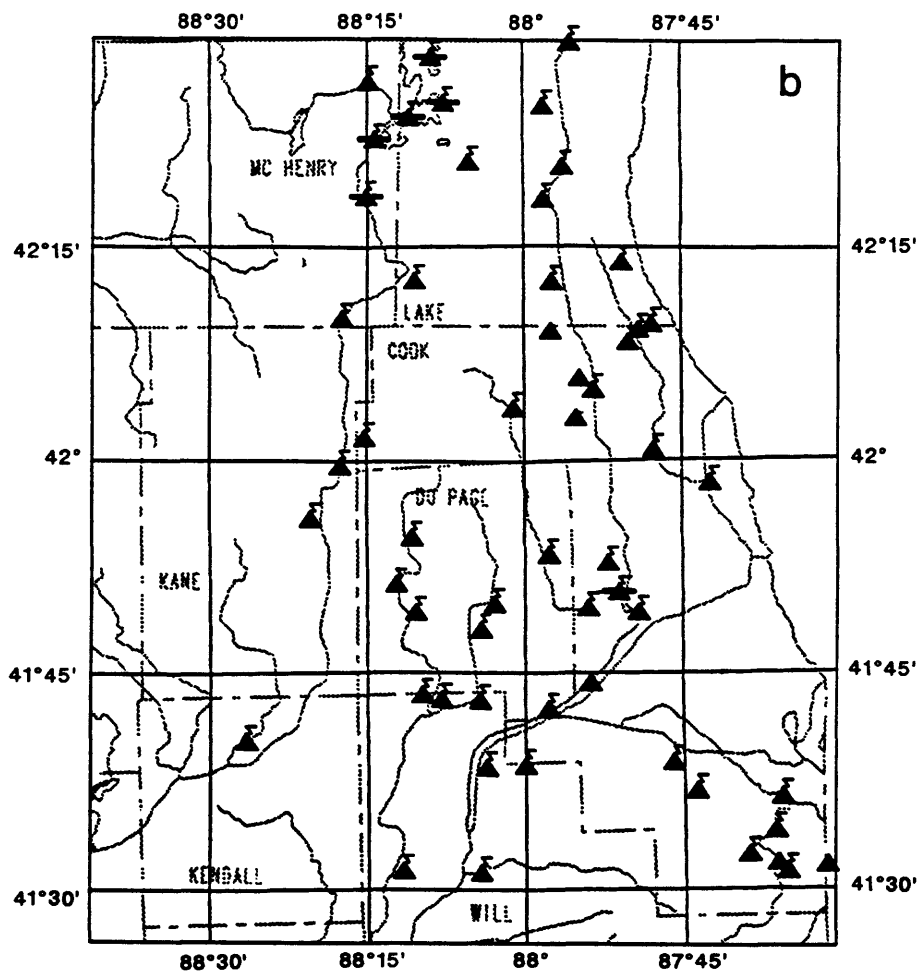
<u>Station classification</u>	<u>Number of stations</u>
Stream stations.....	181
Continuous record:	
Discharge.....	148
Stage only.....	10
Partial record:	
Peak (maximum) flow only.....	23
Lake, reservoir, and subimpoundment stations.....	8
Stage and contents.....	3
Stage only.....	5
Total.....	<hr/> 189

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 north-eastern Illinois and (b) northeastern Illinois.



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°

0 5 10 15 MILES
 0 5 10 15 KILOMETERS

EXPLANATION

- ▲ Continuous record station
- ▬ Continuous record, stage only
- ▬ Continuous record with telecommunication

Figure 7.--Discharge and stage stations in (a) Illinois except north-eastern 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.

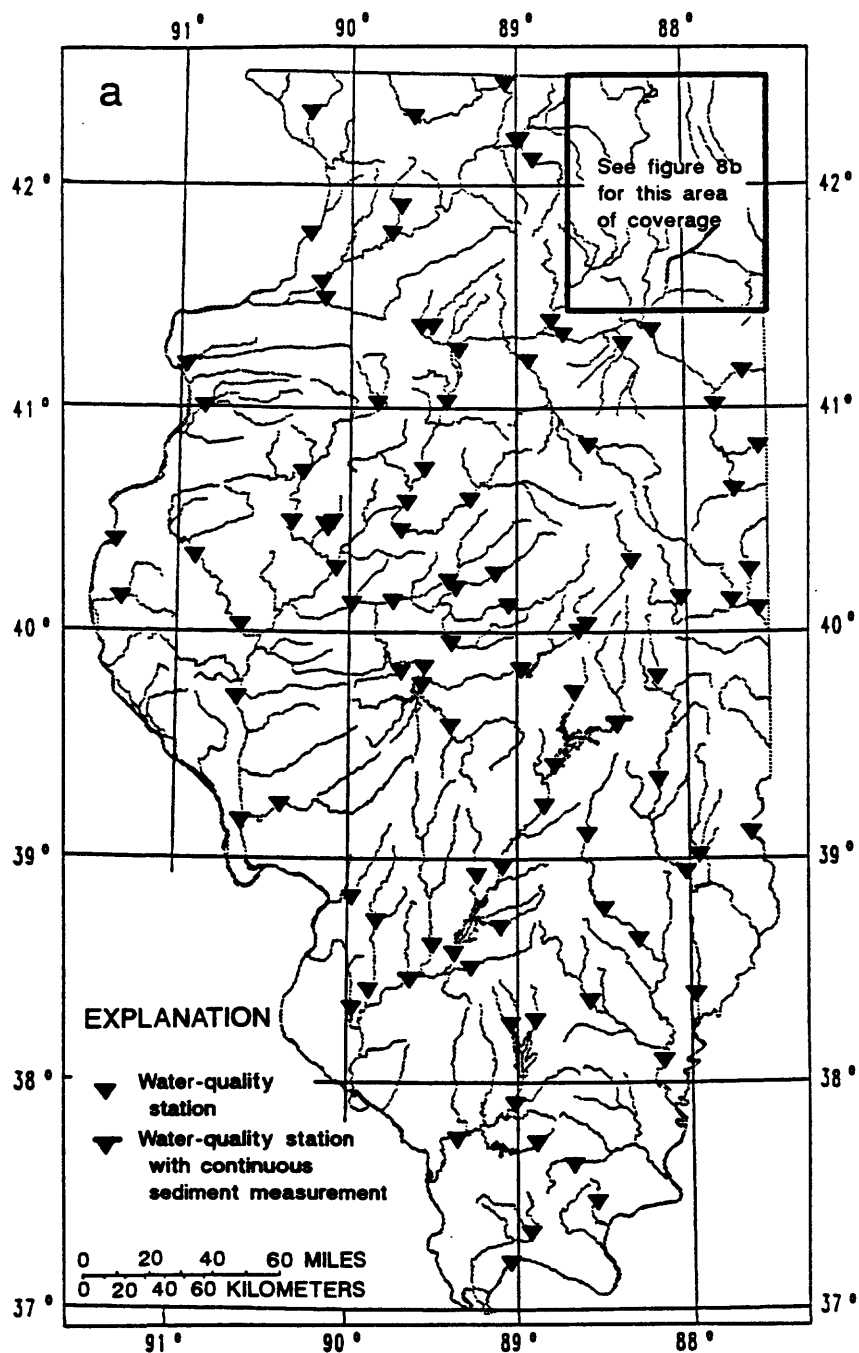
The 155-station network includes 3 stations operated in cooperation with the Metropolitan Water Reclamation District of Greater Chicago and 9 stations operated as part of the USGS's National Stream Quality Accounting Network (NASQAN) program; two of these stations are operated by adjacent Districts.

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:

<u>Data classification</u>	<u>Number of stations</u>
Physical data:	
Water temperature.....	126
Specific conductance.....	126
pH.....	126
Dissolved oxygen.....	126
Sediment data.....	4
Chemical data:	
Inorganic constituents.....	126
Organic constituents.....	126
Microbiological data.....	126

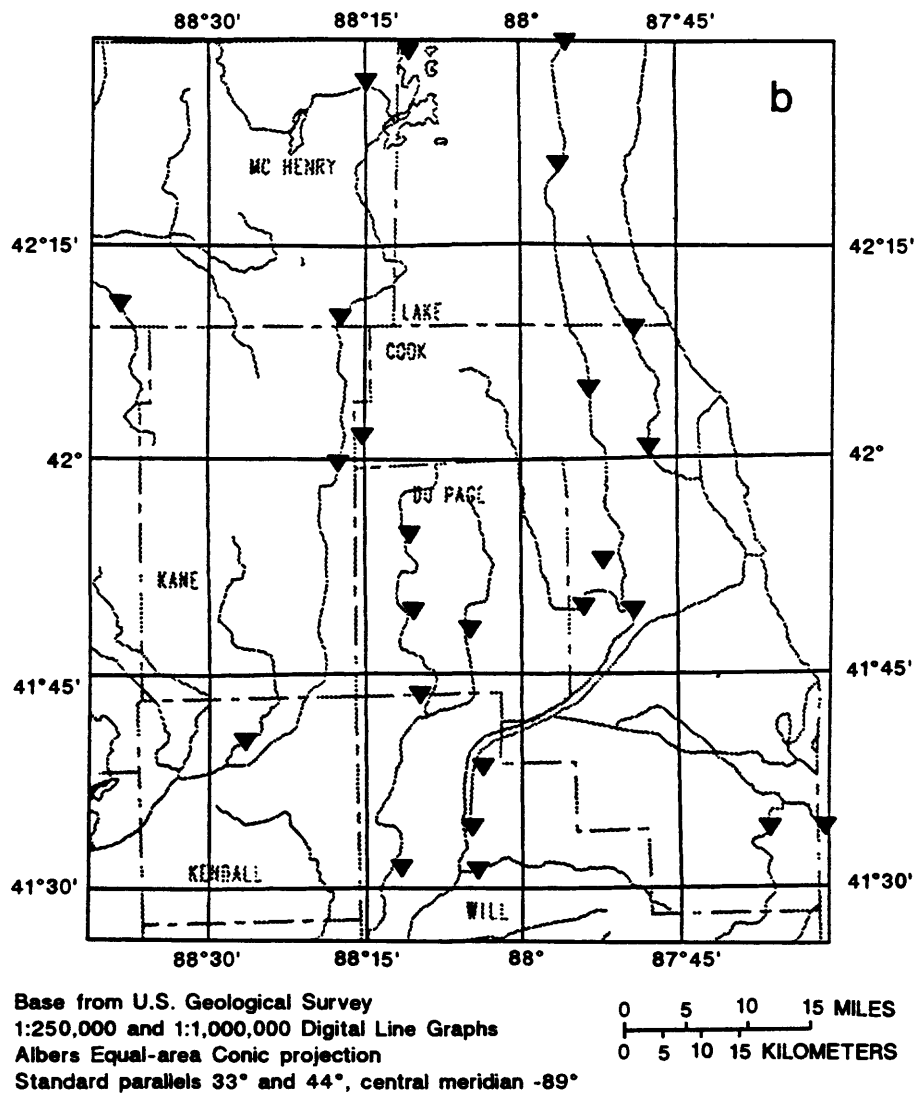
Ground-Water Data Stations

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 seven observation wells. Four wells, three of which are piezometers, are at the same location but open at different depths. Data also are collected from 50 public-supply wells in the State as part of an ongoing water-quality study in cooperation with the IEPA; water 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.



EXPLANATION

▼ Water-quality station

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:

<u>Data type</u>	<u>Number of wells</u>
Water levels.....	7
Physical data:	
Water temperature.....	50
Specific conductance.....	50
pH.....	50
Chemical data:	
Inorganic constituents.....	50
Volatile organic compounds.....	50
Synthetic organic compounds.....	50

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 seven 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

or

U.S. Geological Survey
Water Resources Division
02 E. Main Street, 4th Floor
Urbana, IL 61801

Phone: (703) 648-5215

Phone: (217) 398-5353

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

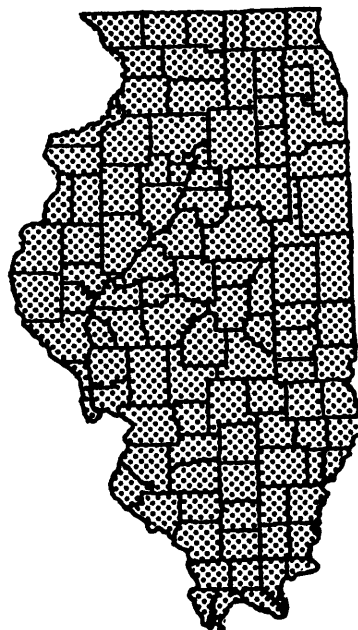
Phone: (217) 398-5353
Hours: 8:00 to 4:30 central time

DESCRIPTIONS OF PROJECTS IN 1991

IL001 SURFACE-WATER STATIONS

*** 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 145 continuous-record stations, 23 partial-record stations, 12 stage-only stations, and 3 miscellaneous-measurement stations. Published data in the annual data report.

*** PLANS NEXT YEAR *** Continue surface-water data collection with modifications to the network. A new stage-only station in Du Page County will be added to the network. Data loggers with telephone modems will be installed at five continuous-record stations. Publish data in the annual data report.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

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

*** 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 ***

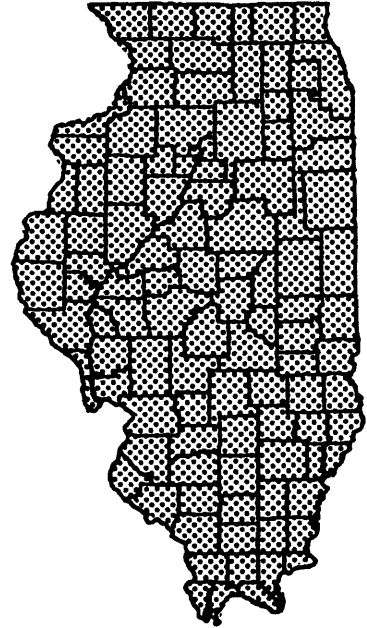
Maurer, J.C., Sterling, J.M., Richards, T.E., and Hayes, P.D., 1991, Water resources data--Illinois, water year 1990, Volume 1. Illinois except Illinois River basin: U.S. Geological Survey Water-Data Report IL-90-1, 395 p.

Richards, T.E., Hayes, P.D., and Sullivan, D.J., 1991, Water resources data--Illinois, water year 1990, Volume 2. Illinois River basin: U.S. Geological Survey Water-Data Report IL-90-2, 530 p.

IL002 GROUND-WATER STATIONS

*** 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 Chicago area 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 in one well in Du Page County, one well in Cook County, three piezometers and one well in Lake County, and one well in Bureau County. Collected water samples from the Zion well nest in Lake County. Published data in the annual data report.

*** PLANS NEXT YEAR *** Continue water-level data collection. Add one or two observation wells, to be measured quarterly, to the network. Collect water samples at the new observation well in Bureau County and 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

*** PUBLISHED REPORT ***

Richards, T.E., Hayes, P.D., and Sullivan, D.J., 1991, Water resources data-- Illinois, water year 1990, Volume 2. Illinois River basin: U.S. Geological Survey Water-Data Report IL-90-2, 530 p.

IL003 WATER-QUALITY STATIONS

*** PROJECT TITLE *** Quality of Water 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 Water Resources Division 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

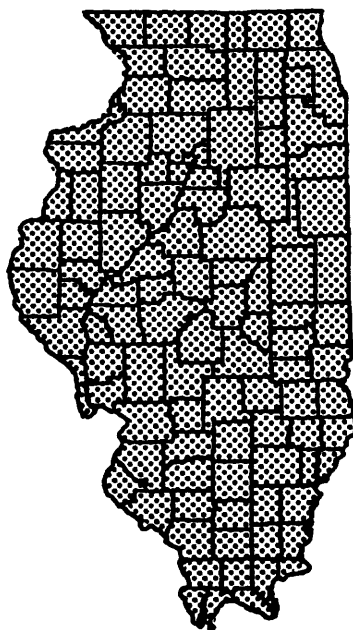
*** FIELD LOCATION *** Illinois Statewide

*** 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., 1991, Water resources data--Illinois, water year 1990, Volume 1. Illinois except Illinois River basin: U.S. Geological Survey Water-Data Report IL-90-1, 395 p.

Richards, T.E., Hayes, P.D., and Sullivan, D.J., 1991, Water resources data--Illinois, water year 1990, Volume 2. Illinois River basin: U.S. Geological Survey Water-Data Report IL-90-2, 530 p.

Coupe, R.H., and Johnson, G.P., 1991, Triazine herbicides in selected streams in Illinois during storm events, spring 1990, in Mallard, G.E., and Aronson, D.A., ed., U.S. Geological Survey Toxic Substances Hydrology Program; abstracts of the technical meeting, Monterey, California, March 11-15, 1991, U.S. Geological Survey Open-File Report 91-088, p. 65.

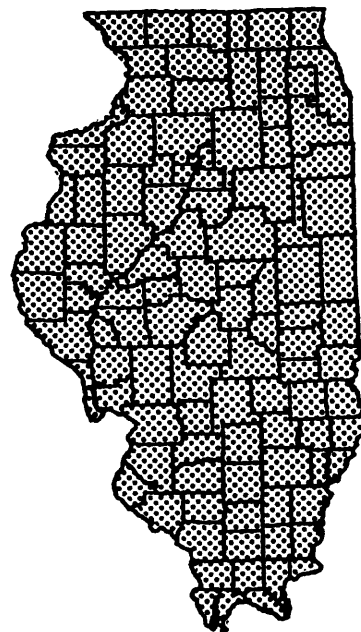
IL004 SEDIMENT STATIONS

*** 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 base 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

*** COOPERATORS ***

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

*** PUBLISHED REPORTS ***

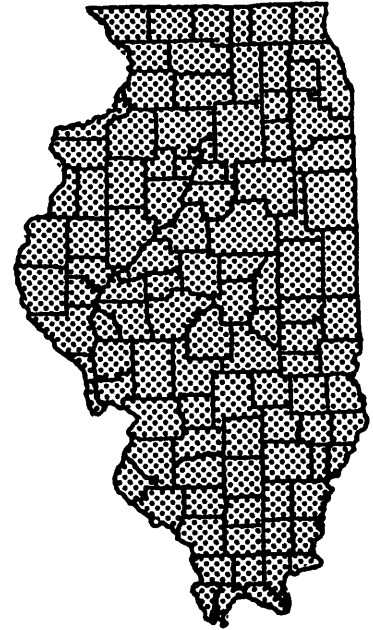
Maurer, J.C., Sterling, J.M., Richards, T.E., and Hayes, P.D., 1991, Water resources data--Illinois, water year 1990, Volume 1. Illinois except Illinois River basin: U.S. Geological Survey Water-Data Report IL-90-1, 395 p.

Richards, T.E., Hayes, P.D., and Sullivan, D.J., 1991, Water resources data--Illinois, water year 1990, Volume 2. Illinois River basin: U.S. Geological Survey Water-Data Report IL-90-2, 530 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), the Illinois Environmental Protection Agency (IEPA), and the USGS. The ISWS will obtain water-withdrawal and delivery data from questionnaires that they send to water users throughout the State. The ISWS and USGS will enter the data into a site-specific data base that is usable to both parties. The USGS will transfer the statewide data into the State Water Use Data System (NEWSWUDS). The IEPA will obtain return data by way of the National Pollutant Discharge Elimination System. The IEPA and USGS will enter the data into the IEPA's data base. The USGS will transfer the statewide data into the NEWSWUDS. The withdrawal, delivery, and return data will be aggregated by water-use category (water supply, commercial, industrial, fossil-fuel power, nuclear power, mining, hydroelectric, and sewage treatment) and location (county, hydrologic unit, and aquifer). Water uses by other categories (domestic, livestock, irrigation, and reservoir evaporation) will be estimated. The aggregations are done to meet State and National data needs.

*** SUMMARY OF RESULTS *** The 1989-90 withdrawal and delivery data were obtained. Data for 1989 were aggregated by category and location and entered into the Aggregated Water Use Data System (AWUDS). For the first time in the history of this program, the USGS assisted the ISWS with data entry and the USGS obtained a copy of the statewide site-specific withdrawal data. The 1990 return data were obtained and entered into the NEWSWUDS. These data were aggregated by category and location and entered into AWUDS. A procedural manual for the manipulation and entry of return data into NEWSWUDS was written. The report, "Determination of Water Use in Rockford and Kankakee Areas, Illinois" was published.

*** PLANS NEXT YEAR *** (1) Aggregate and enter 1990 water-use data into AWUDS. (2) Obtain 1991 water-use data. (3) Assign downstream-order numbers to return sites in NEWSWUDS for integration into the National Water Information System (NWIS) site file. (4) Improve procedural manual for an open-file report.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

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

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

*** COOPERATORS ***

Board of Trustees of the University of Illinois, State Water Survey
Illinois Environmental Protection Agency

*** 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 Lonquist, 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.

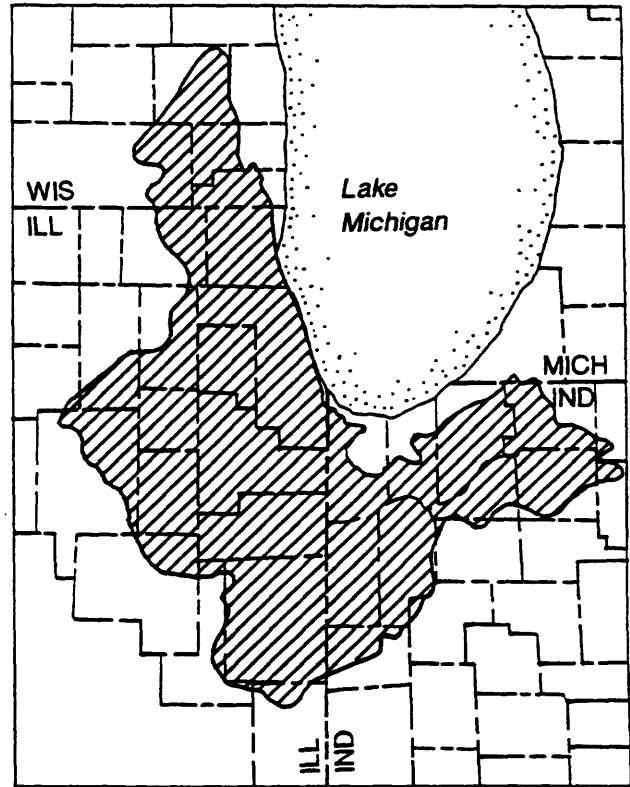
Kirk, J.R., Hlinka, K.J., Sasman, R.T., and Sanderson, E.W., 1985, Water withdrawals in Illinois, 1984: Champaign, Ill., Illinois State Water Survey Circular 163, 43 p.

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

LaTour, J.K., 1991, Determination of water use in Rockford and Kankakee areas, Illinois: U.S. Geological Survey Water-Resources Investigations Report 90-4166, 70 p.

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

*** PROBLEM *** Protecting 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) To provide a description of existing water-quality conditions. (2) Develop conceptual models that relate observed conditions to sources and causes. (3) Track long-term trends in water quality. (4) 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. Water samples were collected monthly and suspended-sediment samples were collected bimonthly for analyses for inorganic constituents. The first draft of the analysis of existing water-quality data was completed and sent to Regional NAWQA staff for review. Open-file data reports (OFR) describing streambed-sediment sampling for inorganic constituents (OFR 90-571) and the fixed-station sampling (OFR 91-175) were approved for publication. A paper describing geographic information system (GIS) applications in this study was approved and published in the proceedings of U.S. Environmental Protection Agency (USEPA) GIS conference. The Project Liaison Committee met once to discuss progress and plans. Began a special study to develop prototype for implementing computer modeling into NAWQA studies. Calibrated a diffusion analogy flow (DAFLOW) model for the entire Kankakee River system. Results from analyses of streambed sediment samples for inorganic constituents identified anomalously high concentrations of thorium and four rare-earth elements in parts of the Du Page River basin. These elevated concentrations, which are related to a USEPA Superfund site, were reported to the appropriate Federal and State agencies, and to the Project Liaison Committee.

*** PLANS NEXT YEAR *** Continue sampling at four fixed-stations. Continue to compile and statistically summarize existing water-quality data for the basin. Complete and print analysis of existing water-quality information report. Complete reports for inorganic and organic constituents; continue writing summary reports for other constituent groups.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

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

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

*** PERIOD OF PROJECT *** Continuous since April 1986

*** PLANNED REPORTS ***

Data on agricultural organics in water

Spatial distribution of trace elements in sediment

Analysis of existing water-quality information

Relation of changes in treatment plants to changes in water quality

Sediment and water quality in the upper Illinois River basin

Trace elements in water, sediment, and biota

Organic compounds in water, sediment, and biota

Nutrients, dissolved oxygen, and fecal-indicator bacteria

*** 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

Surface-water-quality assessment of the upper Illinois River basin in Illinois, Indiana, and Wisconsin: Data on agricultural organic compounds in water, April 1988 through August 1990

*** PUBLISHED ABSTRACTS ***

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.

Blanchard, S.F., 1989, Surface-water quality of the upper Illinois River basin in Illinois, Indiana, and Wisconsin--analysis of existing information, in Pederson, G.L., and Smith, M.M., comps., U.S. Geological Survey Second National Symposium on Water Quality: Abstracts of the technical sessions, Orlando, Florida, November 12-17, 1989: U.S. Geological Survey Open-File Report 89-409, p. 5.

Ruhl, P.M., and Striegl, R.G., 1989, Relations between fish population and water quality in the upper Illinois River basin in Illinois, Indiana, and Wisconsin--analysis of existing information, in Pederson, G.L., and Smith, M.M., comps., U.S. Geological Survey Second National Symposium on Water Quality: Abstracts of the technical sessions, Orlando, Florida, November 12-17, 1989: U.S. Geological Survey Open-File Report 89-409, p. 80-81.

Smith, S.M., Sanzolone, R.F., and Colman, J.A., 1989, Use of multivariate techniques for background and anthropogenic-source analysis of trace elements in streambed materials in the upper Illinois River basin in Illinois, Indiana, and Wisconsin, in Pederson, G.L., and Smith, M.M., comps., U.S. Geological Survey Second National Symposium on Water Quality: Abstracts of the technical sessions, Orlando, Florida, November 12-17, 1989: U.S. Geological Survey Open-File Report 89-409, p. 93.

Stanke, F.A., 1989, 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, in Pederson, G.L., and Smith, M.M., comps., U.S. Geological Survey Second National Symposium on Water Quality: Abstracts of the technical sessions, Orlando, Florida, November 12-17, 1989: U.S. Geological Survey Open-File Report 89-409, p. 96.

Terrio, P.J., 1989, 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, in Pederson, G.L., and Smith, M.M., comps., U.S. Geological Survey Second National Symposium on Water Quality: Abstracts of the technical sessions, Orlando, Florida, November 12-17, 1989: U.S. Geological Survey Open-File Report 89-409, p. 100-101.

*** 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. Geological Survey Open-File Report 90-375, 68 p.
- Colman, J.A., and Sanzolone, R.F., 1991, Surface-water-quality assessment of the upper Illinois River basin in Illinois, Indiana, and Wisconsin--Geochemical data for fine-fraction streambed sediment from high- and low-order streams, 1987: U.S. Geological Survey Open-File Report 90-571, 108 p.

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 and regional areas of environmental concern.

*** OBJECTIVE *** To provide technical consultation, training, and quality assurance and to conduct investigations 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 HOD Landfill, Superior Street, 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 analysis of data collected to date at ACME Solvents and Pagel's Pit sites and wrote an administrative report to USEPA. Report has received Headquarter's approval. (2) Provided technical review of reports and work plans at the HOD Landfill, Superior Street, ACME Solvents, and Pagel's Pit sites. (3) Completed field work for study of ground-water/surface-water interactions, Byron Salvage Yard area. (4) Continued 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) Complete report writing of Water-Resources Investigations Report for ground-water/surface-water study at the Byron site. (2) Finish data collection and analysis for fractured dolomite aquifer studies at Byron and Parson's Casket sites. (3) Write report drafts and submit for publication.

*** 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 ABSTRACTS ***

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.

Avery, C.F., Yeskis, D.J., and Bolen, W.F., 1991, Interaction of ground water with the Rock River near Byron, Illinois, in Programs and abstracts, American Geophysical Union 1991 Fall Meeting, December 9-13, 1991, San Francisco, California.

*** 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.

IL083 RAINFALL-RUNOFF IN DU PAGE COUNTY

*** PROJECT TITLE *** Rainfall-Runoff
Relations in Three 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 rain-
fall-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 rela-
tions 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 *** Streamflow and rainfall data collection con-
tinued throughout the year. The processing of data collected since 1986 for
modeling is 90 percent complete. Rainfall-runoff modeling using the
Hydrological Simulation Program--Fortran (HSPF) model continued throughout the
year. A data report describing rainfall data collected at project sites during
the period 1986-91 is 70 percent complete.

*** PLANS NEXT YEAR *** Continue data collection and analysis through the
1992 water year. 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 *** James J. Duncker

*** PERIOD OF PROJECT *** October 1987 through September 1992



*** 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

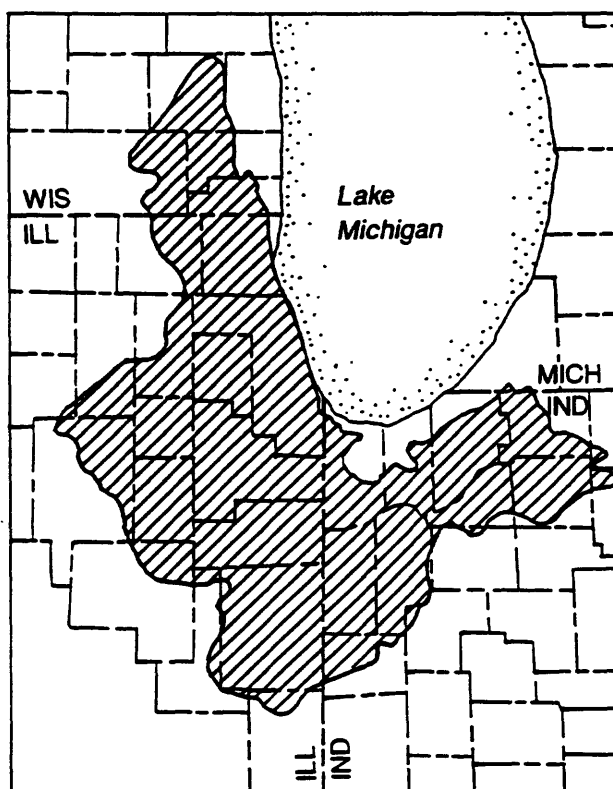
Rainfall data collected during 1986-91 in Du Page County, Illinois

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 *** Exploratory data analysis was completed. Preliminary results indicate that habitat effects and water quality might not be partitionable from one another. Further analysis will attempt to define the relative importance of habitat and water quality.

*** PLANS NEXT YEAR *** Complete report.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

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

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

*** PERIOD OF PROJECT *** January 1988 through September 1992

*** PLANNED REPORT ***

Fish community composition and structure and fish condition factors as related to water and sediment quality in the upper Illinois River basin, Illinois, 1978-86

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 (IEPA) 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 (GIS) will give accurate tabular and graphic representation of Illinois ground water. Other explanatory statistics may be applied. Correlations and special trends will be explored. A statewide ground-water-quality network will be designed and statistically evaluated.

*** SUMMARY OF RESULTS *** Published ground-water-quality data for public-supply wells in annual data report. Created a GIS coverage of 753 public-supply wells open to individual aquifers. Continued sampling 50 wells four times per year for inorganics, nutrients, and metals. Sampled 25 of these wells, which are in unconsolidated material or shallow bedrock, every quarter for pesticides and herbicides. In addition to the network of 50 ambient wells, the USGS helped IEPA select 200 wells for a pesticide network.

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

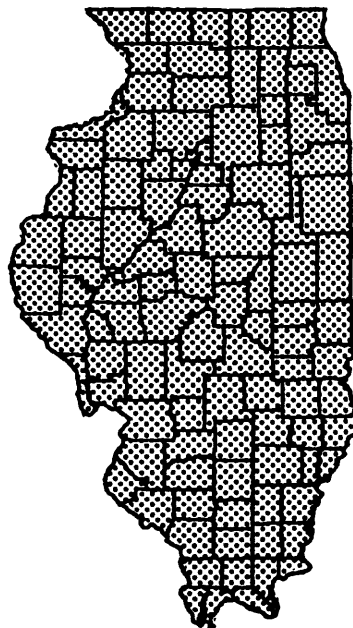
*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

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

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

*** COOPERATOR ***
Illinois Environmental Protection Agency



*** PLANNED REPORTS ***

Selected inorganic constituent concentrations in public-supply wells in Illinois
Trends in ground-water-quality data for public-supply wells in Illinois

*** PUBLISHED REPORTS ***

Maurer, J.C., Sterling, J.M., Richards, T.E., and Hayes, P.D., 1991, Water resources data--Illinois, water year 1990, Volume 1. Illinois except Illinois River basin: U.S. Geological Survey Water-Data Report IL-90-1, 395 p.

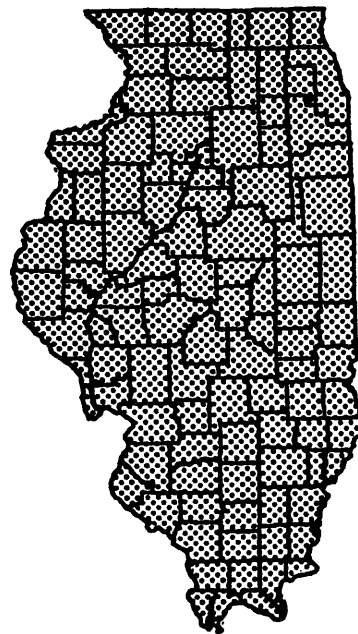
Richards, T.E., Hayes, P.D., and Sullivan, D.J., 1991, Water resources data--Illinois, water year 1990, Volume 2. Illinois River basin: U.S. Geological Survey Water-Data Report IL-90-2, 530 p.

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. 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 1989 water-return data for 498 facilities into NEWSWUDS. Preliminary investigations show that returns and streamflow seem to be related at Thorn Creek above Glenwood, Illinois. Also, most study reaches show that return flows exceeded streamflows during the drought of 1988. Wrote first draft of report and had it reviewed.

*** PLANS NEXT YEAR *** Complete and publish 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

*** REPORT IN PROCESS ***
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 Nine 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 nine 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 with regression analysis.

*** SUMMARY OF RESULTS *** Streamflow and rainfall data collected in the five watersheds instrumented last water year was continued throughout this water year. Four additional gages were installed in very small watersheds consisting of a single landcover category. The landcover categories being gaged are agricultural, single-family residential, estate-type residential, and commercial strip. Initial watershed characterization was begun using aerial photography analysis.

*** PLANS NEXT YEAR *** Continue data collection and analysis. Compute and publish streamflow records for the 1991 water year. Calibrate and verify the Hydrological Simulation Program--Fortran (HSPF) model for each of the watersheds.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

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

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

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

*** COOPERATOR ***

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

IL091 FLOOD FREQUENCY IN URBAN WATERSHEDS

*** PROJECT TITLE *** Techniques for Flood-

Frequency Analysis in Changing Watersheds

*** PROBLEM *** Methods in flood-frequency

analysis for planning and design in urbanizing and regulated watersheds rely on the use of state-of-the-art hydrologic and hydraulic models in order to avoid violating the assumptions in traditional frequency analysis methods. These techniques have not been thoroughly tested, and some results have indicated misleading and inconsistent results when applying log-Pearson Type III analysis to simulated flood peaks under various land-use scenarios. There is a need for developing new methodologies for frequency analysis and testing and verifying the new methods and required models.

*** OBJECTIVES *** To explore, develop, and

evaluate techniques for determining accurate flood-frequency estimates using hydrologic/hydraulic models in rapidly changing urban watersheds.

*** APPROACH ***

This study will be a three pronged effort. The modeling literature will be thoroughly reviewed in order to compare and contrast the available hydrologic and hydraulic models and flood-frequency analysis techniques including the stochastic generation of rainfall for input into a continuous simulation model. This will be carried out by scientists at the Illinois State Water Survey (ISWS). New techniques for flood-frequency analysis will be investigated by scientists at the University of Wisconsin. These will include developing flood recurrence intervals by continuous simulation of long stream-flow record to produce a base condition (with calculated frequencies) and comparing alternative scenarios to the base condition by using the same set of storms under the new conditions, performing flood-frequency analysis on flood volumes, and relating flood peaks to volumes. These techniques are to be tested on actual field situations and through Monte Carlo simulations. Finally, the suitability of one-dimensional, unsteady flow modeling to flood-frequency analysis will be investigated. Streamflow record containing events that violate the implicit assumptions of a one-dimensional model will be obtained by (1) operating a dam on a major river in such a manner as to generate a relatively deep wave, and (2) collecting stage and discharge data at a culvert during changing flow conditions and during an overbank event. Dye data will be utilized in order to test the total flow field of the flow model by inputting it to a Lagrangian transport model. All efforts will be coordinated in regular meetings with the cooperators and their contractees.



*** SUMMARY OF RESULTS *** The literature review has been completed and published as a report by the ISWS entitled "A Review of Rainfall-Runoff Modeling for Stormwater Management" by Vernon Knapp and others. The first proposed flood-frequency technique has been developed and published as Bradley, A.A., and Potter, K.W., 1991, Flood frequency analysis for evaluating watershed conditions with rainfall-runoff models, Water Resources Bulletin, v. 27, no. 1, p. 83-91. The flood-volume frequency method has been investigated and a paper titled "A new approach to flood-frequency analysis of simulated flows" is being reviewed. A major dye and discharge synoptic was conducted on the Fox River in Illinois with data collected at six continuous-record gages and several other locations. Discharge hydrographs and dye concentrations have been computed in preparation for model calibration and for publication as a hydraulic-model-verification data set. Gaging stations have been established to measure flow at a culvert, back-water, and overbank sections together with upstream and downstream boundaries.

*** PLANS NEXT YEAR *** The model verification for the Fox River data set will be completed. A report containing the model-verification data set will be completed. The small-stream-verification data set will be collected and computed.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

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

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

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

*** COOPERATOR ***

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

*** PLANNED REPORTS ***

Data collection methods and data summary for verification of a one-dimensional, unsteady-flow model

IL093 HYBRID APPROACH TO LAND-USE MAPPING

*** PROJECT TITLE *** Use of Merged SLAR and TM Imagery to Classify and Map Land Cover and Land Use

*** PROBLEM *** Land cover in the six-county Chicago metropolitan area in northeastern Illinois is undergoing rapid changes in response to substantial economic growth and a rapidly growing suburban population. This area is the site of numerous surface-water, ground-water, and water-quality investigations by both the Illinois District of the USGS and several Federal, State, and local agencies. In addition, a recent and reliable assessment of the wetlands within the study area is critically needed by a variety of State, county, and local agencies. Most existing land cover digital data is outdated and of relatively poor spatial resolution. A critical need exists to update the digital land cover of northeastern Illinois at an improved spatial resolution in a format compatible with the appropriate geographic information system.



*** OBJECTIVES *** (1) Create an updated digital data base of wetlands and other selected land cover features of the six-county northeastern Illinois area at an improved resolution of approximately 0.22 acre per pixel (picture element). (2) Interface the updated land cover digital data base with a GIS that is compatible with the input requirements of District and(or) cooperator computer systems and hydrologic modeling programs.

*** APPROACH *** (1) Merge Side-Looking Airborne Radar (SLAR) imagery with satellite-based Thematic Mapper (TM) imagery. (2) Classify the merged imagery with two techniques: (a) guided clustering and then (b) neural network analysis. Assess accuracy of classification. (3) Convert the classified raster-based imagery to a vector format and load to a GIS. The project will be executed in two distinct phases. The first phase will involve the guided clustering analysis. The second phase will involve the neural network analysis.

*** SUMMARY OF RESULTS *** Operational image processing system brought on-line. Annotated report outline was written and was approved by cooperators. Three of the eight sections for the first report have been written. Image data rectified and merged, in part.

*** PLANS NEXT YEAR *** Classify the merged TM and SLAR digital imagery into selected target units using a guided-clustering image processing strategy. Perform various statistical tests of classification accuracy (accompanied by ground truthing). Prepare a report of project results for colleague review.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Northeastern Illinois

*** PROJECT CHIEF *** Robin B. King

*** PERIOD OF PROJECT *** January 1991 through March 1993

*** COOPERATORS ***

Illinois Department of Conservation

Du Page County

Kane County

Northeastern Illinois Planning Commission

*** PLANNED REPORTS ***

Classification of multisource remote sensor imagery for terrain characterization
in northeastern Illinois

Use of an artificial neural network to classify multisource remote sensor imagery

IL094 UNIT VALUES

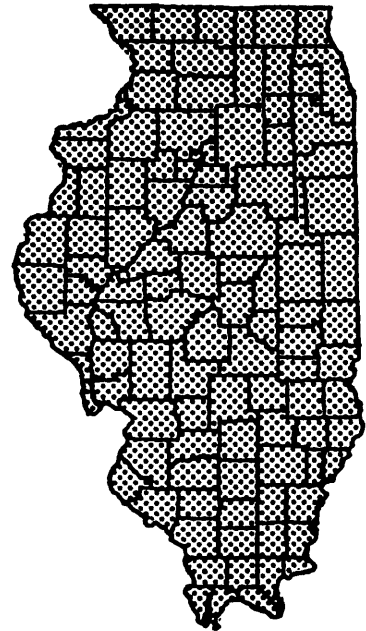
*** PROJECT TITLE *** Unit-Values Pilot
Study

*** PROBLEM *** Unit value stage and discharge data are not available in digital form prior to 1965 when stage data were collected in graphic form on strip charts.

*** OBJECTIVES *** (1) To determine the feasibility, procedures, and software to compute digital unit values from archived graphic charts, and then to transfer that data to a Write Once Read Many (WORM) disk, and (2) to determine realistic cost estimates for converting from graphic to digital format.

*** APPROACH *** A review of 10 continuous-stage chart records and a list of the problems to create unit values for these stations will be made. From the 10 records, 3 test records will be selected and digitized. The digitized stage will have shifts and streamflow ratings applied to create unit discharges. Finally, these data will be transferred to a WORM disk.

*** SUMMARY OF RESULTS *** A review of 10 representative continuous-stage graphic records and a list of the problems to create unit values for these stations were made. From these records, four test records were selected and



digitized. The digital paper tapes were processed into unit stage values for one station. The digitized stage will have shifts and streamflow ratings applied to create unit discharges. These data need to be transferred to a WORM disk.

*** PLANS NEXT YEAR *** Data needs to be loaded on WORM disk. Complete report.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Lawrence J. Mansue

*** PERIOD OF PROJECT *** December 1990 through September 1991

*** COOPERATOR ***

Illinois Department of Transportation, Division of Water Resources

*** PLANNED REPORT ***

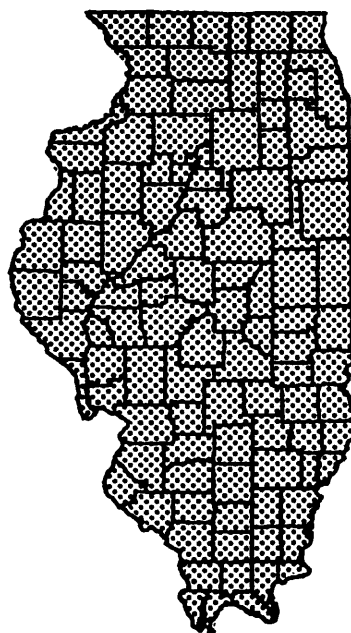
Unit Values of Stage and Discharge from Historical Data

IL095 CHLORINE ISOTOPES

*** PROJECT TITLE *** Chlorine Stable Isotope Composition of Brines from the Lower Paleozoic Sediments of the Illinois Basin

*** PROBLEM *** In some parts of the Illinois Basin, surface water and shallow drinking water aquifers have been contaminated by saline waters from lower Paleozoic sediments. A recent study of saline formation water in the Michigan Basin suggests that saline formation waters have a distinguishable chlorine isotope composition. If so, chlorine isotope composition could be used to trace saline formation waters in the Illinois Basin and other sedimentary basins in the Midwest.

*** OBJECTIVES *** (1) To determine the isotopic variability in the Illinois Basin for purposes of tracing saline water contamination in fresh-water aquifers. (2) To search for characteristic isotope signatures for major formation groups. (3) To determine if formation waters of similar age in adjacent basins have the same chlorine isotope ratios.



*** APPROACH *** (1) Literature review of chlorine isotopes and the Illinois Basin. (2) Collect about 20 formation-water samples from Paleozoic sediments and overlying aquifers. (3) Analyze the samples for major chemical constituents, trace elements, and strontium and chlorine isotopes. (4) Analyze about 15 saline-water samples, which were previously collected from the Alberta, Michigan, and Appalachian Basins, for chlorine isotopes. (5) Evaluate the results of the analyses and write journal article.

*** SUMMARY OF RESULTS *** The literature review of studies involving chlorine stable isotopes and geochemistry of the Illinois Basin was completed. Interesting examples of similar studies in the Michigan Basin and basins along the Gulf coast were evaluated. Over 20 samples from Paleozoic sediments, overlying aquifers, and springs were taken. Procedures were established and equipment and supplies were obtained for splitting the samples and analyzing for major chemical constituents, trace elements, chlorine and strontium isotopes. Sample analysis has begun.

*** PLANS NEXT YEAR *** Complete the analysis of the collected samples and of about 15 other water samples collected from the Alberta, Michigan, and Appalachian Basins for chlorine isotopes. Evaluate the results of the analyses with respect to chronostratigraphic variability and isotopic composition within the Illinois Basin and between the Illinois Basin and adjacent basins. Write a journal article to present the findings of the investigation.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Angel M. Martin, Jr.

*** PERIOD OF PROJECT *** June 1991 through September 1992

*** COOPERATOR *** Northern Illinois University

*** PROJECT TITLE *** Hydrogeology and
Contaminant Assessment in the Southeast Chicago
Area

*** PROBLEM *** The U.S. Environmental
Protection Agency, Region V, has requested that
the USGS, Illinois District, conduct an investiga-
tion designed to define the hydrogeologic and
water-quality conditions in the southeast Chicago
area. This area has significant surface water and
ground-water contamination which presents a signi-
ficant potential hazard.

*** OBJECTIVES *** (1) Characterize the
hydrology of the surface-water and shallow ground-
water system in the area of southeast Chicago.
(2) Characterize water quality in the area. (3)
Identify the nature and extent of a potential non-
aqueous phase liquid layer, if present, in the
study area.

*** APPROACH *** Conduct one or more synoptic water-level surveys in the
study area. Conduct drilling, soil-gas surveys, and water-quality sampling to
determine the presence and type of contamination present in the study area.

*** PLANS NEXT YEAR *** Conduct synoptic water-level survey. Drill moni-
toring wells. Conduct soil-gas survey.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Southeast Chicago

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

*** PERIOD OF PROJECT *** September 1991 through September 1993

*** COOPERATORS ***

U.S. Environmental Protection Agency, Region V

*** PLANNED REPORT *** Results of the water-level survey and soil-gas
sampling and the interpretation of the hydrology and contaminant distribution
in the study area.



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.
- W 2362 Floods of December 1982 to May 1983 in the central and southern Mississippi River and the Gulf of Mexico basins, by R.B. Stone and R.H. Bingham. 1991.
- W 2367 Results of hydrologic research at a low-level radioactive-waste disposal site near Sheffield, Illinois, edited by B.J. Ryan. 1991.
- W 2375 National Water Summary 1988-89--Hydrologic events and floods and droughts, by U.S. Geological Survey. 1991.

Circulars

Circulars contain technical or nontechnical information of popular interest including timely administrative or scientific information. Circulars are available free of charge from the U.S. Geological Survey, Books and Open-File Reports Section, Federal Center, Box 25425, Denver, CO 80225 (phone 303-236-7476).

- C 216 Water resources of the St. Louis area, Missouri and Illinois, by J.R. Searcy, R.C. Baker, and W.H. Durum. 1952.
- C 456 Estimated use of water in the United States, 1960, by K.A. MacKichan and J.C. Kammerer. 1961.
- C 476 Principal lakes of the United States, by C.D. Bue. 1963.
- C 536 Are we running out of water?, by R.L. Nace. 1967.
- C 554 Hydrology for urban land planning--A guidebook on the hydrologic effects of urban land use, by L.B. Leopold. 1968.
- C 556 Estimated use of water in the United States, 1965, by C.R. Murray. 1968.
- C 601-A Water for the cities--The outlook, by W.J. Schneider and A.M. Spieker. 1969.

- C 601-C Flood hazard mapping in metropolitan Chicago, by J.R. Sheaffer, D.W. Ellis, and A.M. Spieker. 1970.
- C 601-D Water as an urban resource and nuisance, by H.E. Thomas and W.J. Schneider. 1970.
- C 601-E Sediment problems in urban areas, by H.P. Guy. 1970.
- C 601-F Hydrologic implications of solid-waste disposal by W.J. Schneider. 1970.
- C 601-G Real-estate lakes, by D.A. Rickert and A.M. Spieker. 1972.
- C 601-H Role of water in urban planning and management, by W.J. Schneider, D.A. Rickert, and A.M. Spieker. 1973.
- C 601-I Water facts for planners and managers, by J.H. Feth. 1973.
- C 601-J Extent and development of urban flood plains, by W.J. Schneider and J.E. Goddard. 1974.
- C 601-K An introduction to the processes, problems, and management of urban lakes, by L.J. Britton, R.C. Averett, and R.F. Ferreira. 1975.
- C 631 Disposal of liquid wastes by injection underground--Neither myth nor millennium, by A.M. Piper. 1969.
- C 643 Reconnaissance of selected minor elements in surface waters of the United States, October 1970, by W.H. Durum, J.D. Hem, and S.G. Heidel. 1971.
- C 645 A procedure for evaluating environmental impact, by L.B. Leopold, F.E. Clarke, B.B. Hanshaw, and J.R. Balsley. 1971.
- C 676 Estimated use of water in the United States in 1970, by C.R. Murray and E.B. Reeves. 1972.
- C 703 Water demands for expanding energy development, by G.H. Davis and L.A. Wood. 1974.
- C 719 The National Stream Quality Accounting Network (NASQAN)--Some questions and answers, by J.F. Ficke and R.O. Hawkinson. 1975.
- C 765 Estimated use of waters in the United States in 1975, by C.R. Murray and E.B. Reeves. 1977.
- C 953 Erosion and landform modification at a low-level radioactive-waste disposal facility near Sheffield, Illinois, by J.R. Gray, in Glysson, G.D., ed., Proceedings of the Advanced Seminar on Sedimentation, August 15-19, 1983, Denver, Colorado. 1987.
- C 953 Measurement of bedload discharge in nine Illinois streams with the Helley-Smith sampler, by J.B. Graf, in Glysson, G.D., ed., Proceedings of the Advanced Seminar on Sedimentation, August 15-19, 1983, Denver, Colorado. 1987.

Hydrologic Investigations Atlases

Hydrologic Investigations Atlases may contain a wide range of hydrologic and hydrogeologic data of regional and national interest, such as streamflow, ground water, water quality, and extent of flooding. Hydrologic Investigations Atlases and other maps are sold by the U.S. Geological Survey, Map Distribution Section, Federal Center, Box 25286, Denver, CO 80225 (phone 303-236-7477).

- HA-39. Floods in the Little Calumet River basin, near Chicago Heights, [north-eastern] Illinois. 1960.
- HA-61. Stream composition of the conterminous United States, by F.H. Rainwater. 1962.
- HA-67. Floods in Arlington Heights quadrangle, [northeastern] Illinois, by D.W. Ellis, H.E. Allen, and A.W. Noehre. 1963.
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- HA-88. Floods in Libertyville quadrangle, [northeastern] Illinois, by A.W. Noehre, D.W. Ellis, and D.E. Long. 1964.
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- HA-199. Preliminary map of the conterminous United States showing depth to and quality of shallowest ground water containing more than 1,000 parts per million dissolved solids, by J.H. Feth and others. 1965.
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- HA-458. Floods in Maple Park quadrangle, northeastern Illinois, by R.T. Mycyk and G.L. Walter. 1972.
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- HA-710. Average annual runoff in the United States, 1951-80, by W.A. Gebert, D.J. Graczyk, and W.R. Krug. 1987.

Hydrologic-Unit Maps

Hydrologic-Unit Maps have been developed for each State and depict the major hydrologic regions, subregions, accounting units, and cataloging units used for the collection and organization of hydrologic data. Hydrologic-Unit Maps and other maps are sold by the U.S. Geological Survey, Map Distribution Section, Federal Center, Box 25286, Denver, CO 80225 (phone 303-236-7477).

U.S. Geological Survey, 1975, Hydrologic unit map of Illinois--1974.

Water-Resources Investigations Reports (WRI/NTIS)

Water-Resources Investigations Reports contain hydrologic information, mainly of local interest, intended for quick release to the public in book or map format. The following reports are available for inspection at the Urbana, Ill., and Reston, Va., offices of the U.S. Geological Survey. The reports may be purchased either as microfiche or hard copy 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. Further information about these reports may be obtained from the District Chief, U.S. Geological Survey, 4th Floor, 102 E. Main Street, Urbana, IL 61801 (phone 217-398-5353).

- WRI 13-75. Drainage areas for Illinois streams, by K.M. Ogata. 1975.
(PB 246298/AS)
- WRI 77-104. Frequency analysis of Illinois floods using observed and synthetic streamflow records, by G.W. Curtis. 1977. (PB 277350/AS)
- WRI 77-117. Technique for estimating magnitude and frequency of floods in Illinois, by G.W. Curtis. 1977. (PB 277255/AS)
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- WRI 79-24. Chemical analyses of surface water in Illinois, 1975-77, Volume II, Illinois River basin and Mississippi River tributaries north of Illinois River basin, by David Grason and R.W. Healy. 1979.
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- WRI 82-22. A technique for estimating time of concentration and storage coefficient values for Illinois streams, by J.B. Graf, George Garklavs, and K.A. Oberg, 1982. (PB82-218793)

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- 90-4162. Statistical and graphical methods used to describe ground-water quality in Illinois, by R.H. Coupe and K.L. Warner (p. 111-122), in U.S. Geological Survey National Computer Technology Meeting: Proceedings, Phoenix, Arizona, November 14-18, 1988, edited by B.H. Balthrop and J.E. Terry. 1991.
- 90-4166. Determination of water use in Rockford and Kankakee areas, Illinois, by J.K. LaTour. 1991.
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- 91-4084. U.S. Geological Survey research in radioactive waste disposal: fiscal years 1986-1990, compiled by N.J. Trask and P.R. Stevens. 1991. (Sheffield, Ill., by P.C. Mills, p. 40-47.)

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Open-File Reports are informal manuscripts, maps, and other material made available to the public. The following reports are available for inspection in the Urbana, Ill., and Reston, Va., offices of the U.S. Geological Survey. They may be purchased from U.S. Geological Survey, Books and Open-File Reports Section, Federal Center, Box 25425, Denver, CO 80225 (phone 303-236-7476).

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- 83-926. Geologic and hydrologic data collected during 1976-1984 at the Sheffield low-level radioactive-waste disposal site and adjacent areas, Sheffield, Illinois, by J.B. Foster, George Garklavs, and G.W. Mackey. 1984.
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- 87-543. Data-collection methods and data summary for the assessment of water quality in Cedar Creek, west-central Illinois, by R.D. McFarlane, W.O. Freeman, and A.R. Schmidt. 1987.
- 87-698. Water-resources activities in Illinois, 1987, by M.L. Garrelts. 1988.
- 88-143. U.S. Geological Survey ground-water studies in Illinois, by D.C. Voelker, J.R. Nicholas, and K.L. Norton. 1988. (Water Fact Sheet)
- 89-31. Water-resources activities of the U.S. Geological Survey in Illinois, 1988, by M.L. Garrelts. 1989.
- 89-271. Water and tritium movement through the unsaturated zone at a low-level radioactive-waste disposal site near Sheffield, Illinois, 1981-85, by P.C. Mills and R.W. Healy. 1991.
- 89-409. U.S. Geological Survey Second National Symposium on Water Quality: Abstracts of the technical sessions, Orlando, Florida, November 12-17, 1989, by Pederson, G.L., and Smith, M.M., comps. 1989.
- Surface-water quality of the upper Illinois River basin in Illinois, Indiana, and Wisconsin--analysis of existing information by S.F. Blanchard, p. 5.
- Relations between fish populations and water quality in the upper Illinois River basin in Illinois, Indiana, and Wisconsin--analysis of existing information, by P.M. Ruhl and R.G. Striegl, p. 80-81.
- Use of multivariate techniques for background and anthropogenic-source analysis of trace elements in streambed materials in the upper Illinois River basin in Illinois, Indiana, and Wisconsin, by S.M. Smith, R.F. Sanzalone, and J.A. Colman, p. 93.
- 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.
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- IL-73-1. Water Resources Data for Illinois--Water Year 1973, by U.S. Geological Survey, 1974. (PB 288020/AS)
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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

Assistant Chief Geologist,
Eastern Region
U.S. Geological Survey
953 National Center
Reston, Virginia 22092

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GENERAL INFORMATION

Public Inquiries Office
U.S. Geological Survey
Room 1-C-402
503 National Center
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.
- 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
03338780	North Fork Vermilion River near Bismarck, Ill.	D,CQ
03339000	Vermilion River near Danville, Ill.	D,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
03380500	Skillet Fork at Wayne City, Ill.	D,CQ
03381495	Little Wabash River at Main Street at Carmi, Ill.	CQ
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

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
05418950	Apple River near Elizabeth, Ill.	CQ
05419000	Apple River near Hanover, Ill.	D
05420500	Mississippi River at Clinton, Iowa	CQ
05435500	Pecatonica River at Freeport, Ill.	D,CQ
05437500	Rock River at Rockton, Ill.	D,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
05443500	Rock River at Como, Ill.	D,CQ
05444000	Elkhorn Creek near Penrose, Ill.	D,CQ
05446000	Rock Creek at Morrison, Ill.	C
05446500	Rock River near Joslin, Ill.	D,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.	D
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
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

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
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
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	North Branch Chicago R 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
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
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

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
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
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 Wyandot, Ill.	C,CQ
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

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
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 River at Allerton Park nr Monticello, Ill.	CQ
05573540	Sangamon River at Route 48 at Decatur, Ill.	D,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 Creek at Burns Lane Bridge at Springfield, 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
05582000	Salt Creek near Greenvew, 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
05585500	Illinois River at Meredosia, Ill.	S/8
05586000	North Fork Mauvaise Terre Creek nr Jacksonville, Ill.	C
05586100	Illinois River at Valley City, Ill.	D,CQ,SD
05586500	Hurricane Creek near Roodhouse, Ill.	C
05587000	Macoupin Creek near Kane, Ill.	D,CQ
05587060	Illinois River at Hardin, Ill.	S/8,CQ
05587455	Mississippi River below Grafton, Ill.	CQ
05587900	Cahokia Creek at Edwardsville, Ill.	D,CQ
05588000	Indian Creek at Wanda, Ill.	D
05590800	Lake Fork at Atwood, Ill.	D
05591200	Kaskaskia River at Cooks Mills, Ill.	D,CQ,SD
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

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
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
05593900	East Fork Shoal Creek near Coffeen, Ill.	D
05594000	Shoal Creek near Breese, Ill.	D,CQ
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
05595700	Big Muddy River near Mt. Vernon, Ill.	S
05595730	Rayse Creek near Waltonville, Ill.	D,S/8,CQ
05595765	Big Muddy Subimpoundment nr Waltonville, Ill.	S/8
05595820	Casey Fork at Mt. Vernon, Ill.	D,S/8
05595830	Casey Fork at Rt. 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
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
ADAMS COUNTY			
400026091242401	Clayton-Camp Point Well No. 1	Private	Q
BOONE COUNTY			
421649088513801	Belvidere Well No. 9	Municipal	Q
BUREAU COUNTY			
412220089280301	16N9E-16.8e	Private	L
412232089275101	Princeton Well No. 5	Municipal	Q
412242089125101	Ladd Well No. 1	Municipal	Q
CARROLL COUNTY			
415737090061001	Thomson Well No. 4	Municipal	Q
CHAMPAIGN COUNTY			
400832088190601	Champaign Well No. 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
415930088110602	Bartlett Well No. 1	Municipal	Q
420432088114101	Hoffman Estates Well No. 22	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
DE KALB COUNTY			
415424088462501	De Kalb Well No. 12	Municipal	Q
DE WITT COUNTY			
400647088481101	Weldon Well No. 5	Municipal	Q
DU PAGE COUNTY			
414217087592801	37N11E-9.8c	Federal	L
414633088080501	Naperville Well No. 5	Municipal	Q
415149088061701	Wheaton Well No. 2	Municipal	Q
415614088095701	Carol Stream Well No. 5	Municipal	Q
FAYETTE COUNTY			
390759089073102	Ramsey Well No. 6	Municipal	Q
GRUNDY COUNTY			
411112088180601	Gardner Well No. 2	Municipal	Q
412129088252701	Morris Well No. 4	Municipal	Q
HANCOCK COUNTY			
401407091034101	Bowen Well No. 2	Municipal	Q
HENDERSON COUNTY			
405512090573601	Galesburg Well No. 74-3	Municipal	Q
IROQUOIS COUNTY			
404629087453801	Watseka Well No. 7	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
KANE COUNTY			
415257088202001	Geneva Well No. 6	Municipal	Q
420720088154601	Carpentersville Well No. 6	Municipal	Q
KANKAKEE COUNTY			
410127087425201	St. Anne Well No. 3	Municipal	Q
LA SALLE COUNTY			
413255089064801	Mendota Well No. 3	Municipal	Q
LAKE COUNTY			
421537088082101	Wauconda Well No. 2	Municipal	Q
422044088014301	Grayslake Well No. 4	Municipal	Q
422803087475301	46N12E-14.6g1	Federal	L,Q
422803087475302	46N12E-14.6g2	Federal	L,Q
422803087475303	46N12E-14.6g3	Federal	L,Q
422803087475304	46N12E-14.6g4	Federal	L,Q
McHENRY COUNTY			
421034088164601	Algonquin Well No. 1	Municipal	Q
421335088204601	Crystal Lake Well No. 6	Municipal	Q
422525088361401	Harvard Well No. 6	Municipal	Q
MADISON COUNTY			
385117090063701	Wood River Well No. 6	Municipal	Q
MASON COUNTY			
401754090032001	Havana Well No. 5	Municipal	Q
401811089361801	San Jose 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
MASSAC COUNTY			
370843088435301	Metropolis Well No. 2	Municipal	Q
MONROE COUNTY			
381749090185301	Valmeyer Well No. 4	Municipal	Q
PEORIA COUNTY			
404511090004001	Elmwood Well No. 3	Municipal	Q
405536089300401	Chillicothe Well No. 7	Municipal	Q
PULASKI COUNTY			
371637089105401	Ullin Well No. 1	Municipal	Q
373617089120301	Mounds Well No. 1	Municipal	Q
ROCK ISLAND COUNTY			
412555090265401	Coal Valley Well No. 3	Municipal	Q
ST. CLAIR COUNTY			
383916090023501	Mound PWD Well No. 1	Municipal	Q
STEPHENSON COUNTY			
421813089373901	Freeport Well No. 4	Municipal	Q
TAZEWELL COUNTY			
404222089243201	Washington Well No. 7	Municipal	Q
WAYNE COUNTY			
383036088255001	Cisne 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
WHITE COUNTY			
380549088042101	Carmi Well No. 3	Municipal	Q
WHITESIDE COUNTY			
413922090044101	Erie Well No. 2	Municipal	Q
WILL COUNTY			
413238088084601	Joliet Rooney Site	Municipal	Q
413514088011901	Lockport Well No. 5	Municipal	Q
WINNEBAGO COUNTY			
422723089034001	Rockton Well No. 5	Municipal	Q
422929089020901	South Beloit Well No. 3	Municipal	Q