WATER RESOURCES ACTIVITIES

IN ILLINOIS, 1985

Compiled by Mary L. Garrelts

U.S. GEOLOGICAL SURVEY

Open-File Report 86-130

Urbana, Illinois

1986

UNITED STATES DEPARTMENT OF THE INTERIOR

DONALD PAUL HODEL, Secretary

GEOLOGICAL SURVEY

Dallas L. Peck, Director

For additional information
write to:

District Chief
U.S. Geological Survey
Water Resources Division
102 E. Main St., 4th Floor
Urbana, IL 61801

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CONTENTS

CONTENTS

ILLUSTRATIONS

TABLES

WATER RESOURCES ACTIVITIES IN ILLINOIS, 1985

By Mary L. Garrelts

ORIGIN AND MISSION OF THE U.S. GEOLOGICAL SURVEY

The U.S. Geological Survey 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 national domain." An integral part of that original mission includes publishing and disseminating the earth-science information needed to understand, to plan the use of, and to manage the Nation's energy, land, mineral, and water resources.

Since 1879, the research and fact-finding role of the U.S. Geological Survey has grown and been modified to meet the changing needs of the Nation it serves. As part of that evolution, the U.S. Geological Survey has become the Federal Government's largest earth-science research agency, the Nation's largest civilian mapmaking agency, the primary source of data on the Nation's surface- and ground-water resources, and the employer of the largest number of professional earth scientists. Today's programs serve a diversity of needs and users. Programs include:

- Conducting detailed assessments of the energy and mineral potential of the Nation's land and offshore areas.
- Investigating and issuing warnings of earthquakes, volcanic eruptions, landslides, and other geologic and hydrologic hazards.
- Conducting research on the geologic structure of the Nation.
- Studying the geologic features, structure, processes, and history of the other planets of our solar system.
- Conducting topographic surveys of the Nation and preparing topographic and thematic maps and related cartographic products.
- Developing and producing digital cartographic data bases and products.
- Collecting data on a routine basis to determine the quantity, quality, and use of surface and ground water.
- Conducting water-resource appraisals in order to describe the consequences of alternative plans for developing land and water resources.
- Conducting research in hydraulics and hydrology, and coordinating all Federal water-data acquisition.

- Using remotely sensed data to develop new cartographic, geologic, and hydrologic research techniques for natural resources planning and management.

- Providing earth-science information through an extensive publications program and a network of public access points.

Along with its continuing commitment to meet the growing and changing earth-science needs of the Nation, the U.S. Geological Survey remains dedicated to its original mission to collect, analyze, interpret, publish, and disseminate information about the natural resources of the Nation--providing "Earth Science in the public Service."

MISSION AND PROGRAM OF THE WATER RESOURCES DIVISION

The mission of the Water Resources Division is to provide the hydrologic information and understanding needed for the optimum utilization and management of the Nation's water resources for the overall benefit of the people of the United States.

This is accomplished, in large part, through cooperation with other Federal and non-Federal agencies, by:

- Collecting, on a systematic basis, data needed for the continuing determination and evaluation of the quantity, quality, and use of the Nation's water resources.

- Conducting analytical and interpretive water-resource appraisals describing the occurrence, availability, and the physical, chemical, and biological characteristics of surface and ground water.

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

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

- Coordinating the activities of Federal agencies in the acquisition of water data for streams, lakes, reservoirs, estuaries, and ground waters.

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

ILLINOIS DISTRICT

Organization

The Illinois District of the U.S. Geological Survey, Water Resources Division, consists of two operating sections, two support units, and three field offices (fig. 1). Personnel are based at the District office and one Field Headquarters in Urbana, a Field Headquarters in Mt. Vernon, and a Subdistrict office in De Kalb. The District operates with guidance from Regional and National offices in Reston, Virginia. Offices for research, training, equipment development, and laboratory services, located throughout the United States, provide technical assistance and advice to the District.

Network-Operations Section

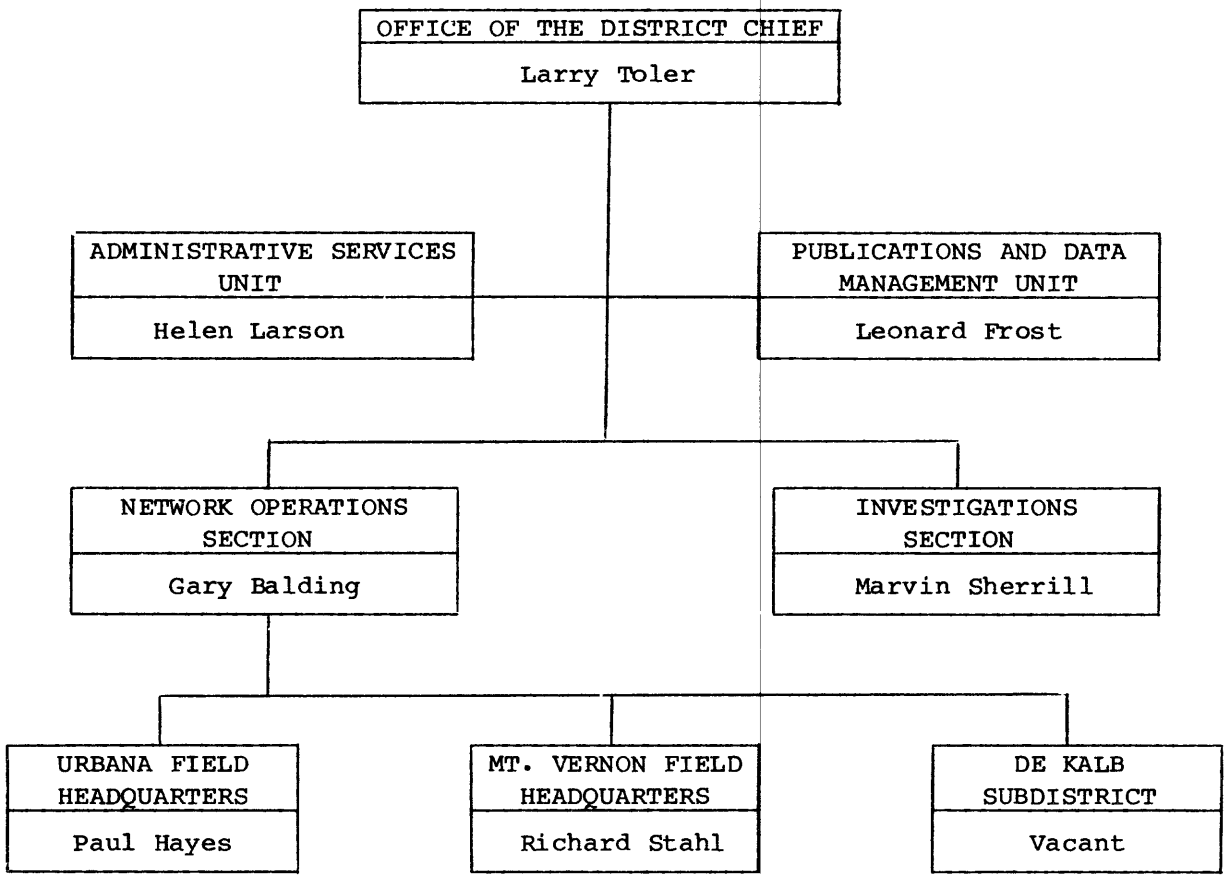
The Network Operations Section designs and implements a network of stream-gaging, water-quality, sediment, and observation-well sites based on data needs. The Section directs the installation and maintenance of equipment, data collection and analysis, and compilation of records for publication in the annual data report. It maintains the drainage-area map file and all hydrologic-data files. The Section conducts special data-collection efforts as needed or on demand, for example, major floods, low-flow measurements, and indirect measurements, and provides assistance in the collection of water-resources data in support of projects. 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 and report to the Chief, Network Operations Section (fig. 2).

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, States, and water-resources regions. The Section conducts special hydrologic and research studies on current water issues such as coal hydrology, radiohydrology, mineral and energy development, sediment and erosion, urban hydrology, water disposal, and river quality. Special investigative techniques for water-resource evaluation include 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.

Publications and Data-Management Unit

This support unit provides ADP services; maintains computer manuals and program catalogs, does computer programing, and assists hydrologists in program selection, application, and modification. The Unit assembles reports



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

Figure 1.--Illinois District organization chart with office addresses.

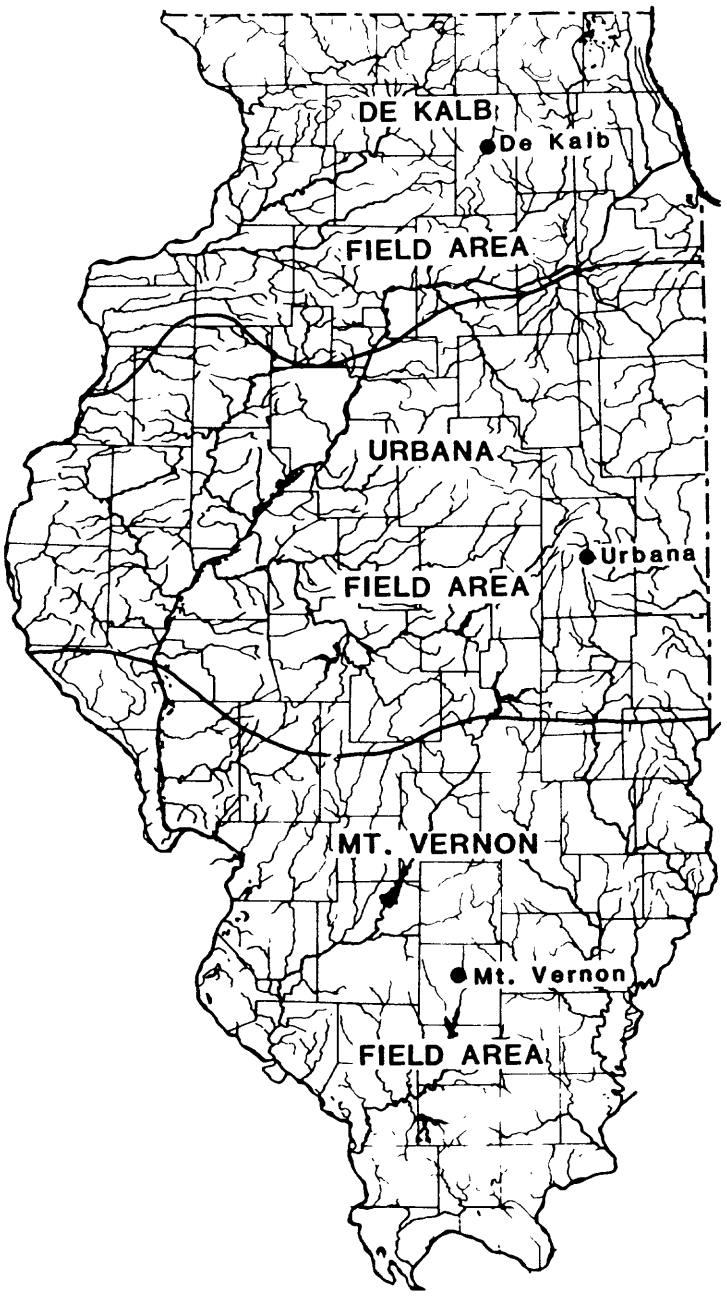


Figure 2.--Suboffice areas of responsibility.

for colleague, regional, and division review, prepares camera-ready copy for publication, keeps manuscript status records, and prepares printing specifications. The Unit maintains the District's data files and library; maintains District warehouse facilities, including supplies of hand tools and shop equipment; processes vehicle procurement and disposition; and maintains the District controlled-property inventory.

Administrative-Services Unit

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

Budget and Funding Sources

Funds to support the work performed by the Illinois District, Water Resources Division, are derived from three principal sources.

Federal Program

Funds for the Federal Program are appropriated by the Congress, and are specifically identified in the annual Geological Survey budget. These funds are used to support research, data collection, high-priority topical programs including energy-related 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. 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 1985 are listed in table 1.

Table 1.--Agencies supporting water-resources activities during fiscal year 1985

State Agencies

Illinois Department of Transportation
- Division of Water Resources

Illinois Envirionmental Protection Agency
- Division of Water Pollution Control
- Division of Public Water Supplies

Illinois Department of Energy and Natural Resources
- Water Survey Division

Local Agencies

Bloomington and Normal Sanitary District

Forest Preserve District of Cook County

The Metropolitan Sanitary District of Greater Chicago

City of Springfield

City of Decatur

Federal Agencies

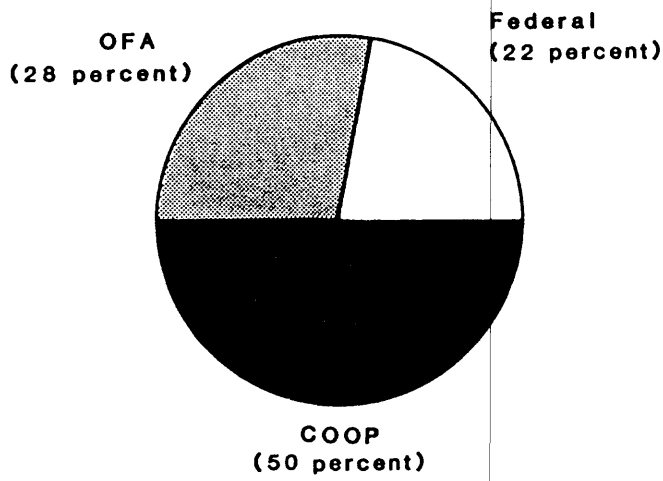
Department of the Army
- Corps of Engineers
  - Rock Island District
  - St. Louis District
  - Louisville District
  - Chicago District

Department of Housing and Urban Development
- Federal Emergency Management Agency

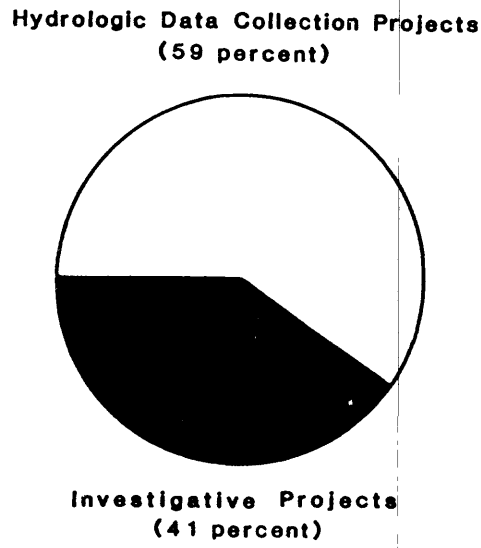
Other Federal Agencies (OFA) Program

In this program, the funds are transferred to the Geological Survey as reimbursement for work performed at the request of another Federal agency.

Funding from all sources in fiscal year 1985 amounted to about $3,200,000 which was distributed as follows:



The diagram below shows the percentage of the activities for fiscal year 1985 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 for the solution or alleviation of water problems in Illinois and the Nation.

WATER ISSUES AND CONDITIONS

Illinois generally has adequate supplies of water suitable for most uses. The mean annual precipitation for the 1951-80 period is shown in figure 3. 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 alluvium-filled shallow valleys that were eroded into the bedrock by ancestral streams.

The 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. Three of the major water-resources issues currently being addressed by the Illinois District of the Water Resources Division have to do with water-availability, water-quality, and hydrologic hazards and land-use issues. These issues are summarized below.

Water-Availability Issues

Ground water is the source for most municipal supplies in the northern part of the State, especially in the Chicago metropolitan area. Water withdrawals in this area have created water-level declines in excess of 850 feet. Most rural supplies throughout the State are obtained from shallow aquifers that are vulnerable to drought and contamination. During drought, some surface-water supplies are inadequate, particularly in the southern two-thirds of Illinois. Withdrawals of water (ground water plus surface water) are shown in figure 4.

Water-Quality Issues

Pollution of streams by hazardous waste from disposal sites and by overflows from combined storm and sanitary sewers is recognized as an important issue. Nonpoint source pollution resulting from runoff from agricultural lands and modification of stream channels is a statewide issue. Statewide, streams and lakes may be affected by sedimentation, turbidity, aquatic weeds, fluctuating water levels, algal blooms, and oxygen depletion.

Programs to identify stream biota and habitats are being conducted by the Illinois Environmental Protection Agency to provide information for discharge permitting and resource management.

Ground-water pollution in Illinois has numerous sources including landfills, feed lots, septic systems, road salts, spills, abandoned wells, leaking underground storage tanks, mine wastes, and saline intrusion. More than 500 potential hazardous-waste sites have been identified in the State. Maximum allowable concentrations of volatile organics, fluoride, and barium in ground water in some areas are exceeded.

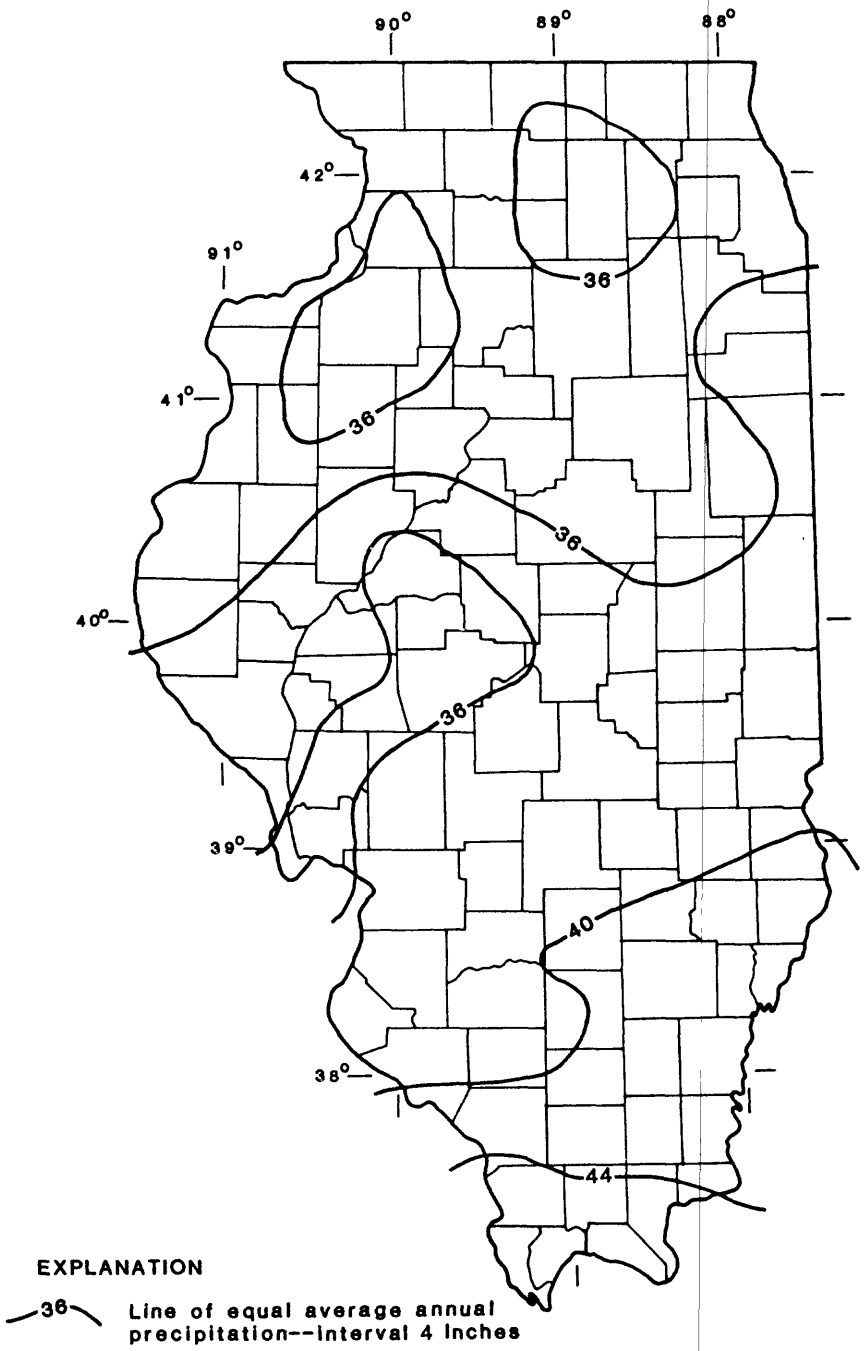


Figure 3.--Average annual precipitation in Illinois, 1951-80 (compiled by J. D. Laver from National Oceanic Atmospheric Administration data).

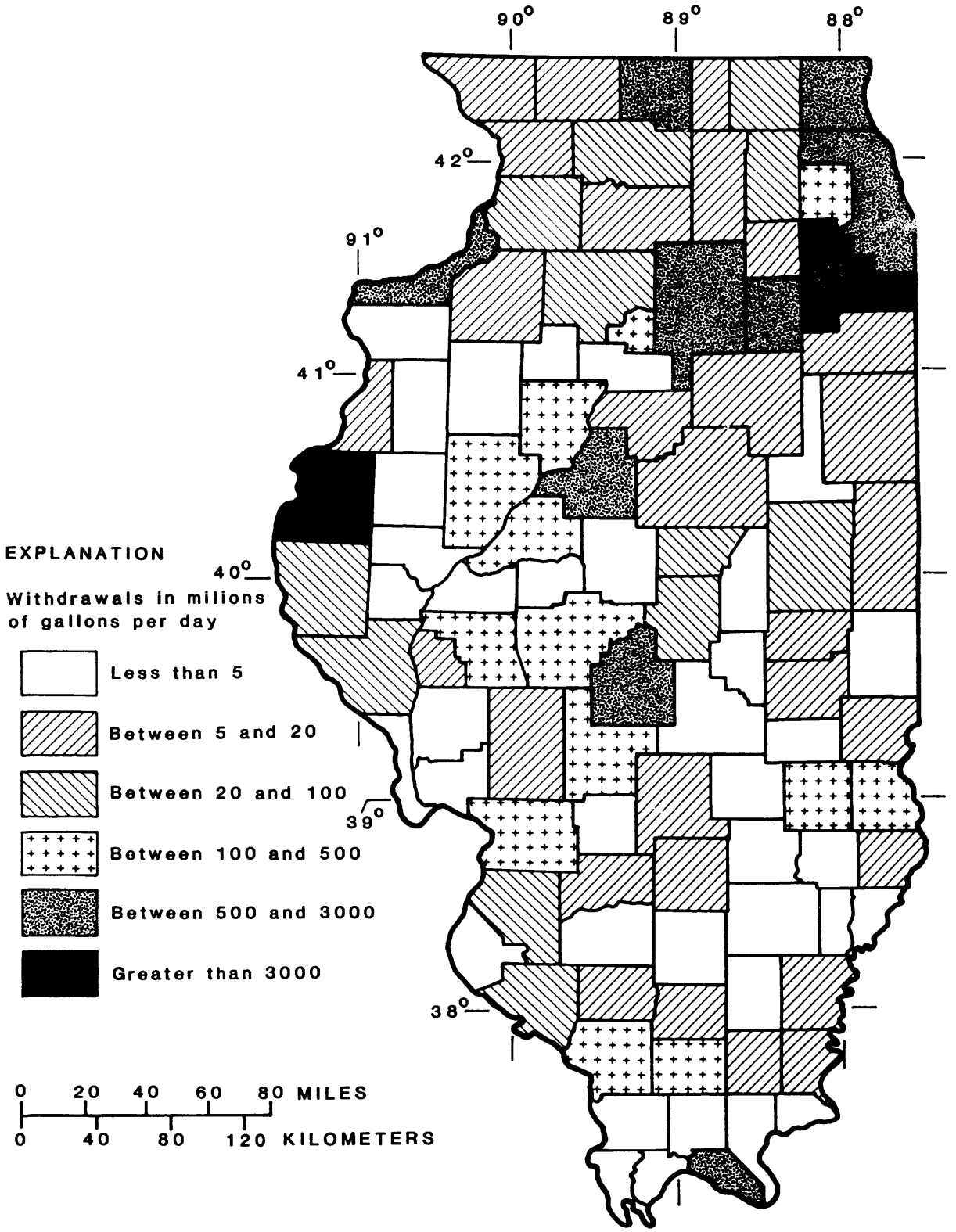


Figure 4.--Water withdrawals, estimated and reported for 1984 (Kirk and others, 1985, table 16).

Standards for seasonal disinfection of wastewater are being considered, partially, in response to concern about halogenation of organics.

Hydrologic Hazards and Land-Use Issues

Flood damages in urban areas have increased more than 900 percent since the mid-1960's. Rising ground-water levels in parts of the East St. Louis area have caused flooded basements and structural damage to buildings. Some degree of erosion occurs statewide, and affects croplands, streams, lakes, and reservoirs. In some areas, more than one-third of the original soil has been estimated to have been eroded during the past 100 years. Many wetland areas in the State have been drained to allow for agricultural, urban, and industrial uses during the past 160 years. Of the less than 50,000 acres of wetlands remaining, less than 25 percent are protected by either the State or Federal government.

WATER QUANTITY AND QUALITY

Surface-Water

Quantity

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. In Illinois, data on discharge and stage were obtained at the following numbers of stations:

Station classification		Number of stations
Stream stations		170
Continuous record:		
Discharge and stage	140	
Stage only	6	
Partial record:		
Peak (maximum) flow only	24	
Lake and reservoir stations		8
Stage and contents	3	
Stage only	5	
Total		178

The locations of sites where streamflow or stage are collected are shown in figure 5, and the types of data collected are shown in table 2. Average runoff for the 1951-80 period is shown in figure 6.

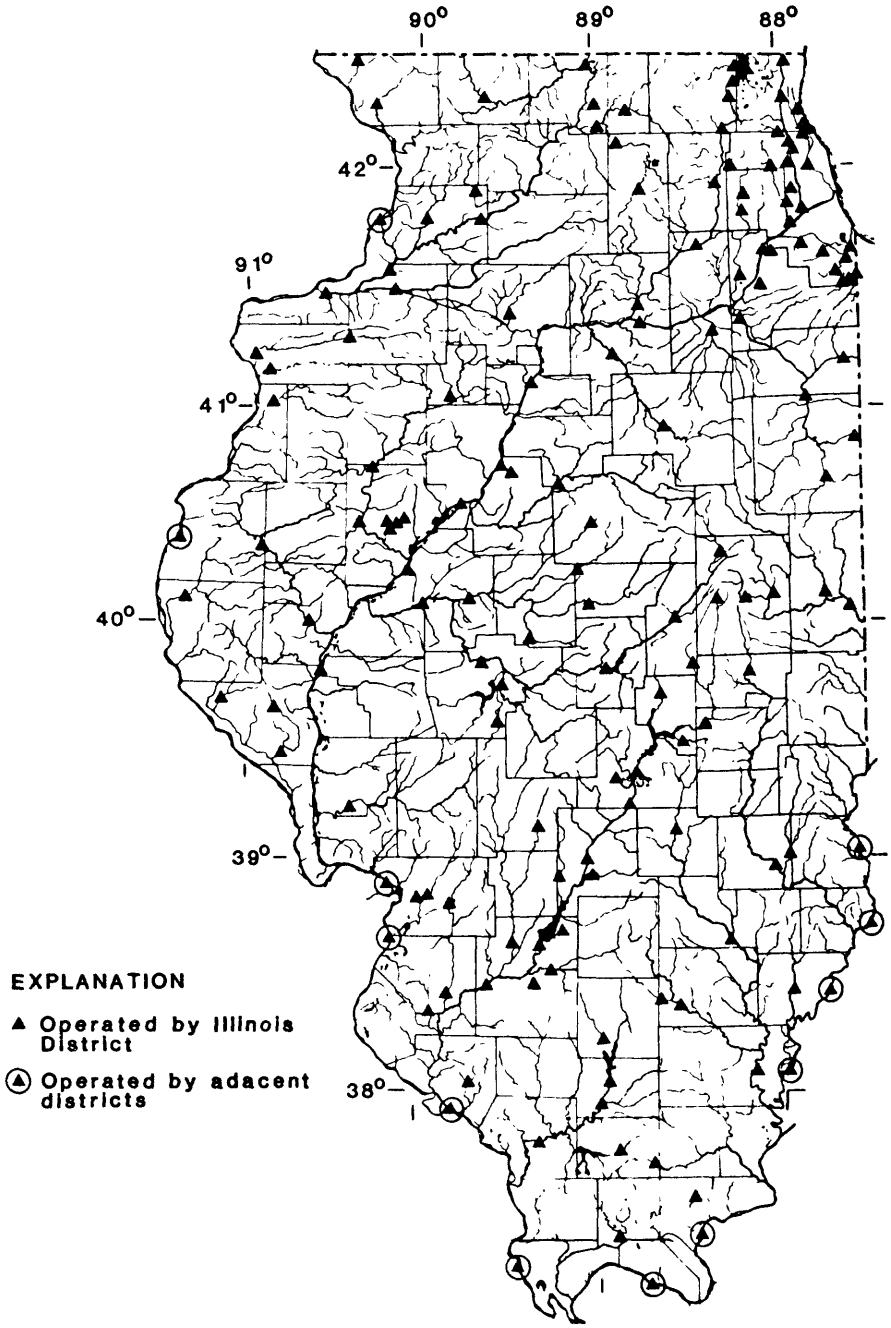


Figure 5.--Surface-water stations.

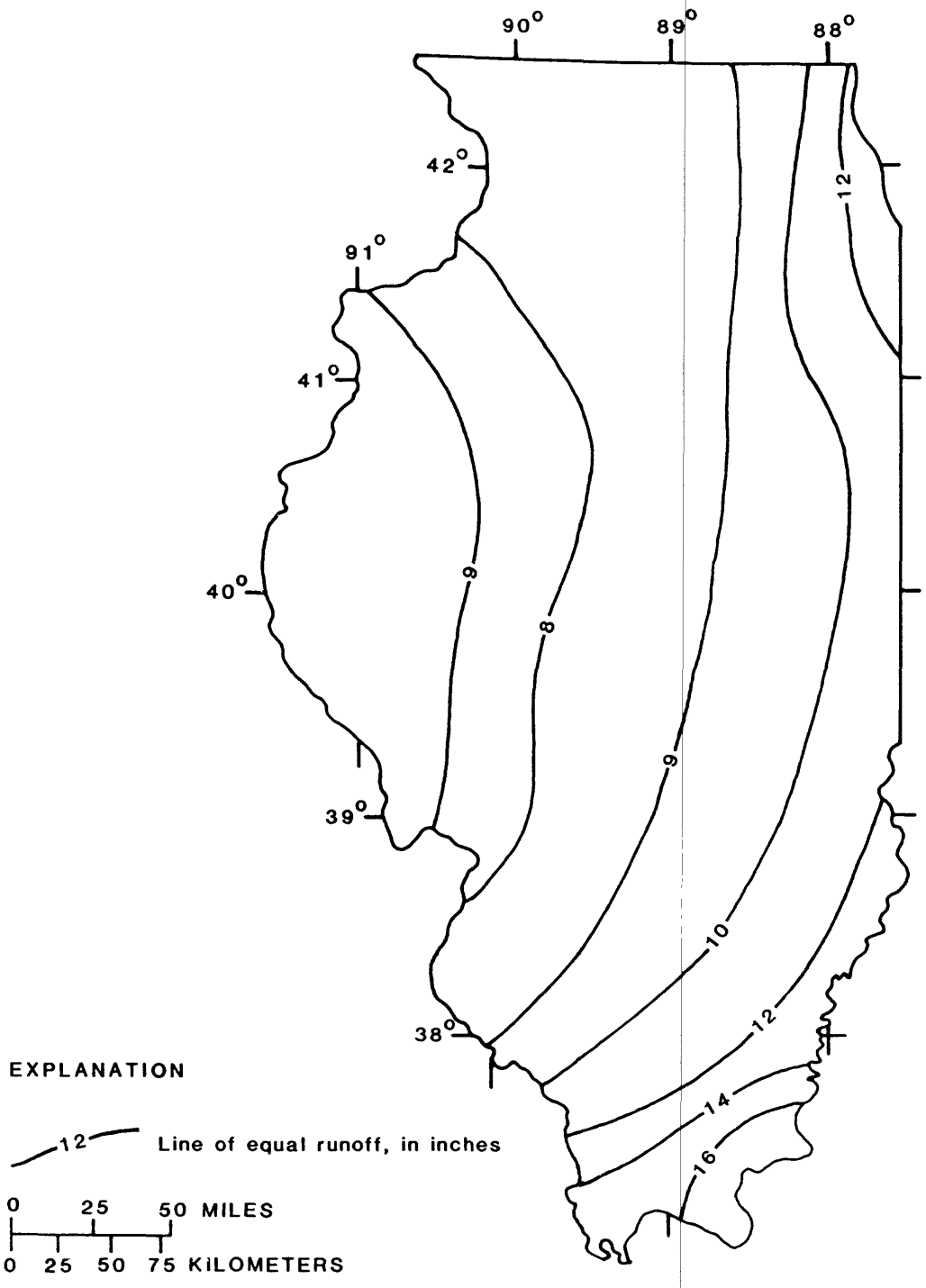


Figure 6.--Average annual runoff, in inches, 1951-80.

Quality

Data collected from 204 water-quality sampling stations, operated jointly by the U.S. Geological Survey and the IEPA (Illinois Environmental Protection Agency, were recently evaluated by the IEPA (1984). The evaluation showed that between 1972 and 1982 major water-quality improvements took place. Fewer river miles of streams were considered seriously degraded in 1982 than in 1972 (fig. 7). Approximately 35 percent of the streams assessed showed improvement, 64 percent were unchanged, and only 1 percent were degraded. Causes of stream-use impairment are shown in figure 8. Water-quality stations operated during fiscal year 1984 are shown in figure 9 and are listed in table 2.

Two parameters of serious concern at the present are dissolved oxygen and ammonia. Despite the recognition of ammonia as a current problem, violations of State standards (Illinois Pollution Control Board, 1984) for both total and un-ionized ammonia have shown downward trends since 1978. Violation rates for iron and fecal coliform bacteria were higher in 1982 and 1983 than they were in the previous 4 years.

Chlordane, dieldrin, and pentachlorophenol have been detected in samples from a network of 38 stream and 3 Lake Michigan sites sampled by the IEPA. Pentachlorophenol detection rates (percentage of samples in which was detected) have varied in the past several years, however, there seems to be a recent upward trend. The rate of detection of pesticides in stream-bottom materials seems to be trending downward although no uniform sampling program exists for these parameters. Planning was done for establishing a 30-station network for sampling pesticides in whole water.

General levels of mineralization of surface waters in Illinois are indicated in figure 10. Sulfate concentrations, which reflect areas with surface coal mining, are also shown in figure 10.

Data classification	Number of stations
Physical data:	
Water temperature	201
Specific conductance	201
pH	201
Dissolved oxygen	201
Sediment data	9
Chemical data:	
Inorganic constituents	199
Organic constituents	201
Microbiological data	199

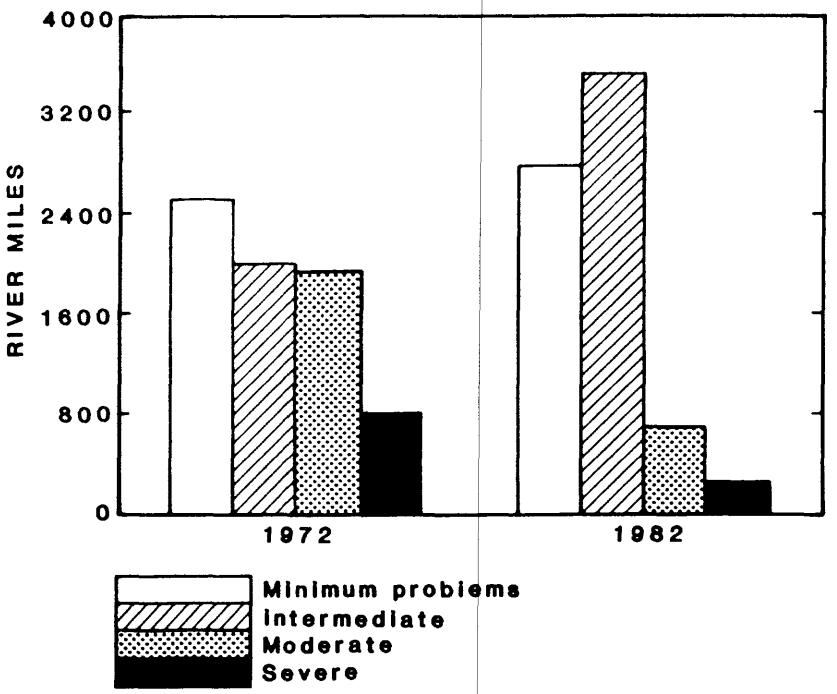


Figure 7.--Changes in stream conditions in Illinois (IEPA, 1984).

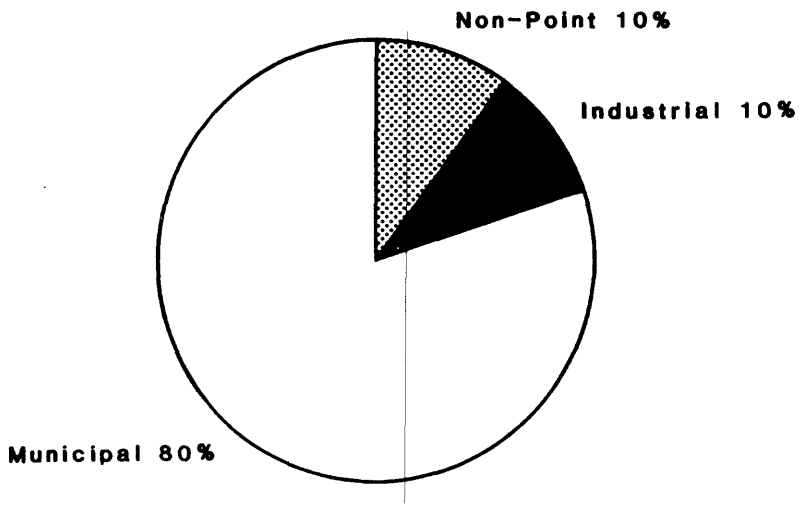


Figure 8.--Causes of use impairment of Illinois streams (IEPA, 1984).

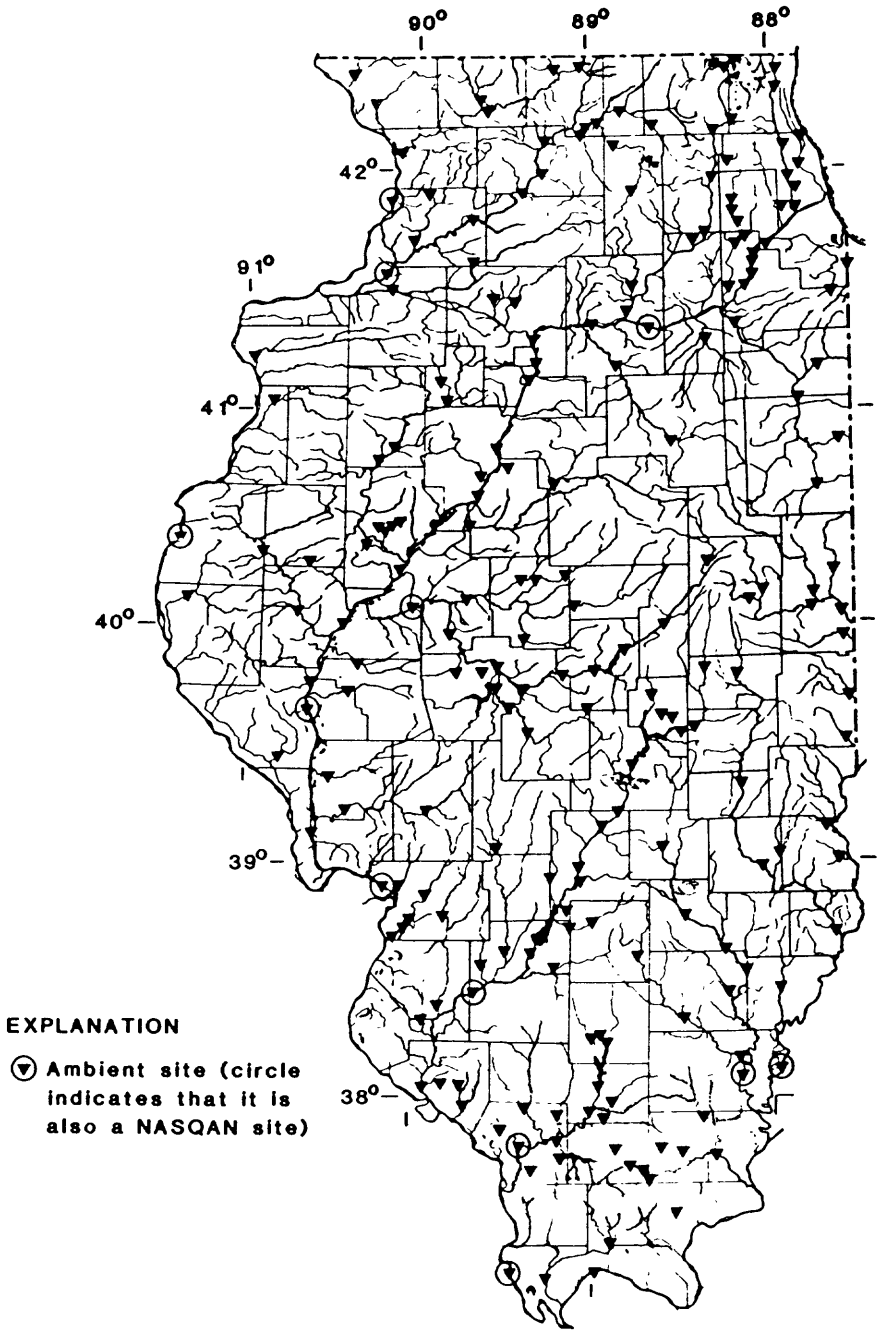


Figure 9.--Water-quality stations.

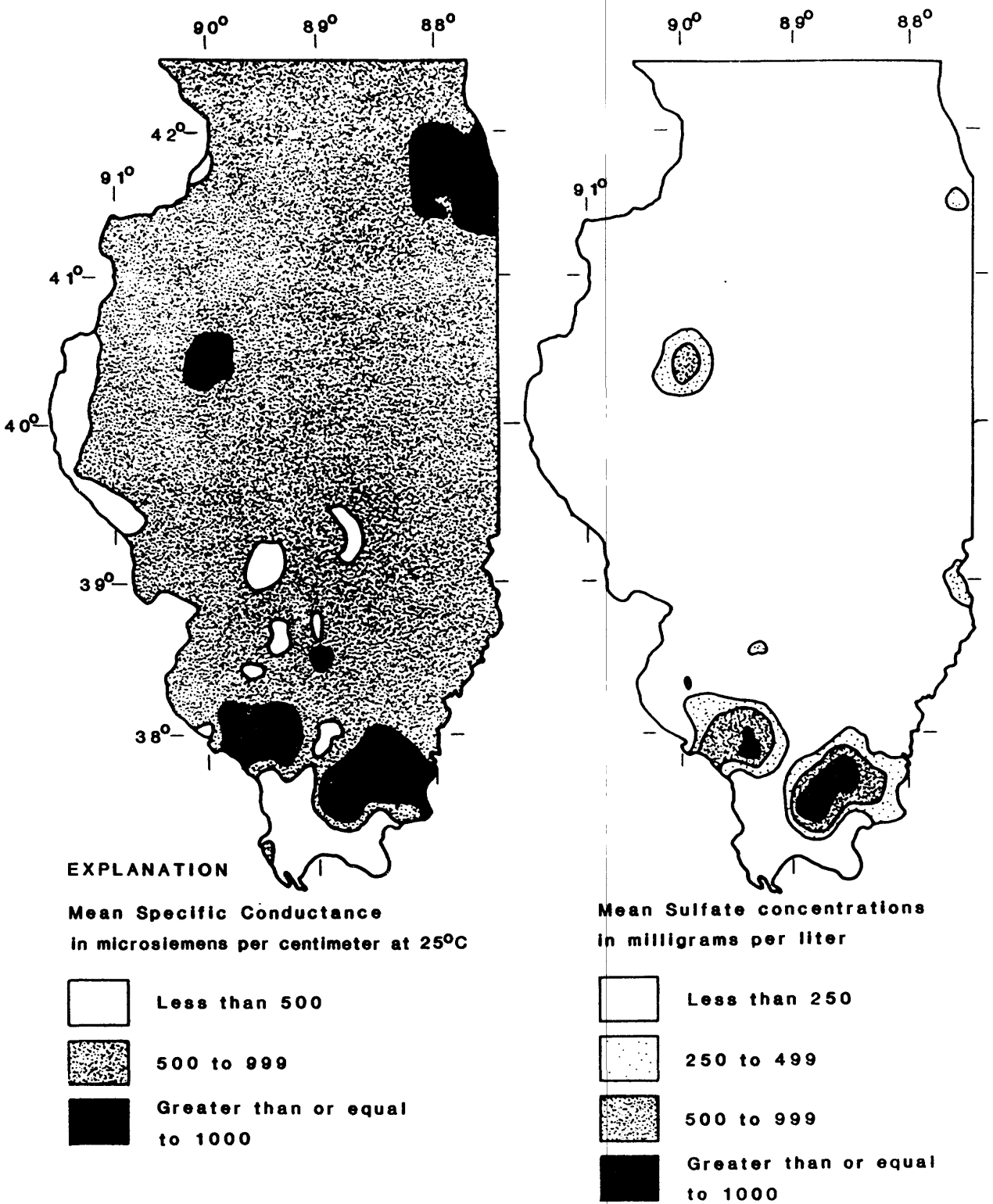


Figure 10.--Mean specific conductances and mean sulfate concentrations for streams in the Illinois surface-water-quality network.

Ground Water

Water levels in wells, discharges of springs and wells, and water-quality analyses are used in monitoring ground-water trends; however, these hydrologic data must be integrated with other observations and ground-water system studies in order to fully assess these trends. In Illinois, the U.S. Geological Survey regularly measures water levels in three observation wells. Other wells, 357 in number, are known as project wells and are used for specific studies. Among these are 343 public water supply wells which comprise the newly established ground-water-quality observation network.

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

Data type	Number of wells
Water levels	255
Physical data:	
Water temperature	344
Specific conductance	344
pH	344
Chemical data:	
Inorganic constituents	353
Organic constituents	343

The ground-water stations and types of data collected are listed in table 3. No water-quality data are collected at the three observation wells. Numbers of wells, by county, in the water-level observation network and the water-quality observation network are shown in figure 11.

DATA MANAGEMENT

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

WATSTORE

The National Water Data Storage and Retrieval System (WATSTORE) of the U.S. Geological Survey provides computerized procedures and techniques for processing water data and provides effective and efficient management of data-releasing activities. It was established in November 1971 to computerize the water-data system of the Geological Survey and to provide for more effective and efficient management of its data-releasing activities. The system is

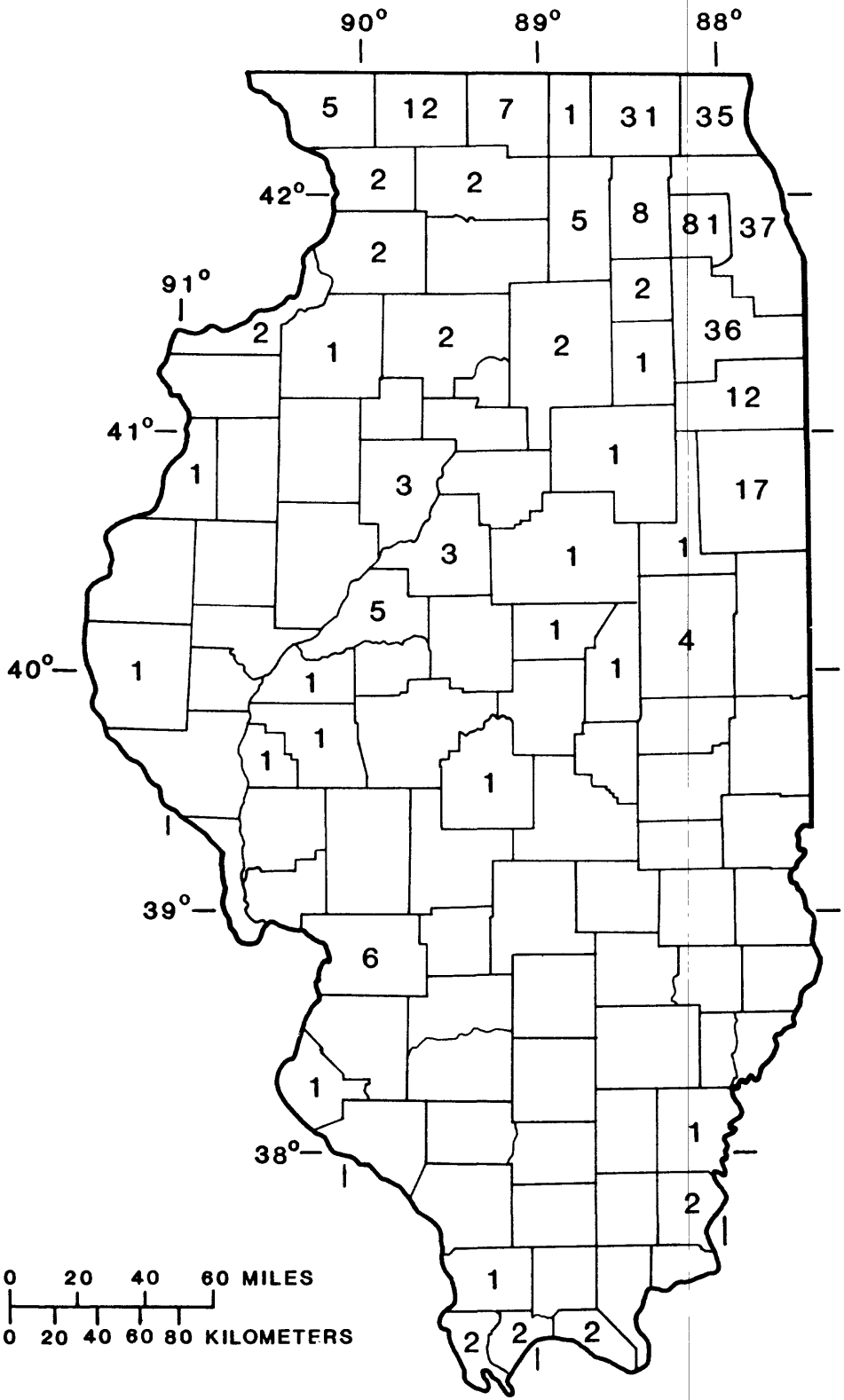


Figure 11.--Numbers of wells, by county, in the ground-water observation networks.

operated and maintained on the central computer facilities of the U.S. Geological Survey at its National Center in Reston, Va., and on PRIME computers in District offices throughout the Nation as part of the Distributed Information System (DIS). Data may be obtained from WATSTORE through the 46 district offices of the 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
4th Floor
102 East Main Street
Urbana, IL 61801.

NAWDEX

The National Water-Data Exchange (NAWDEX) is a nationwide program managed by the U.S. Geological Survey to assist users of water data or water-related data in identifying, locating, and acquiring needed data. It is a national confederation of water-oriented organizations working together to make their data more readily accessible and to facilitate a more efficient exchange of water data.

Services are available through a Program Office at the Geological Survey National Center in Reston, Va., and a nationwide network of Assistance Centers in 45 States and Puerto Rico, which provide local and convenient access to NAWDEX facilities. A directory 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 (Josefson and Blackwell, 1982).

NAWDEX 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. NAWDEX 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

Telephone: (703) 860-6031
FTS 928-6031

Hours: 7:45 to 4:15 eastern time

or

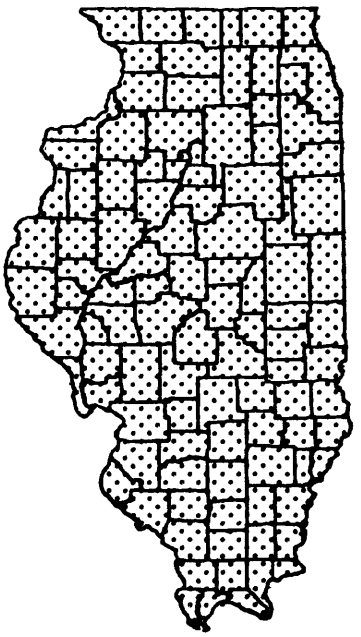
NAWDEX ASSISTANCE CENTER
Illinois
U.S. Geological Survey
Water Resources Division
4th Floor
102 East Main Street
Urbana, IL 61801

Telephone: (217) 398-5353
FTS 958-5353

Hours: 8:00 to 4:30 central time

DESCRIPTIONS OF PROJECTS IN 1985

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, estuaries, etc., for use in planning and design.

*** APPROACH *** Standard methods of data collection will be used as described in the 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 for surface water was done for approximately 140 continuous-record gaging stations and about 24 partial-record stations. The second electromagnetic velocity meter in Illinois was installed and operational in the summer of 1985 at the reactivated gaging station Illinois River at Havana. Sixteen stations equipped with data collection platforms were put into the Distributed Satellite Telemetry Data Handling System, the first for Illinois.

*** PLANS NEXT YEAR *** Continue surface-water data collection with modifications to the network. Install an acoustical velocity meter at Illinois River at Meredosia.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

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

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

*** COOPERATORS ***

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

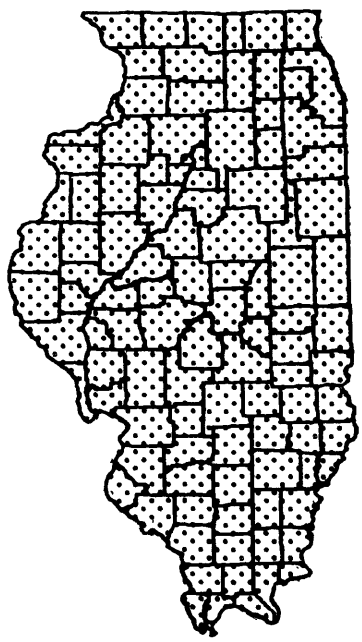
*** COMPLETED REPORTS ***

Stahl, R. L., Fitzgerald, K. K., Richards, T. E., and Hayes, P. D., 1985, Water resources data--Illinois, water year 1984, Volume 1. Illinois except Illinois River basin: U.S. Geological Survey Water-Data Report IL-84-1, 447 p.

Fitzgerald, K. K., Hayes, P. D., Richards, T. E., and Stahl, R. L., 1985, Water resources data--Illinois, water year 1984, Volume 2. Illinois River basin: U.S. Geological Survey Water-Data Report IL-84-2, 383 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 northeast Chicago area and intense farming and mining in much of the State require monitoring of ground water to assess the the impact of man's activities on existing and potential water uses.

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

*** APPROACH *** Coordinate ground-water data gathering efforts with State, local, and other Federal agencies in Illinois. Efforts will be directed to having all participants use current and uniform data collection and reporting procedures. Data collection is planned to meet site-specific

needs and to provide a statewide baseline of information from which to evaluate the general status of the State's ground-water quantity and quality.

*** SUMMARY OF RESULTS *** Measured water levels at two wells in Du Page County, one well in Bureau County, and published data.

*** PLANS NEXT YEAR *** Continue water-level data collection.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Gary O. Balding

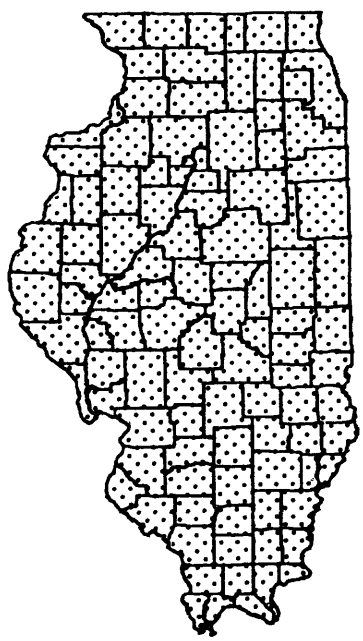
*** PERIOD OF PROJECT *** Continuous since April 1982

*** COMPLETED REPORTS ***

Fitzgerald, K. K., Hayes, P. D., Richards, T. E., and Stahl, R. L., 1985, Water resources data--Illinois, water year 1984, Volume 2. Illinois River basin: U.S. Geological Survey Water-Data Report IL-84-2, 383 p.

IL003 WATER-QUALITY STATIONS

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



*** PROBLEM *** Water-resource planning and water-quality assessment require a statewide base level of relatively standardized data. In Illinois, dense urbanization, especially in the northeast 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 stations across the State. To achieve timely 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 Survey 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 supply a baseline of information from which to evaluate the general nature of the State's surface-water quality.

*** SUMMARY OF RESULTS *** Quality assurance (QA) programs applied to field data collection and direct-service laboratory activities of the Illinois Environmental Protection Agency (IEPA) have continued. All data from IEPA and Water Resources Division (WRD) laboratories have been reviewed and prepared for publication. Discharge values, where available, have been associated with the chemical data.

*** PLANS NEXT YEAR *** Continue data collection and quality assurance at about 200 stations.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Kathleen K. Fitzgerald

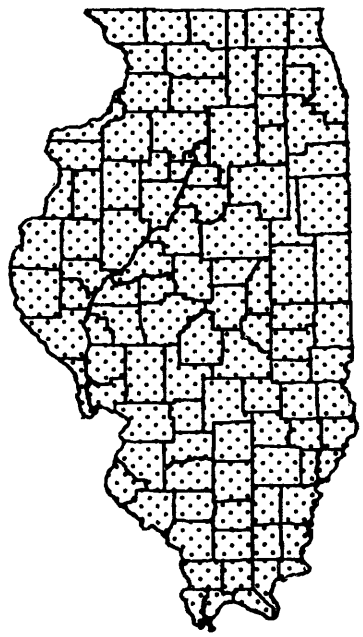
*** PERIOD OF PROJECT *** Continuous since June 1967

*** COOPERATORS ***
Illinois Environmental Protection Agency, Division of Water Pollution Control
Metropolitan Sanitary District of Greater Chicago

*** COMPLETED REPORTS ***
Stahl, R. L., Fitzgerald, K. K., Richards, T. E., and Hayes, P. D., 1985, Water resources data--Illinois, water year 1984, Volume 1. Illinois except Illinois River basin: U.S. Geological Survey Water-Data Report IL-84-1, 447 p.

Fitzgerald, K. K., Hayes, P. D., Richards, T. E., and Stahl, R. L., 1985, Water resources data--Illinois, water year 1984, Volume 2. Illinois River basin: U.S. Geological Survey Water-Data Report IL-84-2, 383 p.

IL004 SEDIMENT STATIONS



*** PROJECT TITLE *** Sediment Stations

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

*** OBJECTIVES *** To provide a data bank for evaluating sediment problems in Illinois and a base from which the effectiveness of erosion control programs can be evaluated for their effect on water quality. To contribute to the national bank 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 discharges and instantaneous suspended-sediment discharges for particle-size determinations were computed for nine sites.

*** PLANS NEXT YEAR *** Prepare and publish the 1985 water year suspended-sediment data. Collect and analyze samples and compute suspended-sediment discharge record for nine sites.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

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

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

*** COOPERATORS ***
Metropolitan Sanitary District of Greater Chicago
U.S. Army Corps of Engineers
Rock Island District
St. Louis District
Chicago District

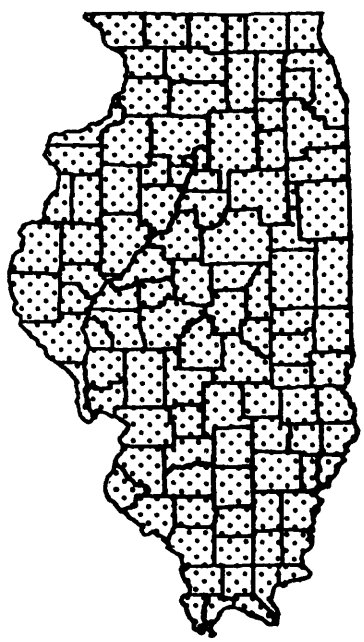
*** COMPLETED REPORTS ***

Stahl, R. L., Fitzgerald, K. K., Richards, T. E., and Hayes, P. D., 1985, Water resources data--Illinois, water year 1984, Volume 1. Illinois except Illinois River basin: U.S. Geological Survey Water-Data Report IL-84-1, 447 p.

Fitzgerald, K. K., Hayes, P. D., Richards, T. E., and Stahl, R. L., 1985, Water resources data--Illinois, water year 1984, Volume 2. Illinois River basin: U.S. Geological Survey Water-Data Report IL-84-2, 383 p.

IL006 FLOOD INVESTIGATIONS

*** PROJECT TITLE *** Flood Investigations



*** PROBLEM *** The National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 provide for the operation of a flood-insurance program. The Federal Emergency Management Agency (FEMA) needs flood studies in selected areas to determine applicable flood-insurance premium rates.

*** OBJECTIVES *** To conduct the necessary hydrologic and hydraulic evaluations and studies of areas assigned by FEMA and to present the results in an appropriate format.

*** APPROACH *** To conduct the necessary evaluations or to conduct surveys by ground or photogrammetric methods. Determine flood-discharge frequency relationships using local historical information, gaging-station records, or other applicable information. Determine water-surface profiles using step-backwater models or by other acceptable methods and furnish the results in reports prepared to FEMA specifications.

*** SUMMARY OF RESULTS *** Flood insurance studies using limited detail methods were started for Logan, Menard, and De Witt Counties and Wenona, Morrison, Dowell, Arthur, Monticello, and Muddy, Illinois.

*** PLANS NEXT YEAR *** Complete flood-insurance studies for Logan, Menard, and De Witt Counties and Wenona, Morrison, Dowell, Arthur, and Monticello, Illinois.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Allen W. Noehre

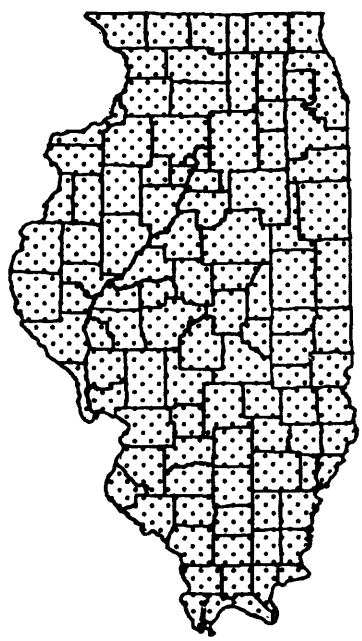
*** PERIOD OF PROJECT *** April 1984 to September 1986

*** COOPERATOR ***
Department of Housing and Urban Development, Federal Emergency Management Agency

*** PLANNED REPORTS ***
Flood Insurance Study, Logan County, Illinois
Flood Insurance Study, Menard County, Illinois
Flood Insurance Study, De Witt County, Illinois
Flood Insurance Study, City of Wenona, Illinois
Flood Insurance Study, City of Morrison, Illinois
Flood Insurance Study, Village of Arthur, Illinois
Flood Insurance Study, Village of Dowell, Illinois
Flood Insurance Study, City of Monticello, Illinois
Flood Insurance Study, Village of Muddy, Illinois

IL007 WATER USE

*** PROJECT TITLE *** Illinois Water Use Data Program



*** PROBLEM *** A water supply is adequate or not depending upon present and future demands. Information is being collected in great detail describing 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 distribution of available supplies.

*** OBJECTIVES *** To conduct a comprehensive, continuing, and authoritative water use inventory throughout the State of Illinois as a basis for present analyses and future projections. To develop and operate water use inventories which will be responsive to the data needs of users at the local, State, and national levels. To collect, store, and disseminate water use data to complement the data on availability and quality of the State's water resources.

*** APPROACH *** Responsibilities will be divided between the Illinois State Water Survey (ISWS) and the U.S. Geological Survey (USGS). The ISWS will collect water use withdrawal data by mailing questionnaires to water users throughout the State. The responses will be classified by water use category (public system, self-supplied industry, rural, fish and wildlife, agriculture) and aggregated by user category and location (county, hydrologic unit, aquifer, township). These aggregated data will then be entered into the National Water Use Data System (NWUDS). The USGS will, in a similar manner, collect, classify, aggregate, and prepare for entry in State files and into NWUDS water use return data. The USGS will coordinate the collection of water use data and maintain standards of data collection which will meet the National needs.

*** SUMMARY OF RESULTS *** Collected the 1984 water withdrawal, delivery, and return data from municipal water managers and private water users of two Illinois cities. Compiled other water-use data such as use by sprinklers, non-contact cooling water, and evaporative systems. Measured discharge from out-flows at all sanitary districts and several major water users. In cooperation with the Illinois State Water Survey, the Illinois water withdrawal data for 1983 have been collected and entered into the National Water Use Data System (NWUDS). In cooperation with the Illinois Environmental Protection Agency, the Illinois water return data for the months of January and February 1985 have been entered into the State Water Use Data System (SWUDS).

*** PLANS NEXT YEAR *** Continue compiling the 1984 private water users' release data for the two cities and analyze these data. Enter the Illinois 1984 water withdrawal data into the NWUDS and prepare and enter the Illinois 1985 return data into SWUDS and NWUDS.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

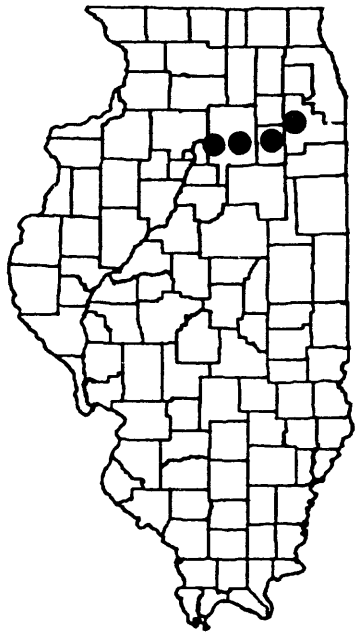
*** PROJECT CHIEF *** Timothy R. Lazaro

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

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

*** PLANNED REPORT ***
Water Use in Kankakee and Rockford, Illinois, in 1984

IL027 DAM RATINGS



*** PROJECT TITLE *** Dam Site Rating Study for Illinois River

*** PROBLEM *** Because of regulation of flows on the Illinois River by powerplant and navigation dams, adequate discharge ratings are needed to ensure that release requirements into the river below the dams are being met. Some of the dams have theoretical sluice gate and spillway ratings that were developed when the dams were constructed and the power generating equipment was new. As considerable time has passed since initial development of these ratings their current accuracy is questionable.

*** OBJECTIVES *** (1) Verify or adjust existing stage-discharge ratings. (2) Extend ratings for gated spillways, where needed, to include extreme hydrologic conditions. (3) Assess the feasibility of measuring discharge in forebays of gated-spillway sections.

*** APPROACH *** Discharge measurements will be made at Brandon Road, Dresden Island, Marseilles, and Starved Rock Dams. The measurements will be used to evaluate the accuracy of existing ratings for discharge controlled by tainter gates, headgates, and valves used to fill and empty locks. Measurements will be made under hydrologic conditions that are suitable for determining poorly-defined portions of existing ratings and ratings that may have changed because of structure rehabilitation. Discharge will be measured in the main channel, in forebays at Dresden Island Dam, in the Marseilles Canal, and in the headrace of the Illinois Power and Light Company hydroelectric-power plant at Marseilles.

*** SUMMARY OF RESULTS *** Three measurements of discharge ranging from 39,600 to 71,200 ft^3/s were used to define the stage-discharge relation for submerged weir flow at Starved Rock Dam. Data collected at electric tape gage at tailwater section of Marseilles Dam were used to define the relation of tailwater elevation to stage measured at a continuous-record gaging station located 400 yards downstream from the dam.

*** PLANS NEXT YEAR *** Additional measurements will be made at Brandon Road, Dresden Island, Marseilles, and Starved Rock Dams in an effort to verify stage-discharge-gate opening relations published in 1981 after the first phase of project activities was completed. Measurements will be made in an attempt to rate the conveyance capacity of valves used to fill Marseilles Lock. Structures refurbished as part of the Corps rehabilitation/construction program will be rated again by use of discharge measurements.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

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

*** PROJECT CHIEF *** Dean M. Mades

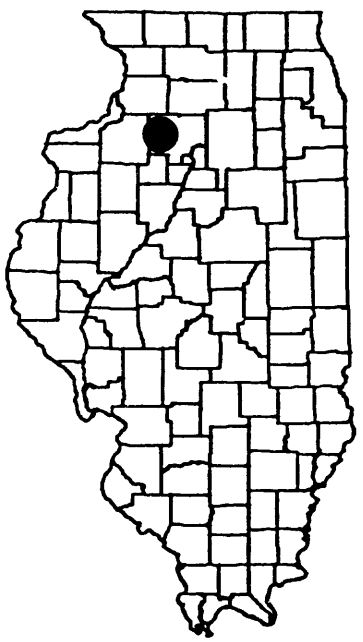
*** PERIOD OF PROJECT *** October 1977 to September 1981
October 1983 to September 1986

*** COOPERATOR ***
U.S. Army Corps of Engineers, Rock Island District

*** PLANNED REPORT ***
Stage-Discharge Relations at Dams on the Illinois Waterway

IL043 EROSION AT SHEFFIELD SITE

*** PROJECT TITLE *** Erosion and Landform Modification at Sheffield, Illinois, Low-Level Radioactive-Waste Disposal Site



*** PROBLEM *** Long-term retention of low-level radioactive wastes at the Sheffield radioactive-waste disposal site requires maintenance of the integrity of burial trenches and their caps as erosion reduces the surface and removes soil from exposed trench walls. Erosion can cause the following problems: (1) Reduction of stability of caps because of steepened slopes caused by gully and channel erosion; (2) slope failure due to infiltration; (3) encroachment of valleys upon trenches because of long-term land form modification; and (4) increased sediment yield to streams because of increased runoff and decreased cover.

*** OBJECTIVES *** (1) To determine rainfall-runoff relations for the site; (2) measurement of sediment yield and determination of the relationship of sediment discharge to runoff for the site; (3) determination of the types and rates of geomorphic change within the area; (4) determination of potential for erosion and slumping and identification of specific problem areas; and (5) development of a data base to which changes caused by changing practices on the site can be compared.

*** APPROACH *** Gaging stations equipped with stage recorders and automatic samplers will be established to collect data to compute sediment discharge from four watersheds less than 10 acres, three of which will be located on-site to evaluate erosion rates, and one located off-site as an experimental control.

Runoff and sediment discharge from four small watersheds (each under an acre in size), two located within the control watershed, will be computed from data obtained by dekaport divisor systems. Five recording rain gages will provide rainfall distribution data for the site and control watershed. Photographic surveys and channel cross sections will be made to aid in defining land-surface changes. Data describing precipitation, runoff, and sediment discharge will be used with a precipitation-runoff model to evaluate long-term sediment yields from the study areas.

*** SUMMARY OF RESULTS *** Annual sediment yield from the site averaged 4.5 megagrams per hectare and exceeded yields from the undisturbed area by 200 times. Sediments eroded from bare areas, rills, and gullies composed a disproportionately large part of site yields. More than 300 surface collapses were recorded at the site from October 1978 through June 1985. Several collapses exceeded 3 meters in width; one collapse was estimated to be approximately 6 meters deep. Sixty-two percent of the collapses occurred in swales between trenches or near trench boundaries, and the remainder occurred on trench covers. Two-thirds of the collapses, representing 63 percent of the cumulative collapse weight, were recorded from February to April. Annually, over 3 times more sediment was moved by collapse than by surface transport.

*** PLANS NEXT YEAR *** Continue data collection through December. Finish collapse analysis. Compute sediment yields for 3.5-year period, July 1982 through December 1985. Complete rainfall-runoff-sediment transport modeling. Publish report.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

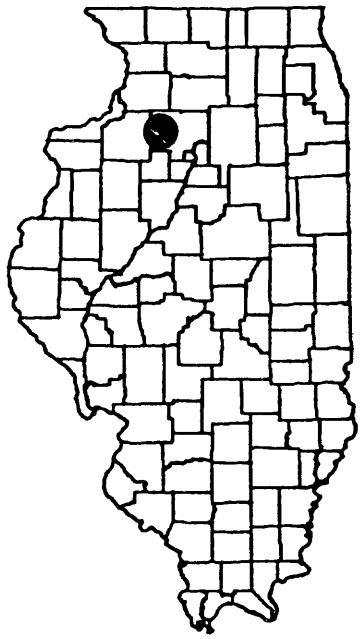
*** FIELD LOCATION *** North-central Illinois

*** PROJECT CHIEF *** John R. Gray

*** PERIOD OF PROJECT *** October 1980 to September 1986

*** PLANNED REPORT ***
Runoff, Sediment Transport, and Landform Modifications at Sheffield, Illinois

IL044 SHEFFIELD UNSATURATED FLOW



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

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

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

*** APPROACH *** Soil moisture and suction data will be obtained in the field using a neutron soil moisture probe and tensiometers. Soil moisture chemistry will be determined from samples collected with soil suction lysimeters. Gamma spectral logging will be used to monitor changes in radionuclide content of soil and soil water. Evapotranspiration will be computed using data obtained from a meteorological station. Tracers will be used to determine dispersivities. Models of unsaturated moisture flow and solute transport will be used. New techniques (gravity drain lysimeters and radio-frequency sensors) will be experimented with to measure the flux of water within the Toulon pebbly sand.

*** SUMMARY OF RESULTS *** The movement of wetting fronts from precipitation was monitored. The trench covers generally limited water movement into the trenches--the spring months were sometimes an exception. A sufficient supply of water for evapotranspiration demands was generally maintained. Hydrogeochemical analyses indicate little difference between the chemistry of water samples obtained on-site and off-site. Tritium is the only radionuclide detected in concentrations above background. For most of the year there was virtually no water movement in the vicinity of the tunnel--again the exception was during the

spring when a slug of downward moving water was observed. Rather than moving vertically downward, water apparently moves along sloping interfaces between lithologic units; saturated hydraulic conductivities of the sediments varied over five orders of magnitude, resulting in a significant horizontal flow component within the unsaturated zone. One report received Director's approval.

*** PLANS NEXT YEAR *** Experiment with additional instrumentation for tracking individual wetting fronts and determine the effect of the tunnel on the unsaturated flow regime. Prepare reports.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

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

*** PROJECT CHIEF *** Barbara J. Ryan

*** PERIOD OF PROJECT *** October 1980 to September 1989

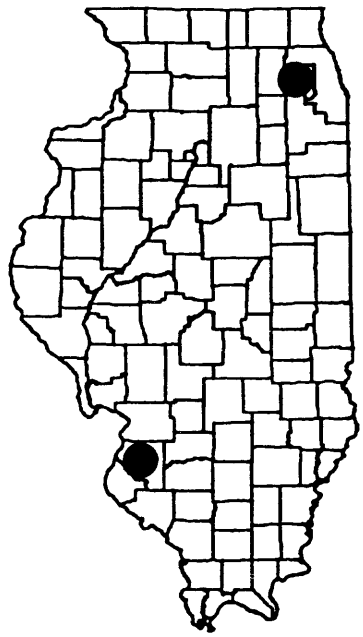
*** PLANNED REPORTS ***

Soil Moisture Movement and Radionuclide Transport at a Low-Level Radioactive-Waste Disposal Site
Water Movement Through Trench Covers at a Low-Level Radioactive-Waste Site
Water Chemistry Within the Unsaturated Zone at a Low-Level Radioactive-Waste Site
Water and Radionuclide Movement in the Unsaturated Zone at a Low-Level Radioactive-Waste Disposal Site near Sheffield, Ill.

*** REPORTS IN PROCESS ***

Concepts and Data Collection Techniques used in a Study of the Unsaturated Zone at a Low-Level Radioactive-Waste Disposal Site near Sheffield
Microclimate and Evapotranspiration of Vegetated Waste-Trench Covers at a Low-Level Radioactive-Waste Disposal Site in Northwestern Illinois

IL060 ILLINOIS STREAM QUALITY MODELING



*** PROJECT TITLE *** Illinois Stream Quality Modeling: Du Page River and Richland Creek Basins, Illinois

*** PROBLEM *** Both Richland Creek and the Du Page River drain predominantly urban areas (248 and 324 square miles, respectively). During warm-weather low-flow periods, the concentrations of dissolved oxygen, in both streams, fall below the State standard of 5.0 milligrams per liter. High concentrations of nitrogen and carbon from wastewater treatment facilities in these basins cause some of the dissolved-oxygen demand. Degradation of sediment material and algal growth and respiration use dissolved oxygen. Nutrient loads to the streams support algal growth and thus have an affect on the levels of dissolved oxygen in the stream. The impacts of these sources of oxygen demand or the stream's dissolved-oxygen concentrations must be assessed.

*** OBJECTIVES *** (1) Describe the water quality during low-flow periods. (2) Identify stream reaches that do not meet State water-quality standards. (3) Identify the cause and effect relations of processes in those reaches failing to meet State standards by use of a calibrated low-flow model.

*** APPROACH *** Water-quality data, including ultimate biochemical oxygen demands, constituent concentrations (dissolved oxygen, ammonia, nitrite plus nitrate, phosphorus), pH, specific conductance, and air and water temperatures, will be collected twice (over 24-hour periods) for each stream. These data collections will be during warm-weather low-flow periods and at differing waste-loading or hydrologic conditions. Measurements of sediment oxygen demand, reaeration rate, traveltime, and algal primary productivity will also be made. Regression analysis will be used to develop equations to relate reaeration rate and calibrated and verified with this data. The model will be used to assess cause and effect relations of stream process.

*** SUMMARY OF RESULTS *** The report "Assessment of low-flow water quality in the Du Page River" is awaiting Director's approval. The water quality and cause and effect relation of several physical, chemical, and biological processes in Richland Creek are being evaluated using measured data and computer simulations. Data collection and model calibration are completed. The results show several subreaches with extreme low dissolved oxygen concentrations. Initial model simulations indicate that sediment oxygen demand is the primary cause of this dissolved-oxygen depletion. Project complete except report.

*** PLANS NEXT YEAR *** Publish and distribute the Du Page River report. Verify a water-quality model using the Richland Creek data. Complete a report describing the data collection, data analysis, and modeling results for Richland Creek.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Northeastern and Southwestern Illinois

*** PROJECT CHIEF *** Ward O. Freeman

*** PERIOD OF PROJECT *** April 1983 to September 1985

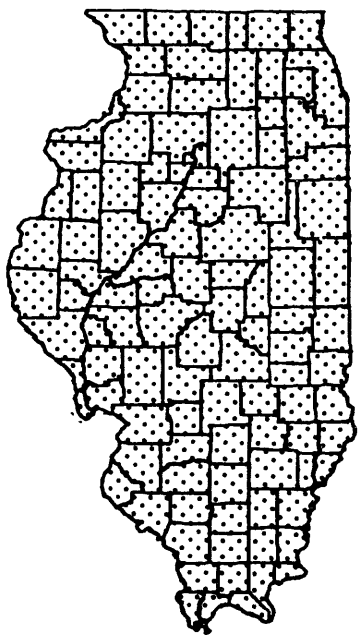
*** COOPERATOR ***
Illinois Environmental Protection Agency

*** PLANNED REPORT ***
Assessment of Water Quality in Richland Creek

*** REPORT IN PROCESS ***
Assessment of Water Quality in the Du Page River

IL061 PEAK FLOW SKEW

*** PROJECT TITLE *** Distribution of Log-Pearson III Skew Coefficient for Annual Peak Discharge at Stream-Gaging Stations in Illinois



*** PROBLEM *** Cost effective bridge and culvert design for waterways that are ungaged is very dependent on accurate estimates of peak discharge. Techniques for estimating peak discharge at ungaged locations in Illinois for various recurrence intervals, use the Water Resources Council (WRC) regional estimates for skewness. There is a critical need to evaluate the appropriateness of the regional skew coefficients in Illinois.

*** OBJECTIVES *** (1) To develop a procedure for estimating the log-Pearson III skew coefficient at ungaged areas in Illinois. (2) To evaluate differences between the procedure developed and the regional skew coefficients.

*** APPROACH *** Three methods will be used to determine a procedure for estimating skew coefficients at ungaged areas. Stations from nearby States will be included in the analysis to eliminate "State-line" boundary effects.

The three methods for estimating skew coefficients will be compared to determine which one is most accurate. This method will be compared to WRC regional skew coefficients. Estimates of peak discharge for various recurrence intervals will be calculated at several Illinois stations using skew coefficients determined from the best method. These estimates of peak discharge will be compared to those calculated using WRC regional skew coefficients.

*** SUMMARY OF RESULTS *** Three variations of the regional-mean technique for estimating generalized skew were developed. The mean-square errors were computed for the three variations of the regional-mean technique and the WRC skew map. Although the three variations of the regional-mean technique are slightly more accurate than the WRC skew map, flood estimates based on the three variations are not significantly different from flood estimates based on the WRC skew map. Colleague review of a report describing results of the study has been completed. Project complete except report.

*** PLANS NEXT YEAR *** Submit report for Director's approval and publish report.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

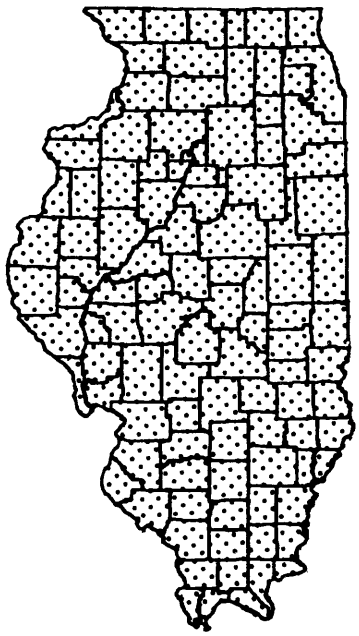
*** PROJECT CHIEF *** Dean M. Mades

*** PERIOD OF PROJECT *** October 1983 to September 1985

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

*** REPORT IN PROCESS ***
Estimating Generalized Skew of the Log-Pearson Type III Distribution for Annual Peak Floods in Illinois

IL062 GW-QW NETWORK



*** PROJECT TITLE *** Illinois Ground-Water Observation Network

*** PROBLEM *** Increasing water needs and contamination of ground-water resources in Illinois and throughout the Nation make it necessary to evaluate present and estimate future quantity and quality of these resources. Planning, management, and regulatory agencies need reliable hydrologic information to manage and protect Illinois' water resources. Long-term records of ground-water levels and quality are needed to evaluate the effects of climatic variations on the ground-water system, to provide a consistent data base from which to evaluate effects of development and use, and to aid in the prediction of the quality and quantity of future supplies.

*** OBJECTIVES *** (1) Establish a network of wells representative of major geohydrologic units in Illinois. (2) Operate a ground-water observation network to collect water-level and water-quality data to (a) describe baseline conditions in each geohydrologic unit, (b) investigate trends in ground-water quality and quantity, and (c) to establish a manageable data base which can be used in preparing periodic assessments of Illinois' ground-water resources.

*** APPROACH *** (1) Select approximately 400 wells to represent major geohydrologic units in Illinois. (2) Complete well schedules and enter data into the National Water Data Storage and Retrieval System-Ground Water Site Inventory (WATSTORE-GWSI). (3) Prepare in-house guidelines for sampling each well type based on construction and accessibility. (4) Measure water levels and sample wells for a group of water-quality characteristics agreed upon by the Illinois Environmental Protection Agency and U.S. Geological Survey. (5) Prepare reports annually on progress and during FY 87 to analyze changes observed during first 3 years and determine long-term network sampling plans.

*** SUMMARY OF RESULTS *** The original 105-well network was sampled for organics during the fourth quarterly visit to each site. The sampling program then shifted from the quarterly sampling to one whereby all Public Water Supply (PWS) wells tapping the Silurian dolomite aquifer were being sampled.

*** PLANS NEXT YEAR *** Finish sampling all the Silurian dolomite PWS wells, then add PWS wells open to the drift to the network. Begin a quarterly sampling of several wells from the original 105-well network to be used for trend analyses.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** David C. Voelker

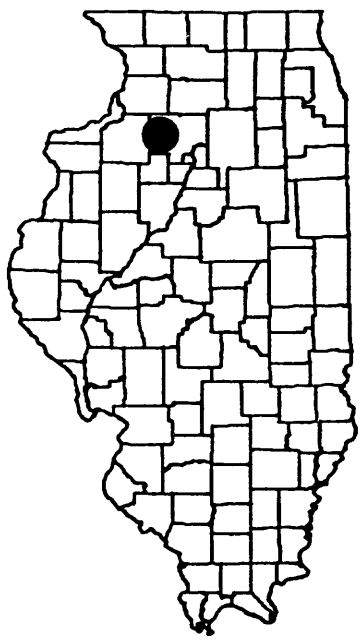
*** PERIOD OF PROJECT *** October 1983 to September 1987

*** COOPERATOR ***
Illinois Environmental Protection Agency

*** PLANNED REPORTS ***
Ground-Water Observation Network--Well Data, 1984
Ground-Water Observation Network--Well Data, 1985
Ground-Water Observation Network--Well Data, 1986
Observation of Ground-Water Levels and Quality in Illinois

IL063 GAS TRANSPORT--SHEFFIELD

*** PROJECT TITLE *** Transport of Radioactive Gases in the Unsaturated Zone at a Low-Level Radioactive-Waste Site, Sheffield, Illinois



*** PROBLEM *** Development of site and management criteria for the underground disposal of radioactive wastes requires that mechanisms which control the transport of radionuclides to offsite areas be understood, and that the relative importance of identified transport pathways be quantified. Analyses of reconnaissance samples of gases collected from the unsaturated zone at the low-level radioactive-waste site near Sheffield show the presence of above background concentrations of several radioactive gases indicating a potential for the molecular diffusion of the enriched gases through the unsaturated zone. Environmental sinks for the transported radionuclides include the atmosphere, the local ground water and soil water, and the biosphere.

*** OBJECTIVES *** To identify the major gas species responsible for the transport of radionuclides in the unsaturated zone; to determine the horizontal concentration gradient of carbon-14 dioxide and tritiated water vapor in a porous sand deposit adjacent to buried radioactive wastes; and to calculate the rate of mass transport of radioactive gases in the unsaturated sand using measured concentration data.

*** APPROACH *** Soil gas sampling tubes will be installed in glacial deposits along a line perpendicular to buried radioactive wastes. Collected gases will be analyzed to determine the partial pressures of major gases in the soil atmosphere. Carbon gases and water vapor will be separated from the soil atmosphere and the radioactivity of individual gases will be measured. Partial pressure and radioactivity data will be used to calculate the mass transport of radioactive gases through the unsaturated zone near the burial site.

*** SUMMARY OF RESULTS *** All field sampling completed in October 1985. Statistical analysis of gas-concentration distributions has begun. Concentration gradients that originate at a waste-burial trench and extend horizontally through the unsaturated zone have been defined for CO_2 (of carbon 14) and CH_4.

*** PLANS NEXT YEAR *** All analytical work for collected samples will be completed. Gas-flux modeling for CO_2 (of carbon 14), CO_2, and CH_4 will be completed. Final draft of project will be written and submitted for Director's approval.

*** HEADQUARTERS OFFICE *** De Kalb, Illinois

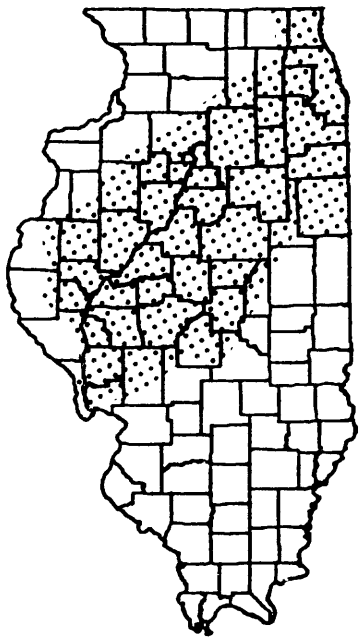
*** FIELD LOCATION *** North-Central Illinois

*** PROJECT CHIEF *** Robert G. Striegl

*** PERIOD OF PROJECT *** October 1983 to September 1986

*** PLANNED REPORTS ***
Transport of Radioactive Gases in the Unsaturated Zone at a Low-Level Radioactive-Waste Site
Journal article on Gas Transport in the Unsaturated Zone

IL064 ILLINOIS RIVER BASIN DATA



*** PROJECT TITLE *** Availability of Hydrologic, Climatologic, and Hydraulic Data in the Illinois River Basin

*** PROBLEM *** The Rock Island District of the Corps of Engineers needs pertinent hydrologic information for regulation of the Illinois Waterway. A knowledge of the available information is needed to prepare master reservoir regulation manuals.

*** OBJECTIVES *** To compile information on the source and availablity of hydrologic, climatologic, and hydraulic data for the Illinois Waterway.

*** APPROACH *** Conduct a search of the literature and query governmental agencies in order to identify and compile the source and availability of hydrologic, climatologic, and hydraulic data in the Illinois River basin. The data will be described so that the usefulness of the information can be determined.

*** SUMMARY OF RESULTS *** A final report was prepared on the sources of climatologic, hydrologic, and hydraulic information for the Illinois River basin. Project compelted.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Central Illinois

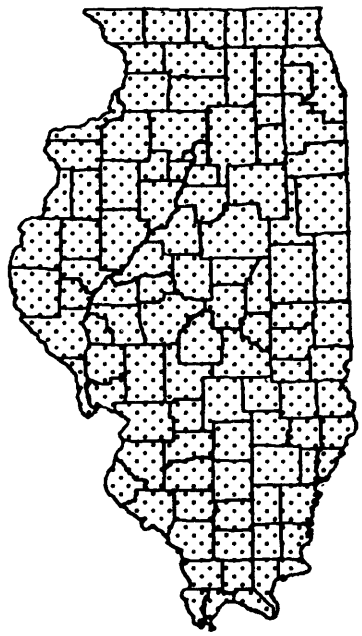
*** PROJECT CHIEF *** G. Wayne Curtis

*** PERIOD OF PROJECT *** October 1983 to March 1985

*** COOPERATOR ***
U.S. Army Corps of Engineers, Rock Island District

*** REPORT IN PROCESS ***
Sources of Climatologic, Hydrologic, and Hydraulic Information in the Illinois River Basin, Illinois, Indiana, and Wisconsin

IL065 AQUIFER DRAINAGE NEAR STRIP MINES



*** PROJECT TITLE *** Predicting Cumulative Aquifer Drainage Flux and Drawdown Resulting from Strip-mine Excavations

*** PROBLEM *** Strip mining below the water table creates hydraulic gradients in aquifers which induce ground-water drainage toward the excavation. As the pit advances, spoil is piled in the previous cut. The resulting ground-water flow to the pit may be a layered system of two or more aquifers draining to an open face on one side and to a face adjoining spoil on the other side. Mining companies and regulatory agencies need a means for predicting the cumulative impact of strip mining on the local ground-water flow.

*** OBJECTIVES *** To simulate the magnitude of ground-water flux and position of the free water surface resulting from second and subsequent cuts using head and discharge data obtained from the first cut situation (evaluated in project IL057).

*** APPROACH *** Two-dimensional variably saturated flow will be examined using the VS2D model (Lappala, 1983) on the Illinois District's Prime computer. The project will build on the results obtained from project IL057 by simulating two cuts for various combinations of aquifer parameters and boundary conditions. Graphs or tables of drawdown versus distance and discharge versus time will be developed for various values of elapsed time of drainage to the first cut, using dimensionless variables.

*** SUMMARY OF RESULTS *** Information from Project IL-057 was combined with information from IL-065 for report. The report is a user's manual that includes technique development. Appendixes contain background information on the VS2D model and evaluation techniques. Project complete except report.

*** PLANS NEXT YEAR *** Submit report to Director for approval.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

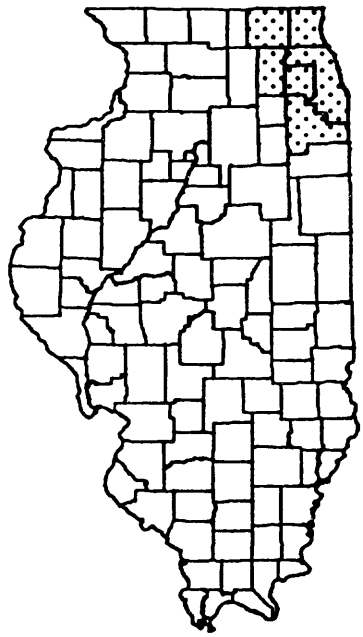
*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Linda S. Weiss

*** PERIOD OF PROJECT *** October 1983 to September 1985

*** REPORT IN PROCESS ***
Technique for Predicting Ground-Water Drainage to Surface Coal Mines

IL066 SALINITY INCREASES, ILLINOIS



*** PROJECT TITLE *** Salinity Increases in Cambrian-age Aquifers in Northeastern Illinois

*** PROBLEM *** During the past few decades several municipalities in northeastern Illinois have reported increasing salinity of water from Cambrian-age aquifers. The locations, magnitude, and casues of salinity increases are not known and need to be better understood for several reasons. The continued availability of a potable water supply is a concern. Salinity increases in northeastern Illinois could affect water supplies in southeastern Wisconsin because of the large cone of depression caused by pumping in northeastern Illinois. If the Chicago-Milwaukee model, being generated by the Regional Aquifer Systems Analysis (RASA), is to be used as a predictive tool, then the water quality of the Cambrian-age aquifers needs to be better understood.

*** OBJECTIVES *** To decermine if a causal relation exists between salinity increases and one or more of the following: Location and density of pumping, pumping rate, pumping period, depth of well, well construction, improperly abandoned wells, geologic structure, variable thickness in the confining unit, and occurrence of shale lenses in the upper part of the Mt. Simon sandstone.

*** APPROACH *** Maps of the possible causes will be compared with maps showing areal extent and magnitude of water-quality changes. The water-quality change maps will also be compared to available maps of drawdown and potentiometric surface.

*** SUMMARY OF RESULTS *** Water quality and geologic data have been compiled and preliminary interpretive maps have been prepared.

*** PLANS NEXT YEAR *** Interpretive maps will be completed and report will be written.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Northeastern Illinois

*** PROJECT CHIEF *** Jane V. Borghese

*** PERIOD OF PROJECT *** October 1984 to September 1986

*** PLANNED REPORT ***
Causes of Salinity Increases in Cambrian-age Aquifers in Northeastern Illinois

IL067 FRACTURED-ROCK HYDROLOGY

*** PROJECT TITLE *** Ground-Water Flow and Tritium Movement in Fractured Dolomite near Chicago, Illinois

*** PROBLEM *** Tritium is present in the dolomite aquifer beneath a formerly used low-level radioactive-waste disposal site located in a forest preserve near Chicago. Tritium movement is known on a large scale, but specific flow paths are not known because the dolomite is fractured. Determining the hydrogeologic factors that govern rates and directions of ground-water flow and tritium movement will yield needed information that is transferable to other disposal sites.

*** OBJECTIVES *** (1) Determine fracture geometry. (2) Quantify hydraulic properties of the fractured rock. (3) Quantify flow rates and directions and the transport properties of the rock. (4) Evaluate the applicability of the discrete-fracture approach to the data. (5) Evaluate the applicability of the continuum approach to the data.

*** APPROACH *** (1) Drill about seven test wells. (2) Run borehole-geophysical logs in each well. (3) Perform aquifer tests using packers. (4) Perform tracer tests using packers. (5) Evaluate and analyze data. (6) Design and use ground-water flow and solute transport models to evaluate applicability of discrete-fracture and continuum approaches.

*** SUMMARY OF RESULTS *** Contracted for seismic refraction, test-well drilling, and borehole geophysics. Seismic work is completed and drilling of four wells is nearly complete. Performed single-hole aquifer and tracer tests to compute range of hydraulic conductivities. Initiated and continuing in-depth literature review. Designed and built packer-transducer system for use in cross-hole aquifer tests.

*** PLANS NEXT YEAR *** Complete test-well drilling and borehole geophysics. Conduct detailed single- and multiple-hole aquifer tests with packers. Complete design and construction of packer system for tracer tests. Conduct tracer tests. Analyze data and prepare journal article or conference paper.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Northeastern Illinois

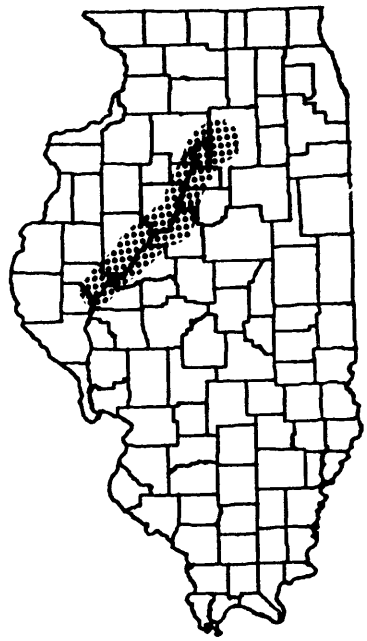
*** PROJECT CHIEF *** James R. Nicholas

*** PERIOD OF PROJECT *** October 1984 to September 1988

*** PLANNED REPORT ***

Ground-Water Flow and Tritium Movement in Fractured Dolomite near Chicago, Illinois

IL068 ILLINOIS RIVER STORAGE



*** PROJECT TITLE *** Channel Storage in the Lower Illinois River, Illinois

*** PROBLEM *** Operational procedures for maintaining pools upstream of dams (in this particular study at La Grange and Peoria) on the Illinois River during all streamflow conditions must be developed. To do so, volume storage-discharge relations need to be derived.

*** OBJECTIVES *** To determine the channel-storage characteristics for the pools upstream from La Grange and Peoria Dams on the Illinois River.

*** APPROACH *** (1) Channel cross sections, available from the U.S. Army Corps of Engineers, and water-surface profiles, available from the Corps and the U.S. Geological Survey, will be used to calculate volume in storage. Using known discharges, a storage-discharge relation will be developed. (2) The Muskingum method of flow routing will also be used to determine the relation of channel storage to discharge at the dams and inflows to the study reach.

*** SUMMARY OF RESULTS *** Channel storage-discharge relations were developed for the Peoria and La Grange Dams on the Illinois River. The relations are linear and are derived from regression analyses. For the same discharge, the channel storage upstream from the Peoria Dam is 2.4 to 4.0 times greater than that upstream from the La Grange Dam. Project complete except report.

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

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Central Illinois

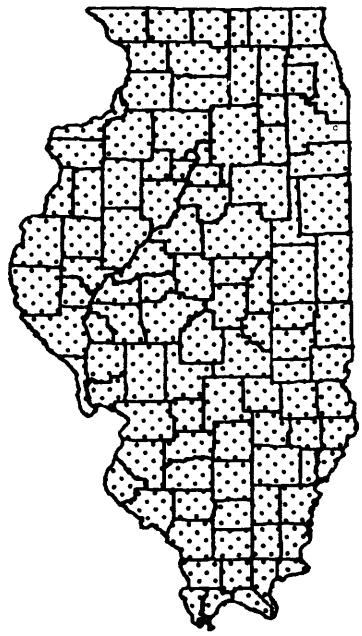
*** PROJECT CHIEF *** Alan R. Klinger

*** PERIOD OF PROJECT *** October 1984 to September 1985

*** COOPERATOR ***
U.S. Army Corps of Engineers, Rock Island District

*** REPORT IN PROCESS ***
Channel Storage-Discharge Relations for the Peoria and La Grange Dams on the Illinois River in Illinois

IL069 PARAMETERS FOR MODELING HYDROGRAPHS



*** PROJECT TITLE *** Variability of Parameters Used in Modeling Discharge Hydrographs

*** PROBLEM *** Values for both unit-hydrograph and rainfall-loss function parameters associated with the HEC-1 model are needed for using that model to estimate discharge hydrographs for ungaged basins. The U.S. Geological Survey has developed a technique for estimating the unit-hydrograph parameters for ungaged basins in Illinois. Estimating techniques or guidelines for selection of values of parameters of the rainfall-loss function are also needed and are not currently vailable.

*** OBJECTIVES *** (1) To develop estimating techniques for parameters of two rainfall-loss computation methods used in the HEC-1 model. (2) To evaluate the error in estimated hydrograph shape which results from use of estimated parameter values.

*** APPROACH *** (1) Estimating techniques in the form of equations will be developed to relate STRKR values to significant available basin characteristics. (2) Individual storm and mean monthly DLTKR values will be related to climatological factors to develop an estimating technique for DLTKR. (3) Initial analysis of STRTL and CNSTL will be made to determine if estimating techniques can be developed. (4) Characteristics of hydrographs computed with estimated parameters will be compared with those of measured hydrographs.

*** SUMMARY OF RESULTS *** HEC-1 program has been adapted for use on PR1ME. The remaining 66 stations have been optimized for STRTL and CNSTL, so that all parameter values for 98 stations are available, for both rainfall-excess equations. A polynomial trend analysis program has been used to determine if regional trends exist in the parameter values. SAS and STAT have been used to relate some parameters to basin and climatological characteristics. About 30 additional stations have been chosen for use in the verification part of the project. Preliminary statistical analyses have been made on optimized rainfall-excess parameters for 99 gaged basins in Illinois.

*** PLANS NEXT YEAR *** Relate rainfall-loss parameter to basin characteristics and climatological factors using statistical means for all parameters of the two rainfall-excess functions. Develop estimating techniques for parameter selection for calibrated and uncalibrated basins. Compare characteristics of hydrographs computed with estimated parameters to those of measured hydrographs at stations not previously considered to assess error incurred. Write report and submit to Director for approval.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

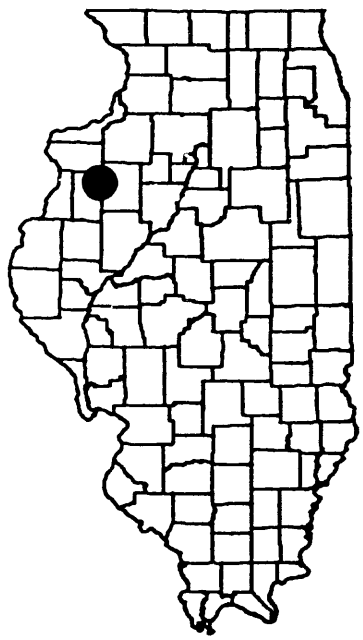
*** PROJECT CHIEF *** Linda S. Weiss

*** PERIOD OF PROJECT *** October 1984 to September 1986

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

*** PLANNED REPORT ***
Parameters for Modeling Hydrographs

IL070 CEDAR CREEK QW ASSESSMENT



*** PROJECT TITLE *** Cedar Creek Water-Quality Assessment; Impact of Storm Runoff and Combined-Sewer Overflows from Galesburg, Illinois

*** PROBLEM *** Concentrations of dissolved oxygen and other constituents in Cedar Creek do not meet the State's water-quality standards during low flows; periods when stream quality is generally most stressed. Sediment deposits with high oxygen demands may play a major role in the creek's dissolved oxygen problems. Overflows from combined sanitary and storm sewers in Galesburg discharge to Cedar Creek and may contribute a large portion of the oxygen-demanding sediments. The impact from combined-sewer overflows and the methods used to determine those impacts are of major concern because many Illinois cities are served by combined-sewer systems.

*** OBJECTIVES *** (1) Describe the water-quality of Cedar Creek, upstream of river mile 25, during low-flow periods. (2) Identify stream reaches that do not meet the State water-quality standards. (3) Identify the cause and effect relations of processes in those reaches failing to meet standards by use of a calibrated low-flow model. (4) Identify the impact of combined-sewer overflows and storm-sewer discharges on the water quality of the creek.

*** APPROACH *** (1) Phase I--A one-dimensional water-quality model will be calibrated and verified using data collected during low-flow periods. Water-quality data will be collected over two 24-hour periods. Measurements of sediment oxygen demand, reaeration rate, traveltime, and algal primary productivity will also be made. (2) Phase II--Storm event sampling of similar constituents

as those sampled in Phase I as well as measurements and estimates of pollutant loads from storm sewers, combined sewer overflows, wastewater treatment facility effluent discharges, and agricultural runoff will be performed. This information will be used to determine the impact of combined sewer overflows and storm-sewer discharges on the water quality of Cedar Creek.

*** SUMMARY OF RESULTS *** Five continuous stream-quality and stage monitoring stations were installed on Cedar Creek. Low-flow measurements of traveltime, reaeration rate, and water quality were made. Measurements of the frequency of overflow from combined sewers in relation to storm events were made. Results from these frequency measurements show that several of the 44 combined sewer overflow structures flow with only 0.1 inch of rain or more. Three 24-hour data collections were performed. As a part of these, concentrations of several chemical constituents were measured. Initial results show dissolved-oxygen concentrations were less than the State minimum standard of 5.0 milligrams per liter in several subreaches of the creek. Algal photosynthesis and respiration does not appear to be a major factor in the dissolved-oxygen depletion because diel variations in dissolved oxygen were not large.

*** PLANS NEXT YEAR *** Continue monitoring stream quality and stage. Measure traveltime and reaeration rate for medium to high flows. Collect quality samples from the stream and point loads during high-flow storm events. Measure sediment oxygen demand and sediment loads in relation to storm events. Calibrate and verify a computer water-quality model for the low-flow phase of the project. Write the low-flow section of the report.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** West-central Illinois

*** PROJECT CHIEF *** Ward O. Freeman

*** PERIOD OF PROJECT *** January 1985 to September 1987

*** COOPERATOR ***
Illinois Environmental Protection Agency

*** PLANNED REPORT ***
Assessment of the Water Quality in Cedar Creek and the Impact of Storm Runoff

*** PROJECT TITLE *** Illinois River Time of Travel Study

*** PROBLEM *** Use of the Illinois River for navigational purposes and the transport of effluents, along with increasing demands to satisfy municipal, industrial, and recreational water needs, and the increased awareness of the potential for accidental spills of harmful pollutants into or adjacent to the river, has pointed out the need to identify the streamflow and longitudinal dispersion characteristics of the Illinois River. Determining these characteristics will aid in the development of predictive techniques for time of travel as applied to hydraulic models for streamflow regulation and for the control and abatement of accidental spills of pollutants.

*** OBJECTIVES *** To measure time of travel and longitudinal dispersion of the reach between Starved Rock Lock and Dam and Peoria Lock and Dam at a streamflow of about 10,000 ft^3/s. To develop a relation between time of travel, streamflow, and dispersion which will allow for the prediction of travel times and dispersion based on this and previously obtained data.

*** APPROACH *** Rhodamine WT dye will be introduced into the river at the upstream edge of each 20- to 30-mile long subreach. Water samples will be collected at appropriate times and predetermined locations for analysis with a fluorometer. The data will define the passage time and peak concentration of the dye cloud as it passes through each subreach.

*** SUMMARY OF RESULTS *** Completed time of travel studies on the Illinois River between Starved Rock Dam and Peoria Dam for medium flow conditions. A report is being written using the data from 1978, 1979, and 1985. It develops a procedure for predicting time of travel and downstream peak concentration resulting from a spill of a water-soluble substance at any point in the study reach during relatively steady flow periods of between 40 and 95 percent flow duration. Project complete except report.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

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

*** PROJECT CHIEF *** Elmer E. Zuehls

*** PERIOD OF PROJECT *** October 1984 to September 1985

*** COOPERATOR ***
U.S. Army Corps of Engineers, Rock Island District

*** PLANNED REPORT ***
Time of Travel in the Illinois River, Marseilles to Peoria, Illinois

IL072 McHENRY DAM

*** PROJECT TITLE *** Dam Site Rating for McHenry Dam on the Fox River

*** PROBLEM *** McHenry Lock and Dam regulates reservoir storage above the dam and flow below the dam for recreation, navigation, and flood-control purposes. Releases from the dam are computed using equations based on theoretical flow over the dam through its gates. Comparison of computed releases with discharge measured at a U.S. Geological Survey (USGS) gaging station 16 miles downstream, after adjustment based on 11 percent difference in drainage areas, indicated a need to reevaluate the coefficients used in the theoretical equations.

*** OBJECTIVES *** To develop a new or modify the existing discharge rating procedure to include a dam rating, surmerged-orifice rating, and free-orifice rating for various gate openings.

*** APPROACH *** Make discharge measurements at various pool elevations and gate settings. During flow over the dam at low to medium pool elevations, measurements will be made from a boat upstream of the dam. During high pool elevations, discharge will be measured from a boat below the dam or from a highway bridge 2.5 miles downstream. Measurements below the dam will be adjusted for the flow through the gates to obtain flow over the dam. During periods of constant gate openings, daily mean flow figures at the USGS gaging station, adjusted using the drainage-area ratio, will be used to verify the computed discharges at McHenry Dam.

*** SUMMARY OF RESULTS *** Discharge measurements have been made at medium- and low-flow conditions for the sluice gates during free-weir and free-orifice flow regimes. One discharge measurement has been made, at low flow, to define the flow over the spillway. The annotated outline and introduction section of the report have been written.

*** PLANS NEXT YEAR *** Additional discharge measurements will be made as needed flow conditions occur. Finalize the rating and prepare report for in-house review by April 30.

*** HEADQUARTERS OFFICE *** De Kalb, Illinois

*** FIELD LOCATION *** Northern Illinois

*** PROJECT CHIEF *** Howard E. Allen, Jr.

*** PERIOD OF PROJECT *** October 1984 to September 1986

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

*** PLANNED REPORT ***
Stage-Discharge Relations at McHenry Lock and Dam near McHenry, Illinois

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 to those interested in or in need of water facts. Many of these publications are available for inspection at the District Office in Urbana and at large public and university libraries.

General Information

The U.S. Geological Survey announces all its publications in a monthly catalog "New Publications of the U.S. Geological Survey." Subscriptions to this monthly listing are available free upon request to the 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 here. 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 to Eastern Distribution Branch, U.S. Geological Survey, 1200 S. Eads Street, Arlington, VA 22202.

Additional information is given in "Guide to obtaining USGS information," U.S. Geological Survey Circular 900, which is free on application to Text Products Section, Eastern Distribution Branch, U.S. Geological Survey, 604 S. Pickett Street, Alexandria, VA 22304-4658.

Water-Resources Information

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

Records of streamflow, ground-water levels, and quality of water were published for many years as 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.

Beginning with the 1971 water year, these series were replaced by a new publication series "U.S. Geological Survey Water-Data Reports." This series combines 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).

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 the Water-Resources Investigations 77-117, "Techniques for estimating magnitude and frequency of floods in Illinois" by G. W. Curtis, 1977.

The U.S. Geological Survey also outlines flood-prone areas on topographic maps as part of a nationwide Federal program for managing flood losses. Information on these maps is available from the District Chief, Water Resources Division, Urbana, Illinois.

Professional Papers

Professional papers are sold by the Text Products Section, Eastern Distribution Branch, U.S. Geological Survey, 604 South Pickett Street, Alexandria, VA 22304.

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 sold at the above-listed Alexandria, Va., address.

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. Kowles, 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.

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

Runoff characteristics from strip-mined lands in Illinois, by T. P. Brabets, published in the proceedings of the Midwest AGU meeting, September 18-19, 1980, De Kalb, Illinois, p. 12.

Estimating average velocities for selected reaches of Illinois streams, by J. B. Graf, published in EOS, Transactions, American Geophysical Union, Vol. 63, No. 18, May 4, 1982, p. 325.

Lessons learned in a hydrogeological case at Sheffield, Illinois, by J. B. Foster, in Proceedings of the Symposium on Low-Level Waste Disposal, Site Characterization and Monitoring, June 16-17, 1982, Arlington, Virginia, NUREG/CP-0028, CONF-820674, Vol. 2, p. 237-244.

Low-flow characteristics of streams in the Kishwaukee River basin, Illinois, 1982, by H. E. Allen, Jr. and E. A. Cowan, in Abstracts, Illinois Water Resources Conference, Illinois Water: Planning for the Future, April 7-8, 1983, De Kalb, Illinois.

Ground-water conditions at a low-level radioactive-waste disposal site near Sheffield, Illinois, by R. W. Healy and J. B. Foster, in Abstracts, Illinois Water Resources Conference, Illinois Water: Planning for the Future, April 7-8, 1983, De Kalb, Illinois.

Northern Midwest regional aquifer study in Illinois, by M. G. Sherrill, in Abstracts, Illinois Water Resources Conference, Illinois Water: Planning for the Future, April 7-8, 1983, De Kalb, Illinois.

Erosion and land modification studies at a low-level radioactive-waste disposal facility near Sheffield, Illinois, by J. R. Gray, in Abstracts, Illinois Water Resources Conference, Illinois Water: Planning for the Future, April 7-8, 1983, De Kalb, Illinois.

Water information systems of the U.S. Geological Survey, by A. W. Noehre, in Abstracts, Illinois Water Resources Conference, Illinois Water: Planning for the Future, April 7-8, 1983, De Kalb, Illinois.

Tritium migration at Palos Forest Preserve, Cook County, Illinois, by J. R. Nicholas, in Abstracts, Illinois Water Resources Conference, Illinois Water: Planning for the Future, April 7-8, 1983, De Kalb, Illinois.

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

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

Accumulation of sediment and heavy metals in Lake Ellyn, an urban lake at Glen Ellyn, Illinois, by E. A. Cowan, in Proceedings of Urban Effects on Water Quality and Quantity, October 20-21, 1983, Urbana, Illinois, Illinois Department of Energy and Natural Resources Document No. 84/06, p. 280-292.

Effects of an urban lake on stormwater runoff and quality, by R. G. Striegl, in Proceedings of Urban Effects on Water Quality and Quantity, October 20-21, 1983, Urbana, Illinois, Illinois Department of Energy and Natural Resources Document No. 84/06, p. 74-83.

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

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

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

Runoff, sediment transport, and landform modifications near Sheffield, Illinois, by J. R. Gray and M. P. deVries, in Sixth Annual DOE Low-Level Waste Management Program Participants' Information Meeting, September 11-13, 1984, Denver, Colorado, CONF-8409115-Absts., p. 67.

Runoff, sediment transport, and landform modifications near Sheffield, Illinois, by J. R. Gray, in Proceedings of the Sixth Annual Participants' Information Meeting, DOE Low-Level Waste Management Program, September 11-13, 1984, Denver, Colorado, CONF-8409115, p. 534-544.

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Methods for determining the transport of radioactive gases in the unsaturated zone, by R. G. Striegl, in Proceedings of the Sixth Annual Participants' Information Meeting, DOE Low-Level Waste Management Program, September 11-13, 1984, Denver, Colorado, CONF-8409115, p. 579-587.

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Technique for estimating cumulative ground-water drainage to surface coal-mine excavations by L. S. Weiss, in 29th Annual Midwest Groundwater Conference, October 1-3, 1984, Lawrence Kansas.

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

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
U.S. Geological Survey
Building 1400, Stop 300
1400 Independence Road
Rolla, Missouri 65401

Phone: (314) 364-3680

GEOLOGY

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

GENERAL INFORMATION

Assistant Director, Eastern Region
U.S. Geological Survey
109 National Center
Reston, Virginia 22092

Phone: (703) 860-7414

OR

Public Inquiries Office
U.S. Geological Survey
302 National Center
Reston, Virginia 22092

Phone: (703) 860-6167

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page 77 follows

TABLES 2 and 3

Table 2.--Surface-Water Stations

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 Engineers, St. Louis District.
S - Stage - continuous record of stage.
SD - Suspended sediment.

Station No.	Station	Type of data
03336645	Middle Fork Vermilion River above Oakwood, Ill.	CQ,D
03336900	Salt Fork near St. Joseph, Ill.	D,CQ
03337000	Boneyard Creek at Urbana, Ill.	D
03337700	Saline Branch near Mayview, Ill.	CQ
03338097	Salt Fork near Oakwood, Ill.	CQ
03338780	North Fork Vermilion River near Bismarck, Ill.	CQ
03339000	Vermilion River near Danville, Ill.	D,CQ
03339147	Little Vermilion River near Georgetown, Ill.	CQ
03341414	Brouilletts Creek near St. Bernice, Ind.	CQ
03341540	Sugar Creek near Elbridge, Ill.	CQ
03341920	Wabash River at Hutsonville, Ill.	CQ
03342050	Sugar Creek at Palestine, Ill.	CQ
03343395	Embarras River at Camargo, Ill.	CQ
03343400	Embarras River near Camargo, Ill.	D
03344000	Embarras River near Diona, Ill.	CQ,C
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
03346550	Embarras River near Billett, Ill.	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.	CQ,C
03379500	Little Wabash River below Clay City, Ill.	D,CQ
03379600	Little Wabash River at Blood, Ill.	CQ
03379950	Elm River near Toms Prairie, Ill.	CQ
03380350	Skillet Fork near Iuka, Ill.	CQ
03380475	Horse Creek near Keenes, Ill.	D
03380500	Skillet Fork at Wayne City, Ill.	D,CQ
03381400	Skillet Fork near Carmi, Ill.	CQ
03381495	Little Wabash River at Main St. at Carmi, Ill.	CQ

Table 2.--Surface-Water Stations--Continued

Station No.	Station	Type of data
03381500	Little Wabash River at Carmi, Ill.	DS
03382090	Sugar Creek near Stonefort, Ill.	CQ
03382100	South Fork Saline River nr Carrier Mills, Ill.	D,CQ
03382185	Bankston Fork near Dorris Heights, Ill.	CQ
03382205	Middle Fork Saline River near Pankeyville, Ill.	CQ
03382325	North Fork Saline River near Texas City, Ill.	CQ
03382530	Saline River near Gibsonia, Ill.	CQ
03384450	Lusk Creek near Eddyville, Ill.	D,CQ
03385000	Hayes Creek at Glendale, Ill.	C
03612000	Cache River at Forman, Ill.	D,CQ
05414820	Sinsinawa River near Menominee, Ill.	D
05416000	Galena River at Galena, Ill.	CQ
05418950	Apple River near Elizabeth, Ill.	CQ
05419000	Apple River near Hanover, Ill.	D
05420100	Plum River at Savanna, Ill.	CQ
05435500	Pecatonica River at Freeport, Ill.	D,CQ
05435680	Yellow Creek near Freeport, Ill.	CQ
05435800	Pecatonica River at Harrison, Ill.	CQ
05437500	Rock River at Rockton, Ill.	D,CQ
05437695	Keith Creek at Eighth St. at Rockford, Ill.	D
05438201	Kishwaukee R at GP Rd at Garden Prairie, Ill.	CQ
05438250	Coon Creek at Riley, Ill.	CQ,C
05438500	Kishwaukee River at Belvidere, Ill.	D
05438600	Kishwaukee R ab South Branch nr Perryville, Ill.	CQ
05439000	South Branch Kishwaukee River at De Kalb, Ill.	D
05439500	South Branch Kishwaukee River nr Fairdale, Ill.	D,CQ
05440000	Kishwaukee River near Perryville, Ill.	D,CQ
05440520	Killbuck Creek near New Milford, Ill.	CQ
05440700	Rock River at Byron, Ill.	CQ
05442020	Kyte River at Daysville, Ill.	CQ
05442200	Rock River at Grand Detour, Ill.	CQ
05443500	Rock River at Como, Ill.	D,CQ
05444000	Elkhorn Creek near Penrose, Ill.	D,CQ
05446000	Rock Creek at Morrison, Ill.	D
05446100	Rock Creek near Erie, Ill.	CQ
05446500	Rock River near Joslin, Ill.	D,CQ
05447100	Green River near Deer Grove, Ill.	CQ
05447500	Green River near Geneseo, Ill.	D,CQ
05448000	Mill Creek at Milan, Ill.	D
05466000	Edwards River near Orion, Ill.	D

Table 2.--Surface-Water Stations--Continued

Station No.	Station	Type of data
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
05495500	Bear Creek near Marcelline, Ill.	D,CQ
05502020	Hadley Creek near Barry, Ill.	C
05502040	Hadley Creek at Kinderhook, Ill.	D
05512500	Bay Creek at Pittsfield, Ill.	D
05513000	Bay Creek at Nebo, Ill.	D,CQ
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
05528000	Des Plaines River near Gurnee, Ill.	D,CQ
05528500	Buffalo Creek near Wheeling, Ill.	D
05529000	Des Plaines River near Des Plaines, Ill.	D,CQ
05529500	McDonald Creek near Mount Prospect, Ill.	D
05530000	Weller Creek at Des Plaines, Ill.	D
05530590	Des Plaines River near Schiller Park, Ill.	CQ
05530990	Salt Creek at Rolling Meadows, Ill.	D
05531500	Salt Creek at Western Springs, Ill.	D,CQ
05532000	Addison Creek at Bellwood, Ill.	D,CQ
05532500	Des Plaines River at Riverside, Ill.	D
05533000	Flag Creek near Willow Springs, Ill.	D
05534050	Des Plaines River at Lockport, Ill.	CQ
05534500	North Branch Chicago River at Deerfield, Ill.	D,CQ
05535000	Skokie River at Lake Forest, Ill.	D
05535070	Skokie River near Highland Park, Ill.	D
05535500	West Fk of N Br Chicago River at Northbrook, Ill.	D
05536000	North Branch Chicago River at Niles, Ill.	D,CQ,SD
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

Table 2.--Surface-Water Stations--Continued

Station No.	Station	Type of data
05536500	Tinley Creek near Palos Park, Ill.	D
05536700	Calumet Sag Channel at Sag Bridge, Ill.	CQ
05536995	Chicago Sanitary & Ship Canal at Romeoville, Ill.	D
05537000	Chicago Sanitary and Ship Canal at Lockport, Ill.	CQ
05537500	Long Run near Lemont, Ill.	D
05537980	Des Plaines River at Route 53 at Joliet, Ill.	CQ
05539000	Hickory Creek at Joliet, Ill.	D,CQ
05539900	West Branch Du Page River nr West Chicago, Ill.	D,CQ
05540095	West Branch Du Page River nr Warrenville, Ill.	D,CQ
05540210	East Branch Du Page River at Rt 34 at Lisle, Ill.	CQ
05540290	Du Page River near Naperville, Ill.	CQ
05540500	Du Page River at Shorewood, Ill.	D,CQ
05541710	Aux Sable Creek near Morris, Ill.	CQ
05542000	Mazon River near Coal City, Ill.	D,CQ
05543500	Illinois River at Marseilles, Ill.	D,CQ
05546700	Fox River near Channel Lake, Ill.	CQ
05547000	Channel Lake near Antioch, Ill.	S
05547500	Fox Lake near Lake Villa, Ill.	S
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
05549600	Fox River at Burtons Bridge, Ill.	CQ
05550000	Fox River at Algonquin, Ill.	D,CQ
05550500	Poplar Creek at Elgin, Ill.	D,CQ
05551000	Fox River at South Elgin, Ill.	CQ
05551200	Ferson Creek near St. Charles, Ill.	D
05551540	Fox River at Montgomery, Ill.	CQ
05551700	Blackberry Creek near Yorkville, Ill.	D,CQ
05551995	Somonauk Creek at Sheridan, Ill.	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
05555950	Little Vermilion River at La Salle, Ill.	CQ
05556200	Illinois River at Hennepin, Ill.	CQ
05556500	Big Bureau Creek at Princeton, Ill.	D,CQ
05557000	West Bureau Creek at Wyanet, Ill.	C,CQ

Table 2.--Surface-Water Stations--Continued

Station No.	Station	Type of data
05557500	East Bureau Creek near Bureau, Ill.	C
05558900	Illinois River at Henry, Ill.	D,SD
05558995	Illinois River at Lacon, Ill.	CQ
05559900	Illinois River at Water Company at Peoria, Ill.	CQ
05560500	Farm Creek at Farmdale, Ill.	D
05561500	Fondulac Creek near East Peoria, Ill.	D
05562010	Farm Creek at Camp St Bridge at East Peoria, Ill.	CQ
05563000	Kickapoo Creek near Kickapoo, Ill.	C
05563500	Kickapoo Creek at Peoria, Ill.	C
05563525	Kickapoo Creek at Bartonville, Ill.	CQ
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,SD
05568000	Mackinaw River near Green Valley, Ill.	C
05568005	Mackinaw River below Green Valley, Ill.	CQ
05568500	Illinois River at Kingston Mines, Ill.	DS
05568775	Spoon River near Wyoming, Ill.	CQ
05568800	Indian Creek near Wyoming, Ill.	D,CQ
05568915	Spoon River near Dahinda, Ill.	CQ
05569500	Spoon River at London Mills, Ill.	D,CQ
05570000	Spoon River at Seville, Ill.	D,CQ
05570350	Big Creek at St. David, Ill.	D,CQ
05570360	Evelyn Branch near Bryant, Ill.	D,CQ
05570370	Big Creek near Bryant, Ill.	D,SD,CQ
05570380	Slug Run near Bryant, Ill.	CQ,D
05570500	Illinois River at Havana, Ill.	DS
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
05572125	Sangamon R at Allerton Park nr Monticello, Ill.	CQ
05573504	Sangamon R at L Decatur W I at Decatur, Ill.	CQ
05573540	Sangamon River at Route 48 at Decatur, Ill.	CQ,D
05573650	Sangamon River near Niantic, Ill.	CQ
05573800	Sangamon River at Roby, Ill.	CQ
05574500	Flat Branch near Taylorville, Ill.	CQ
05575500	South Fork Sangamon River at Kincaid, Ill.	C,CQ
05575570	Sangchris Lake near New City, Ill.	CQ
05575800	Horse Creek at Pawnee, Ill.	D
05576000	South Fork Sangamon River near Rochester, Ill.	DS

Table 2.--Surface-Water Stations--Continued

Station No.	Station	Type of data
05576022	South Fork Sangamon River below Rochester, Ill.	CQ
05576250	Sugar Creek near Springfield, Ill.	CQ
05576500	Sangamon River at Riverton, Ill.	C,CQ
05577500	Spring Creek at Springfield, Ill.	D
05577505	Spring C at Burns Lane Br at Springfield, Ill.	CQ
05578000	Sangamon River at Petersburg, Ill.	CQ
05578500	Salt Creek near Rowell, Ill.	D,CQ
05579500	Lake Fork near Cornland, Ill.	D,CQ
05580000	Kickapoo Creek at Waynesville, Ill.	D,CQ
05580500	Kickapoo Creek near Lincoln, Ill.	C,CQ
05580950	Sugar Creek near Bloomington, Ill.	D
05581500	Sugar Creek near Hartsburg, Ill.	C,CQ
05582000	Salt Creek near Greenview, Ill.	D,CQ
05583000	Sangamon River near Oakford, Ill.	D,CQ,SD
05583915	Sugar Creek near Frederick, Ill.	CQ
05584400	Drowning Fork at Bushnell, Ill.	C
05584500	La Moine River at Colmar, Ill.	D,CQ
05585000	La Moine River at Ripley, Ill.	D,CQ
05585275	Indian Creek at Arenzville, Ill.	CQ
05585500	Illinois River at Meredosia, Ill.	DS
05585830	McKee Creek at Chambersburg, Ill.	CQ
05586000	N Fk Mauvaise Terre Ck near Jacksonville, Ill.	C
05586040	Mauvaise Terre Creek near Merritt, Ill.	CQ
05586100	Illinois River at Valley City, Ill.	CQ,SD
05586500	Hurricane Creek near Roodhouse, Ill.	C
05586600	Apple Creek near Eldred, Ill.	CQ
05586690	Macoupin Creek near Macoupin, Ill.	CQ
05587000	Macoupin Creek near Kane, Ill.	D,CQ
05587060	Illinois River at Hardin, Ill.	CQ
05587700	Wood River at East Alton, Ill.	CQ
05587900	Cahokia Creek at Edwardsville, Ill.	D,CQ
05588000	Indian Creek at Wanda, Ill.	D
05589490	Cahokia Canal near Collinsville, Ill.	CQ
05589510	Canteen Creek near Collinsville, Ill.	CQ
05589785	Harding Ditch at East St. Louis, Ill.	CQ
05590000	Kaskaskia Ditch at Bondville, Ill.	D
05590420	Kaskaskia River near Tuscola, Ill.	CQ
05590800	Lake Fork at Atwood, Ill.	D
05591200	Kaskaskia River at Cooks Mills, Ill.	D,CQ,SD,S
05591300	Kaskaskia River at Allenville, Ill.	CQ

Table 2.--Surface-Water Stations--Continued

Station No.	Station	Type of data
05591400	Jonathan Creek near Sullivan, Ill.	CQ
05591500	Asa Creek at Sullivan, Ill.	CQ
05591550	Whitley Creek near Allenville, Ill.	D,S
05591700	West Okaw River near Lovington, Ill.	CQ,D,S
05591950	Lake Shelbyville near Shelbyville, Ill.	R
05592000	Kaskaskia River at Shelbyville, Ill.	D,CQ
05592050	Robinson Creek near Shelbyville, Ill.	D,S
05592100	Kaskaskia River near Cowden, Ill.	D,CQ,S
05592195	Beck Creek at Herrick, Ill.	CQ
05592500	Kaskaskia River at Vandalia, Ill.	D,CQ,S
05592600	Hickory Creek near Bluff City, Ill.	CQ,S
05592800	Hurricane Creek near Mulberry Grove, Ill.	D,CQ,S
05592900	East Fork Kaskaskia River near Sandoval, Ill.	CQ,D,S
05592930	North Fork Kaskaskia River near Patoka, Ill.	CQ
05592990	Carlyle Lake near Carlyle, Ill.	R
05593000	Kaskaskia River at Carlyle, Ill.	D,S
05593010	Kaskaskia River below Carlyle, Ill.	CQ
05593020	Kaskaskia River near Posey, Ill.	S
05593505	Crooked Creek near Odin, Ill.	CQ
05593520	Crooked Creek near Hoffman, Ill.	D,CQ
05593575	Little Crooked Creek near New Minden, Ill.	D
05593600	Blue Grass Creek near Raymond, Ill.	C
05593785	Shoal Creek near Walshville, Ill.	CQ
05593900	East Fork Shoal Creek near Coffeen, Ill.	D
05594000	Shoal Creek near Breese, Ill.	D,CQ,S
05594090	Sugar Creek at Albers, Ill.	CQ
05594100	Kaskaskia River near Venedy Station, Ill.	D,CQ,SD,S
05594450	Silver Creek near Troy, Ill.	D,CQ
05594800	Silver Creek near Freeburg, Ill.	D,CQ,S
05595200	Richland Creek near Hecker, Ill.	D,CQ,S
05595280	Plum Creek near Baldwin, Ill.	CQ
05595400	Kaskaskia River at Roots, Ill.	CQ
05595540	Marys River at Welge, Ill.	CQ
05595700	Big Muddy River near Mt. Vernon, Ill.	CQ,S
05595730	Rayse Creek near Waltonville, Ill.	CQ,D,S
05595765	Big Muddy Subimpoundment at Rend Lake, Ill.	S
05595830	Casey Fork at Rt 37 near Mt. Vernon, Ill.	CQ,S
05595860	Casey Fork Subimpoundment at Rend Lake, Ill.	S
05595950	Rend Lake near Benton, Ill.	R,CQ
05596400	Middle Fork Big Muddy River near Benton, Ill.	CQ

Table 2.--Surface-Water Stations--Continued

Station No.	Station	Type of data
05597000	Big Muddy River at Plumfield, Ill.	DS,CQ
05597040	Pond Creek at West Frankfort, Ill.	CQ
05597280	Little Muddy River near Elkville, Ill.	CQ
05597500	Crab Orchard Creek near Marion, Ill.	D,CQ
05598050	Crab Orchard C below CO Lake nr Carterville, Ill.	CQ
05598245	Crab Orchard Creek near Carbondale, Ill.	CQ
05599200	Beaucoup Creek near Vergennes, Ill.	CQ
05599500	Big Muddy River at Murphysboro, Ill.	DS,CQ,SD
05599540	Kinkaid Creek near Murphysboro, Ill.	CQ
05599565	Cedar Creek near Pomona, Ill.	CQ
05600000	Big Creek near Wetaug, Ill.	C
05600150	Cache River at Sandusky, Ill.	CQ

Table 3.--Ground-Water Stations

Abbreviations for type of data collected are:

L - Ground-water level measurement.
Q - Ground-water quality determination.
M - Description of subsurface material.
B - Well characteristics.

Abbreviations for ownership are:

ANL - Argonne National Laboratory
USGS - U.S. Geological Survey

Station No.	Local Well No.	Ownership	Type of data
	ADAMS COUNTY		
400026091242401	Clayton-Camp Point #1	Municipal	L,Q,M,B
	ALEXANDER COUNTY		
371010089203701	Central Alexander Co. WD #1	Municipal	L,Q,M,B
371909089255801	McClure-East Cape PWD #1	Municipal	L,Q,M,B
	BOONE COUNTY		
421649088513801	Belvidere #9	Municipal	L,Q,M,B
	BUREAU COUNTY		
412017089472401	512	USGS	L
412017089472701	524	USGS	L
412019089472501	505	USGS	L
412022089472401	502	USGS	L
412220089280301	-	Helen Croisant	L
412232089275101	Princeton #5	Municipal	L,Q,M,B
	CASS COUNTY		
400025090244401	Beardstown #13	Municipal	L,Q,M,B
	CARROLL COUNTY		
415737090061001	Thomson #4	Municipal	L,Q,M,B
420740090091501	Mississippi Palisades State Park #3	State	Q,M,B

Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	CHAMPAIGN COUNTY		
400737088132301	Champaign #46	Private	L,Q,M,B
400832088190601	Champaign #54	Private	L,Q,M,B
401217088220301	Sangamon Valley PWD #1	Private	L,Q,M,B
401841088094701	Rantoul #7	Municipal	Q,M,B
	CHRISTIAN COUNTY		
393823089075901	Assumption #11	Municipal	L,Q,M,B
	COOK COUNTY		
412809087381701	Steger #1	Municipal	Q,M,B
412809087381702	Steger #2	Municipal	Q,M,B
412848087441201	Richton Park #3	Municipal	L,Q,M,B
412912087430101	Richton Park #2	Municipal	L,Q,M,B
412919087410601	Park Forest #6	Municipal	L,Q,M,B
412936087401401	Park Forest #2	Municipal	L,Q,M,B
413043087391201	Chicago Heights #30	Municipal	L,Q,M,B
413753087511701	Orland Park #2	Municipal	L,Q,M,B
413840087494001	Orland Park #11	Municipal	L,Q,M,B
414208087544501	DH-1	USGS	L,Q,M
414222087543601	DH-2	USGS	L,Q,M
414227087543701	DH-3	USGS	L,Q,M
414230087544201	DH-4	USGS	L,Q,M
414232087544101	DH-7	USGS	L,Q,M
414235087543901	DH-5	USGS	L,Q,M
414235087544001	DH-8	USGS	L,Q,M
414237087543901	DH-6	USGS	L,Q,M
414238087544001	DH-9	USGS	L,Q,M
414239087544101	DH-10	USGS	L,Q,M
414614087534901	Indian Head Park #2	Municipal	L,Q,M,B
414619087533701	Indian Head Park #3	Municipal	L,Q,M,B
414829087534601	Western Springs #1	Municipal	L,Q,M,B
415921088110401	Bartlett #3	Municipal	L,Q,M,B
415930088110601	Bartlett #1	Municipal	Q,M,B
415940088043501	Concord Terrace #1	Municipal	L,Q,M,B

Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	COOK COUNTY--Continued		
415944088080901	Hanover Park #6	Municipal	Q,M,B
420008087550001	Prospect Heights #1	Municipal	L,Q,M,B
420012088071001	Schaumburg #5	Municipal	Q,M,B
420106088063301	Schaumburg #4	Municipal	L,Q,M,B
420120088052801	Schaumburg #6	Municipal	Q,M,B
420131088024401	Schaumburg #17	Municipal	L,Q,M,B
420235088022501	Schaumburg #11	Municipal	L,Q,M,B
420242088044001	Hoffman Estates #3	Municipal	Q,M,B
420245088041501	Hoffman Estates #1	Municipal	L,Q,M,B
420323088024301	Schaumburg #9	Municipal	L,Q,M,B
420332088055701	Schaumburg #213	Municipal	L,Q,M,B
420333088073501	Hoffman Estates #20	Municipal	Q,M,B
420432088114101	Hoffman Estates #22	Municipal	L,Q,M,B
420435088115401	Hoffman Estates #21	Municipal	L,Q,M,B
420512088052001	Hoffman Estates #18	Municipal	L,Q,M,B
420535088023901	Plum Grove Condo #1	Municipal	Q,M,B
420538088023901	Plum Grove Condo #2	Municipal	Q,M,B
420538088024301	Plum Grove Condo #3	Municipal	Q,M,B
420559088070301	Hoffman Estates #16	Municipal	L,Q,M,B
420754087552001	Wheeling #4	Municipal	L,Q,M,B
420906088081301	Barrington #1	Municipal	L,Q,M,B
420908088081001	Barrington #2	Municipal	L,Q,M,B
	DE KALB COUNTY		
414511088461601	Waterman #3	Municipal	L,Q,M,B
414515088464001	Waterman #2	Municipal	L,Q,M,B
414603088521601	Shabbona #4	Municipal	L,Q,M,B
415424088462501	De Kalb #12	Municipal	L,Q,M,B
420544088464301	Valley View Subdivision #1	Municipal	Q,M,B
	DE WITT COUNTY		
400647088481101	Weldon #5	Municipal	L,Q,M,B

Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	DU PAGE COUNTY		
414217087592801	9	ANL	L,B
414236087583301	10	ANL	L,B
414451088080701	Naperville #8	Municipal	L,Q,M,B
414453087582501	Darien Brookhaven Manor #2	Municipal	Q,M,B
414500087581601	Darien Brookhaven Manor #1	Municipal	Q,M,B
414500087582501	Draien Brookhaven Manor #3	Municipal	Q,M,B
414530088013701	Downers Grove #14	Municipal	L,Q,M,B
414557088003101	Downers Grove #13	Municipal	L,Q,M,B
414600088101801	Naperville #11	Municipal	L,Q,M,B
414601088101801	Naperville #15	Municipal	L,Q,M,B
414608088112001	Naperville #14	Municipal	L,Q,M,B
414622088013601	Downers Grove #11	Municipal	L,Q,M,B
414633088080501	Naperville #5	Municipal	L,Q,M,B
414636088080401	Naperville #6	Municipal	Q,M,B
414642088045601	Lisle Oakview #3	Municipal	L,Q,M,B
414657088090401	Naperville #4	Municipal	L,Q,M,B
414658088035301	Lisle Oakview #2	Municipal	L,Q,M,B
414708088132901	Naperville #19	Municipal	L,Q,M,B
414720087570401	Clarendon Hills #6	Municipal	L,Q,M,B
414725088001301	Downers Grove #7	Municipal	L,Q,M,B
414727088040501	Lisle Oakview #1	Municipal	L,Q,M,B
414731087581301	Westmont #6	Municipal	Q,M,B
414736088013901	Downers Grove #6	Municipal	L,Q,M,B
414740087565001	Clarendon Hills #4	Municipal	L,Q,M,B
414743088003401	Downers Grove #8	Municipal	Q,M,B
414756088092801	Naperville #10	Municipal	L,Q,M,B
414801087562901	Hinsdale #7	Municipal	L,Q,M,B
414802087561501	Hinsdale #6	Municipal	Q,M,B
414803087583201	Westmont #2	Municipal	L,Q,M,B
414809087561001	Hinsdale #5	Municipal	L,Q,M,B
414816087552801	Hinsdale #2	Municipal	L,Q,M,B
414824087582401	Westmont #9	Municipal	L,Q,M,B
414826087560601	Hinsdale #4	Municipal	L,Q,M,B
414837087581601	Westmont #7	Municipal	L,Q,M,B
414908087553301	Hinsdale #10	Municipal	L,Q,M,B

Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	DU PAGE COUNTY--Continued		
414910087552001	Hinsdale #9	Municipal	Q,M,B
414921087550901	Hinsdale #8	Municipal	L,Q,M,B
414935088012501	Downers Grove #12	Municipal	L,Q,M,B
414938088035501	Citizens Valley View Subdivision #3	Municipal	L,Q,M,B
414949088075501	Citizens Arrowhead Subdivision #2	Municipal	L,Q,M,B
414952087592601	Oak Brook Utility #6	Municipal	L,Q,M,B
415000088020201	Citizens Valley View Subdivision #4	Municipal	L,Q,M,B
415049088053401	Wheaton #7	Municipal	L,Q,M,B
415057088052901	Wheaton #10	Municipal	Q,M,B
415123088043801	Glen Ellyn #6	Municipal	L,Q,M,B
415126088093301	Winfield #4	Municipal	L,Q,M,B
415149088061701	Wheaton #2	Municipal	L,Q,M,B
415130088004101	Highland Hills Sanitary District #1	Municipal	L,Q,M,B
415130088004102	Highland Hills Sanitary District #2	Municipal	L,Q,M,B
415139088042901	Glen Ellyn #5	Municipal	L,Q,M,B
415141088043001	Glen Ellyn #4	Municipal	Q,M,B
415150088061801	Wheaton #3	Municipal	Q,M,B
415222088081301	Liberty Ridge Estates #1	Municipal	L,Q,M,B
415241088040201	Glen Ellyn #3	Municipal	L,Q,M,B
415247088041401	Glen Ellyn #2	Municipal	L,Q,M,B
415330088054601	Wheaton #4	Municipal	Q,M,B
415325088030501	Glen Ellyn Heights Subdivision #2	Municipal	L,Q,M,B
415344088045101	Glendale Heights #10	Municipal	L,Q,M,B
415409088001701	Citizens Lombard Heights #1	Municipal	L,Q,M,B
415410088034301	Glen Ellyn Heights Subdivision #1	Municipal	L,Q,M,B
415422088054701	Glendale Heights #4	Municipal	L,Q,M,B
415423088064001	Carol Stream #2	Municipal	L,Q,M,B
415446088080201	Carol Stream #1	Municipal	L,Q,M,B
415457088045001	Glendale Heights #3	Municipal	L,Q,M,B
415502088004701	Addison #8	Municipal	L,Q,M,B

Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	DU PAGE COUNTY--Continued		
415503088040001	Glendale Heights #5	Municipal	L,Q,M,B
415509088063101	Carol Stream #3	Municipal	L,Q,M,B
415514088034601	Glendale Heights #8	Municipal	L,Q,M,B
415533088043401	Glendale Heights #7	Municipal	Q,M,B
415551087554801	Citizens Country Club Highlands #1	Municipal	L,Q,M,B
415551087590901	Addison #1	Municipal	L,Q,M,B
415553088054801	Glendale Heights #9	Municipal	Q,M,B
415614088095701	Carol Stream #5	Municipal	Q,M,B
415712088020001	Nordic Park Water & Sewer #2	Municipal	L,Q,M,B
415712088053001	Bloomingdale #5	Municipal	L,Q,M,B
415733088001101	Wood Dale #6	Municipal	L,Q,M,B
415806088052301	Roselle #4	Municipal	L,Q,M,B
415807088003801	Itasca #5	Municipal	L,Q,M,B
415822088104401	Bartlett #6	Municipal	L,Q,M,B
415852088040001	Roselle #3	Municipal	L,Q,M,B
415906088044801	Roselle #2	Municipal	L,Q,M,B
	FORD COUNTY		
402719088084501	Paxton #7	Municipal	L,Q,M,B
	GALLATIN COUNTY		
374207088094201	New Shawneetown #4	Municipal	L,Q,M,B
374325088134701	Saline Valley WCD #1	Municipal	L,Q,M,B
	GRUNDY COUNTY		
412129088252701	Morris #4	Municipal	L,Q,M,B
	HENDERSON COUNTY		
405512090573601	Galesburg #74-3	Municipal	L,Q,M,B
	HENRY COUNTY		
412832090082901	Geneseo #25	Municipal	L,Q,M,B

Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	IROQUOIS COUNTY		
403143088054701	Bayles Lake Lot Owners Assoc. #7	Private	Q,M,B
403216088055401	Lake Iroquois #2	Private	Q,M,B
403551088021301	Buckley #3	Municipal	Q,M,B
403551088021302	Buckley #4	Municipal	Q,M,B
404247087434701	Woodland #5	Municipal	L,Q,M,B
404255088002701	Onarga #3	Municipal	Q,M,B
404255088002702	Onarga #4	Municipal	Q,M,B
404557087591701	Gilman #1	Municipal	Q,M,B
404557087592101	Gilman #2	Municipal	Q,M,B
404625087335301	Sheldon #4	Municipal	Q,M,B
404629087453801	Watseka #7	Municipal	L,Q,M,B
404646087425501	Watseka #6	Municipal	Q,M,B
404920087490201	Danforth #6	Municipal	Q,M,B
405611087560001	Clifton #1	Municipal	L,Q,M,B
405712087392301	Beaverville #1	Municipal	L,Q,M,B
410007087543901	Chebanse #2	Municipal	L,Q,M,B
410010087550801	Chebanse #3	Municipal	L,Q,M,B
	JO DAVIESS COUNTY		
421902090131901	Elizabeth #2	Municipal	Q,M,B
422547090083401	Apple Canyon Lake Utility Co. #2	Private	Q,M,B
422655090030801	Apple Canyon State Park #2 Canyon Ridge	State	Q,M,B
423002090052801	Apple River #1	Private	Q,M,B
423021090364001	Mt. Vernon Water & Sewer Co. #3	Private	Q,M,B
	KANE COUNTY		
414503088164801	Wermes Subdivision #2	Municipal	L,Q,M,B
414529088254301	Sugar Grove #2	Municipal	L,Q,M,B
415257088202001	Geneva #6	Municipal	L,Q,M,B
415635088182201	St. Charles #9	Municipal	L,Q,M,B
420555088165501	West Dundee #2	Municipal	L,Q,M,B
420606088162001	East Dundee #2	Municipal	Q,M,B
420612088161101	East Dundee #3	Municipal	Q,M,B
420720088154601	Carpentersville #6	Municipal	L,Q,M,B

Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	KANKAKEE COUNTY		
410127087425201	St. Anne #3	Municipal	L,Q,M,B
410250088102701	Buckingham #3	Municipal	Q,M,B
410250088102702	Buckingham #5	Municipal	Q,M,B
410325088022301	Herscher #8	Municipal	L,Q,M,B
410329088021501	Herscher #7	Municipal	Q,M,B
410658087570701	Hillside Man Subdivision #1	Municipal	L,Q,M,B
410716087475701	Skyway-Skyline Subdivision #1	Municipal	L,Q,M,B
410735087435001	Kankakee Utilities Corp. #2	Private	Q,M,B
410813087545001	Vaughndale Meadows #1	Municipal	L,Q,M,B
410919087393201	Momence #3	Municipal	L,Q,M,B
411010087400901	Momence #4	Municipal	Q,M,B
411429087383701	Grant Park #4	Municipal	L,Q,M,B
	KENDALL COUNTY		
413948088352501	Hollis Park Subdivision #1	Municipal	Q,M,B
414223088212101	Marina Village Subdivision #1	Municipal	Q,M,B
	LAKE COUNTY		
420918087565401	Buffalo Grove #6	Municipal	Q,M,B
420932087551501	Chevy Chase Subdivision #1	Municipal	Q,M,B
420949088082601	Barrington #4	Municipal	L,Q,M,B
421251088030201	Forrest Lake Addition #1	Municipal	L,Q,M,B
421337088062101	Valentine Manor Subdivision Water Service Co. #1	Private	Q,M,B
421531088084401	Wauconda #3	Municipal	L,Q,M,B
421537088082101	Wauconda #2	Municipal	L,Q,M,B
421625088115001	Island Lake #1	Municipal	Q,M,B
421634088003301	Mundelein #3	Municipal	L,Q,M,B
421652088003601	Mundelein #5	Municipal	L,Q,M,B
421717087593701	Libertyville #10	Municipal	L,Q,M,B
421718087570201	Libertyville #8	Municipal	L,Q,M,B
421724087581101	Libertyville #5	Municipal	L,Q,M,B
421730087570001	Libertyville #4	Municipal	L,Q,M,B
421803087554801	Countryside Manor Subdivision #2	Municipal	Q,M,B

Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	LAKE COUNTY--Continued		
422053088031501	Grayslake #3	Municipal	L,Q,M,B
422119088043701	Round Lake Park #2	Municipal	L,Q,M,B
422120088053801	Round Lake #2	Municipal	L,Q,M,B
422121088043901	Round Lake Park #1	Municipal	L,Q,M,B
422217087545201	Gurnee #1	Municipal	L,Q,M,B
422219088040601	Round Lake Beach #4	Municipal	L,Q,M,B
422320087593601	Grandwood Park #1	Municipal	Q,M,B
422320088091801	Fox Lake #3	Municipal	Q,M,B
422347087593901	Grandwood Park #3	Municipal	L,Q,M,B
422356088105201	Fox Lake #2	Municipal	L,Q,M,B
422406087541901	Countryside Estates #1	Municipal	Q,M,B
422410087541801	Countryside Estates #2	Municipal	Q,M,B
422447088044001	Lake Villa #2	Municipal	L,Q,M,B
422447088044002	Lake Villa #4	Municipal	L,Q,M,B
422452088021601	Lindenhurst #1	Municipal	L,Q,M,B
422526088012001	Lindenhurst #2	Municipal	L,Q,M,B
422828088051301	Antioch #4	Municipal	L,Q,M,B
422830088052501	Antioch #3	Municipal	L,Q,M,B
422844088055101	Antioch #2	Municipal	L,Q,M,B
422901087492901	Winthrop Harbor #4	Municipal	L,Q,M,B
	LA SALLE COUNTY		
412120088500401	Ottawa #8	Municipal	L,Q,M,B
413255089064801	Mendota #3	Municipal	L,Q,M,B
	LIVINGTSON COUNTY		
404415088305101	Fairbury #4	Municipal	L,Q,M,B
	McHENRY COUNTY		
421034088164601	Algonquin #1	Municipal	L,Q,M,B
421042088253301	Huntley #5	Municipal	L,Q,M,B
421155088132801	Fox River Grove #2	Municipal	Q,M,B
421155088133101	Fox River Grove #1	Municipal	L,Q,M,B
421316088230001	Turnberry Utility Co. #1	Private	Q,M,B
421324088173601	Crystal Clear Water Co. #1	Private	Q,M,B
421324088173602	Crystal Clear Water Co. #2	Private	Q,M,B
421333088204601	Crystal Lake #6	Municipal	L,Q,M,B
421402088153201	Lake Killarney Water Co. #2	Private	L,Q,M,B
421404088201501	Crystal Lake #3	Municipal	L,Q,M,B

Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	McHENRY COUNTY--Continued		
421411088322801	Union #2	Municipal	Q,M,B
421519088362901	Marengo #4	Municipal	Q,M,B
421640088120001	Island Lake #3	Municipal	L,Q,M,B
421853088154401	McHenry Shores Subdivision #2	Municipal	Q,M,B
421911088265901	Woodstock #1	Municipal	L,Q,M,B
421911088270001	Woodstock #4	Municipal	L,Q,M,B
421943088160301	McHenry #3	Municipal	Q,M,B
421955088263301	Woodstock #6	Municipal	L,Q,M,B
421956088262501	Woodstock #5	Municipal	L,Q,M,B
422006088262401	Woodstock #7	Municipal	L,Q,M,B
422038088142901	Eastwood Manor Subdivision #1	Municipal	Q,M,B
422101088144701	Eastwood Manor Subdivision #2	Municipal	Q,M,B
422228088203001	Wooded Shores Subdivision #2	Municipal	Q,M,B
422243088215401	Sunrise Ridge Subdivision #1	Municipal	L,Q,M,B
422342088133101	Whispering Hills Subdivision #3	Private	Q,M,B
422455088370901	Harvard #5	Municipal	L,Q,M,B
422455088371501	Harvard #4	Municipal	Q,M,B
422458088371401	Harvard #3	Municipal	Q,M,B
422525088361401	Harvard #6	Municipal	L,Q,M,B
422832088182101	Richmond #1	Municipal	L,Q,M,B
422857088182101	Richmond #2	Municipal	L,Q,M,B
	MADISON COUNTY		
383929090012701	Collinsville #10	Municipal	L,Q,M,B
384740090022701	Edwardsville #8	Municipal	L,Q,M,B
384822090034801	Roxana #10	Municipal	L,Q,M,B
384955090055801	Hartford #4	Municipal	L,Q,M,B
385117090063701	Wood River #6	Municipal	L,Q,M,B
385205090044701	Bethalto #12	Municipal	L,Q,M,B
	MASON COUNTY		
401215089414501	Mason City #4	Municipal	L,Q,M,B
401351089503901	Easton #2	Municipal	L,Q,M,B
401754090032001	Havana #5	Municipal	L,Q,M,B
401811089361801	San Jose #4	Municipal	L,Q,M,B
402530089464201	Manito #3	Municipal	L,Q,M,B

Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	MASSAC COUNTY		
370724088374201	Brookport #3	Municipal	Q,M,B
371951088431101	Millstone PWD #1	Municipal	L,Q,M,B
	McLEAN COUNTY		
402912089090901	Normal #100	Municipal	L,Q,M,B
	MONROE COUNTY		
381749090185301	Valmeyer #4	Municipal	L,Q,M,B
	MORGAN COUNTY		
394957090331501	Meredosia #4	Municipal	L,Q,M,B
	OGLE COUNTY		
415551088575201	Creston #1	Municipal	Q,M,B
420717089241301	Leaf River #2	Municipal	Q,M,B
	PEORIA COUNTY		
404009089371401	Peoria Dodge St. #1	Private	L,Q,M,B
404528089335801	Peoria Heights #11	Municipal	L,Q,M,B
405536089300401	Chillicothe #7	Municipal	L,Q,M,B
	PIATT COUNTY		
400138088341601	Monticello #5	Municipal	L,Q,M,B
	PULASKI COUNTY		
371250089133401	Pulaski #1A	Municipal	Q,M,B
371637089105401	Ullin #1	Municipal	L,Q,M,B
	ROCK ISLAND COUNTY		
412634090431201	Andalusia #1	Municipal	Q,M,B
413003090252401	Silvis Heights #1	Municipal	L,Q,M,B
	SCOTT COUNTY		
394600090360501	Jacksonville #2	Municipal	L,Q,M,B

Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	STEPHENSON COUNTY		
421248089293201	German Valley #1	Municipal	Q,M,B
421744089394201	Park Crest #1	Municipal	L,Q,M,B
421813089373901	Freeport #4	Municipal	Q,M,B
421826089374301	Freeport #7	Municipal	L,Q,M,B
421952089382701	Northern Hills Utility Co. #1	Private	Q,M,B
422245089382001	Cedarville #2	Municipal	L,Q,M,B
422317089313001	Dakota #1	Municipal	L,Q,M,B
422451089280701	Rock City #1	Municipal	Q,M,B
422524089493301	Lake Le-Aqua-Na State Park #6	State	Q,M,B
422526089245101	Davis #1	Municipal	L,Q,M,B
422755089382201	Orangeville #1	Municipal	L,Q,M,B
422931089473201	Winslow #2 (Local #1)	Municipal	Q,M,B
	TAZEWELL COUNTY		
402024089184501	Armington #2	Municipal	L,Q,M,B
403626089282001	Morton #5	Municipal	L,Q,M,B
404222089243201	Washington #7	Municipal	L,Q,M,B
	UNION COUNTY		
372540089213401	Anna-Jonesboro #3	Municipal	L,Q,M,B
	WHITE COUNTY		
380530088035301	Carmi #4	Municipal	L,Q,M,B
	WHITESIDE COUNTY		
414617090141501	Albany #2	Municipal	L,Q,M,B
414540089415701	Rock Falls #4	Municipal	L,Q,M,B
	WILL COUNTY		
411953087481501	Peotone #3	Municipal	L,Q,M,B
411958087472201	Peotone #1	Municipal	L,Q,M,B
412015087472301	Peotone #4	Municipal	L,Q,M,B
412229088150001	Channahon Parkway State Park #2	State	Q,M,B
412414088063901	Elwood #3	Municipal	Q,M,B

Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	WILL COUNTY--Continued		
412518087590901	Manhattan #2	Municipal	L,Q,M,B
412603087444901	Consumers Illinois Water Co. #3	Private	Q,M,B
412603087452601	Consumers Illinois Water Co. #6	Private	Q,M,B
412607087374801	Crete #5	Municipal	Q,M,B
412610087403901	Consumers Illinois Water Co. #1	Private	Q,M,B
412615087410901	Consumers Illinois Water Co. #2	Private	L,Q,M,B
412727087350901	Crete #6	Municipal	Q,M,B
412809087363001	Crete #4	Municipal	Q,M,B
412905087514301	Frankfort #3	Municipal	L,Q,M,B
412909087590301	New Lenox #5	Municipal	L,Q,M,B
412942088044901	S.E. Joliet Sanitary Dist. #1	Municipal	L,Q,M,B
413001087582001	New Lenox #2	Municipal	L,Q,M,B
413001087582002	New Lenox #3	Municipal	Q,M,B
413010088042901	Clearview #2	Municipal	Q,M,B
413015088043201	Clearview #1	Municipal	Q,M,B
413053087580201	New Lenox #4	Municipal	L,Q,M,B
413158088023401	Fair Acres Subdivision #1	Municipal	Q,M,B
413232088121001	Will County Water Co. #3	Private	Q,M,B
413238088084601	Joliet #11	Municipal	L,Q,M,B
413314088061101	Crest Hill #7	Municipal	L,Q,M,B
413323087594501	Joliet #205	Municipal	Q,M,B
413337088055501	Crest Hill #1	Municipal	L,Q,M,B
413414088083801	Sunnyland #3	Private	Q,M,B
413514088011901	Lockport #5	Municipal	L,Q,M,B
413514088093301	Central States Utility Co. #1	Private	L,Q,M,B
413723087554501	Derby Meadows Utility Co. #3	Private	L,Q,M,B
413804087545701	Derby Meadows Utility Co. #1	Private	L,Q,M,B
413804087545702	Derby Meadows Utility Co. #2	Private	L,Q,M,B
413810087564901	Chickasaw Hills Utility Co. #1	Private	Q,M,B
413911088051601	Romeoville #1	Municipal	L,Q,M,B
414020088041301	Romeoville #5	Municipal	L,Q,M,B

Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	WINNEBAGO COUNTY		
421114089053901	Rockford Unit #28	Municipal	L,Q,M,B
421535089050301	Rockford Unit #11	Municipal	L,Q,M,B
421739089024701	Bradley Heights #2	Municipal	Q,M,B
421837089025701	Loves Park #1	Municipal	L,Q,M,B
421850089025501	Loves Park #2	Municipal	L,Q,M,B
422020088592401	Loves Park #3	Municipal	L,Q,M,B
422929089020901	S. Beloit #3	Municipal	L,Q,M,B

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