PROCEEDINGS

ILLINOIS WATER-DATA-USERS MEETING

Peoria, Illinois

February 23-24, 1982

Compiled by L. G. Toler

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ILLINOIS WATER-DATA-USERS MEETING
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ABSTRACT

The increased demand for water and concern for the quality of the water resources of Illinois have led to increased demand for water-resources data. Representatives of the major water-data-collecting and water-data-using agencies met in Peoria, Illinois, on February 23-24, 1982, to (1) exchange information on current water-data programs and needs; (2) identify areas where data are needed; and (3) foster coordination and cooperation between agencies.

Recommendations of the group included (1) annual meetings of agencies for coordination of activities; (2) standard methods for collecting and analyzing water data be adopted; (3) a centralized data system be established as a means of sharing water data; (4) water data should be indexed and cataloged, either by each agency or by some centralized system; (5) a statewide water-data-coordination committee should be formed with members from all water-related agencies; (6) a work group be formed to consider the use of uniform water-data codes; and (7) a cooperative working agreement be developed among all water-data-collection agencies in the State to coordinate and maximize efforts on basin-intensive projects.

PURPOSE

The increased demand for water and the concern for the quality of the water resources of the State of Illinois have logically led to an increased demand for water-resources data. The present day economic situation makes it even more desirable that there be communication among agencies' activities in acquiring water-resource data. To help foster this communication, a meeting of water-data-collecting and water-data-using agencies was held in Peoria, Illinois, on February 23-24, 1982. The meeting was co-sponsored by the Illinois Environmental Protection Agency and the U.S. Geological Survey.

The major purpose of the meeting was: 1) to give the agencies an opportunity to explain their current programs and thereby exchange information; 2) to identify areas where data are needed; and 3) to foster coordination and cooperation between agencies.

This report contains a summary of the major recommendations developed during the meeting. It also contains summaries of the status reports given by some of the participating agencies and summaries of the work groups.

RECOMMENDATIONS

The following is a summary of the major recommendations of the work groups:

1) All three work groups recommended that the coordination started at this meeting be continued. It was recommended that these meetings be held annually.

2) The data-management and ground-water work groups recommended that standard methods of collecting and analyzing water data be adopted. The data-management group suggested that all agencies strive to use the methods listed in the "National Handbook of Recommended Methods for Water Data Acquisition" prepared under the sponsorship of the U.S. Geological Survey.

3) Both the ground-water and data-management work groups pointed out the need for data compatibility among agencies, the need to share data, and the need for interaction among agencies' computer systems. The ground-water work group recommended a centralized data system to store all water data collected in Illinois.

4) Two work groups recommended that data collected in Illinois be indexed. The data-management work group suggested that each agency should develop and maintain a data catalog and index of its own data. The ground-water work group suggested a statewide center be established that at a minimum operational level would index all data activities and act as a coordinator for all water-data activities within the State.

5) A statewide water-coordination committee be formed consisting of all water-related agencies. The USCE, IEPA, USGS, and ISWS should lead in forming such a committee.

6) A work group be formed to consider the use of a uniform water-data coding system.

7) A cooperative working agreement be developed between all water-data-collection agencies within the State. This working agreement would contain a basin rotation schedule which would be considered by all agencies when designing basin-intensive projects.

AGENDA

Illinois Water-Data-Users Meeting

February 23-24, 1982

Tuesday, February 23

8:00 - 9:15	Registration
9:15 - 9:30	Welcome - Richard J. Carlson, Director, IEPA
9:30 - 10:15	Agency Status Reports - 1982 Moderator Doug Glysson, USGS IEPA - Ken Rogers ISWS - Dick Schicht ISGS - Ross D. Brower IDOC - Gregg Tichacek IDWR - Mel Allison USCE - Bill Koellner USGS - Gary Balding
10:15 - 10:45	Coffee Break
10:45 - 11:30	Agency Status Reports (continued)
11:30 - 11:45	Charge to Discussion Groups Larry Toler, USGS
11:45 - 1:30	Lunch
1:30 - 3:00	Discussion Groups Surface Water - Bob Clarke, IEPA Ground Water - Ross D. Brower, ISGS Data Management - Robert A. Sinclair, ISWS
3:00 - 3:30	Coffee Break
3:30 - 5:00	Discussion Groups (continued)
5:30 - 6:30	Social Adjustment Hour
6:30	Dinner - Speaker, Porter Ward, Chief, OWDC, USGS, Reston, VA

Wednesday, February 24

8:00 - 9:30	Discussion Groups (continued)
9:30 - 10:00	Coffee Break
10:00 - 11:30	Report from Discussion Groups
11:30 - 11:45	Closing Remarks Doug Glysson, USGS

WELCOME

Richard J. Carlson, Director, IEPA

The purpose of this program is to gather water-management agencies and water-data users to discuss existing status and their future roles in water management. Information on water and related resources is the fundamental building block of any management program. The second important element of data management is the transfer of information into usable formats. The third major step is using the data to solve problems or define basic understanding and knowledge of our resource base and interacting parts.

All of you here are involved in some aspect of information gathering, analyses, or use for implementation. Given so many agency interests and authorities in water data, these meetings offer opportunities to discuss existing efforts and improve our future roles.

The objectives of this conference are as follows:

1) provide water agencies an opportunity to explain current and planned programs and exchange information;

2) to identify new needs for water information programs;

3) to foster coordination and cooperation between agencies.

Water data gathering is generally limited to certain State and Federal agencies (such as PCB, IEPA, DENR, IDWR, IDOC, etc.). However, extensive implementation powers and authorities are vested in local government. Data coordination and exchange between State and Federal agencies must improve. Likewise, effective data transfer to local government must improve if programs are to be viable.

Thus, data must be gathered and made available on a collective and systematic basis to serve local, State, and Federal needs. Data must be shared and must be collected in response to multiple needs to improve user needs and total resource management objectives.

The ultimate objective is to achieve a total water information system which provides accountability of existing water status and forms the base upon which informed decisions can be made to solve existing problems, prevent future problems, and encourage maximum usability of this precious resource -- water!

The general framework of the conference is established to both maximize discussion of interests in either surface or ground water and facilitate interchange of problems and solutions. The work groups also include data management which focuses upon necessary elements to use effectively the data once it is collected and stored.

AGENCY STATUS REPORTS

Illinois Environmental Protection Agency

Ken Rogers

Division of Water Pollution Control Monitoring:

Monitoring programs in the Division of Water Pollution Control have traditionally been oriented towards ambient water quality monitoring, compliance effluent and receiving stream monitoring, and special biological monitoring for enforcement cases. In recent years monitoring efforts have expanded to include basin surveys, lake studies, and special investigations.

Ambient Stream Monitoring:

The current ambient stream monitoring network consists of 204 water-quality stations (Appendix B). The potential for duplication of monitoring effort has been reduced by cooperative agreements with numerous governmental agencies. These include the U.S. Geological Survey as a major cooperator on the stream monitoring stations and the city of Chicago on monitoring 80 Lake Michigan sites.

The Division of Water Pollution Control personnel and cooperators conduct multivertical/depth integrated composite sampling at each ambient stream site with a scheduled monthly sampling frequency. However, the frequency for the past few months has been relaxed to once every 6 weeks due to a reduced field technician headcount. (Appendix B, parameter coverage in ambient network.)

At a subnetwork consisting of 41 sites (Appendix B) within the basic ambient network, additional monitoring is conducted as part of a national network developed by US EPA to determine baseline water quality trends nationally. The major components of this subnetwork in Illinois include basic water column parameter coverage plus trace organic analysis in the water column as well as organic and metal analysis in bottom sediment and fish flesh. Macroinvertebrate monitoring is also included in this subnetwork.

Effluent Monitoring:

Agency effluent sampling is conducted at significant stream dischargers and (as a condition of NPDES permit) dischargers submit self-monitoring reports to the Agency. Monitoring is also conducted as follow-up of improvement surveys in stream segments where municipalities have constructed new wastewater treatment facilities or have upgraded existing plants.

Basin/Intensive Surveys:

Water quality basin studies or intensive surveys are conducted throughout the State. For example, in 1976 a substantial effort was made to acquire water quality information throughout the State using macroinvertebrate monitoring by outside private consultants or contractors (Appendix B). The Natural History Survey contracted to perform studies of the Wabash basin, Rock River basin and Mississippi River -- North Segment. Dames and Moore conducted biological surveys in sections of the Illinois River basin and Wapora, Inc. in the Sangamon.

NALCO Environmental Sciences conducted a biological investigation of the entire Kaskaskia basin. This study, typical of the intensive consultant studies, found severe stream degradation at less than 10 percent of the sampling stations, mostly in small tributaries whose flow consisted almost entirely of effluent.

In 1978, the emphasis for several basin investigations was shifted to documentation of chemical constituents causing degradation observed in biological studies, toxics screening, and assessment of municipal dischargers on receiving stream oxygen regimes.

In 1979, intensive survey monitoring efforts were largely concentrated on the acquisition of water-quality information on Illinois lakes.

Sixty-three representative Illinois lakes (Appendix B) were sampled: 15 of these intensively (monthly) from May through October and the remaining 48 twice, once in early summer and once in later summer. Individual reports were prepared for each of the intensively sampled lakes. Comprehensive reports, "Limnology of 63 Illinois Lakes, 1979", and "Chemical Analysis of Surficial Sediments from 63 Illinois Lakes, Summer, 1979", were also prepared.

They represented a significant advancement in the knowledge of Illinois lakes and have greatly aided in the development of Illinois' strategies for lake assessment, monitoring, protection, and enhancement.

These reports made recommendations concerning the technical basis necessary for development and implementation of an overall lake protection and enhancement program for Illinois. They recommended that the Agency establish a coordinated lake/watershed monitoring program, including Ambient Lake Monitoring and Volunteer Lake Monitoring. (Appendix B, list of recent Agency lake reports.)

Volunteer Lake Monitoring:

In 1981, a cooperative volunteer lake monitoring effort was initiated by the IEPA as part of an overall self-help, service program being developed for lakes. In addition to expanding the Agency's lake data base with information on present water quality and trends, the program was designed to involve citizens in learning about a lake so they can make more informed decisions regarding its use, protection, and enhancement.

We have had an excellent response to the Volunteer Program. About 120 volunteers participated in monitoring 86 lakes in 1981 (Appendix B). A summary report on the Volunteer Lake Monitoring Program is being prepared as well as individual reports for each lake sampled. These reports will be available in May 1982.

We expect the Volunteer Lake Program to increase in size in 1982. We are working with the Illinois Department of Conservation, Division of Fisheries, to arrange for State Park lakes to be monitored by site personnel; public water-supply lakes and those included in a watershed prioritization process are also targeted for inclusion.

Future Monitoring:

In the future, as resources become even more limited, we will probably be expanding the volunteer effort even more and include collection and analysis of water samples for lakes and streams.

Other monitoring efforts planned for 1982 include:

1) The collection and evaluation of information for the Sangamon, Fox, and lower Kaskaskia basins will be jointly conducted with the Illinois Department of Conservation. These efforts will include data and information on hydrology including some stream geometry, water quality, macroinvertebrates, fish and habitats.

2) A study to document effects of hydrologic modifications in Illinois streams and to develop criteria to minimize water quality impacts from such projects.

3) Monitoring to determine improvements in water quality attained following implementation of Agricultural BMP's.

4) Waste-load assimilative capacity study of the Sangamon River from Decatur to Springfield. (Jointly conducted with the USGS.)

Data Management:

In general, all lake and stream data for the Division of Water Pollution Control is entered in the STORET computer system, and analysis of the data is performed using programs in STORET, SAS, and by transferring data to a data base management system developed for use with our Division's Tektronix desk top computer terminal.

Summaries of effluent and discharge monitoring data are also handled with the Agency computer system.

Division of Public Water Supplies Monitoring:

Public Water Supply Monitoring consists generally of sample collections by way of the operators of the public water supplies. Laboratory analyses and data review are conducted by the Agency.

Public water supply monitoring includes monthly bacteriological sampling of all water supplies.

Surface water supplies (of which there are approximately 140 in Illinois) have inorganic chemical analysis conducted annually on both raw and distribution samples. Daily turbidity monitoring is also performed by all surface water supply operators and the data submitted to the Agency monthly.

Present regulations require inorganic analysis of both raw and distribution samples from ground water supplies every 2 years. There are approximately 3,000 wells throughout the State involved in this monitoring effort. Because of funding cutbacks it has been proposed that ground-water distribution samples be monitored every 3 years and analyses performed as requested for raw water from ground-water supplies. (Appendix B).

Organic-pesticides-monitoring is conducted twice each year on surface-water supplies and ground-water supplies which are subject to pesticide contamination. (Appendix B).

Trihalomethanes are monitored at all water supplies serving 10,000 or greater population. Samples are collected quarterly except for ground water supplies that are sampled annually.

All water supplies which have their own water source have quarterly distribution samples analyzed for radiological activity. After the first year the sample frequency is adjusted on the basis of activity found.

Data Management:

All public water supply data are available on a site-by-site basis. However, none of the data is on a computer.

Division of Land Pollution Control Monitoring:

In order to assure that contaminants do not migrate from the landfill site, the owner or operator is required to submit quarterly data from selected monitoring points both during operation and for a period of 3 years after the site is closed (20 years for a hazardous-waste site). Currently, 972 monitor points at 238 waste-management facilities are included in the quarterly monitoring program. These include 844 ground water monitoring wells, 116 surface-water sampling points, and 12 leachate monitoring wells.

The parameters which must be tested for vary, depending on the type of waste handled. Landfills which accept general refuse must submit a comprehensive background analysis from each monitor point before operation begins (Appendix B). Thereafter, the basic monitoring program includes ammonia, boron, chemical oxygen demand, iron, and total dissolved solids. If industrial wastes are accepted, additional parameters are included in the programs.

For hazardous-waste sites, background samples are collected for the parameters listed in Appendix B.

In addition to the quarterly monitoring programs required for the facility operators, the Agency field personnel collect water samples from each of the monitor points at least once per year. Agency field inspectors collected samples at over 300 sites for a total of over 1,300 sampling points during 1981.

Ground-water monitoring also occurs at selected old landfills which are now closed (including some hydro-geological evaluations).

Data Management:

Ground water quality data is available on a site-by-site basis. Recently, data handling has been assisted through the use of a computer.

Illinois State Water Survey

Richard J. Schicht and Michael L. Terstriep

Much of the data-collection effort of the Water Survey is related to relatively short term, problem oriented research projects. Examples of these are the statewide 208 program, the more recent National Urban Runoff Project located in Champaign, erosion and sedimentation of the Blue Creek and Highland Silver Lake watersheds, the Kankakee River study, recent work on the Illinois and Mississippi Rivers sponsored by the Upper Mississippi River Basin Commission, ground-water quality sampling studies, and ground-water pollution studies.

Long term data-collection programs, the status of which will be described here, include ground-water levels, well and aquifer test data, ground-water quality, soil moisture, support of the USGS streamgaging program, reservoir sediment surveys, the statewide stream sediment network, the surface water quality network, the floodplain information repository, water use data, and the National Atmospheric Deposition Program.

Ground-water Level Data:

The Water Survey has maintained observation well networks to monitor water levels in the vicinity of pumping centers since the early 1930's when a recording gage was installed on a well in the Chicago region and periodic measurements were made in 25 wells in northeastern Illinois. The program was accelerated in 1941 as additional recording gages were installed on wells in the Chicago region, East St. Louis area, Peoria area, and Champaign-Urbana area. In January 1981, there were 90 wells equipped with recording gages or measured monthly included in this network, mainly in metropolitan areas.

In addition to these 90 wells, water levels are measured in several hundred wells in an alluvial sand-and-gravel aquifer in the East St. Louis area and a deep sandstone aquifer in northeastern Illinois each 5 years to obtain water-level data for piezometric surface maps. Less frequent measurements of water levels in wells are made in the deep sandstone aquifer in northwestern Illinois, sand and gravel aquifers in the Peoria-Pekin and Havana lowlands areas, and sand-and-gravel and shallow-dolomite aquifers in northeastern Illinois.

Measurement of water levels for a statewide network of shallow wells remote from pumping centers was started in 1958. The purpose of the shallow observation well network is to monitor short-term fluctuations and long-term trends in the water table. The shallow network presently consists of 20 wells equipped with recording gages.

The adequacy of the observation well network was addressed in a joint report by the Water Survey and U.S. Geological Survey. Additional water level monitoring efforts were recommended for several aquifers including river-lowland deposits where large ground-water withdrawals are common, sand and gravel aquifers in Lake and McHenry Counties, Pennsylvanian aquifers, and shallow dolomite and Mississippian aquifers outside areas of heavy pumpage.

The Water Survey is committed to maintaining their present network. It is unlikely that expansion of the network is possible without additional funds.

Well and Aquifer Test Data:

The Water Survey collects data from 30 to 50 well-production and aquifer tests on newly constructed wells per year. This program is dependent upon the cooperation of consulting engineers, well drillers, municipal officials, and industry. Water-level data collected in response to ground-water pumpage are invaluable in determining aquifer hydraulic properties necessary for ground-water resource evaluation. The program could be expanded to include tests on existing wells in areas where aquifer hydraulic property data are sparse.

Ground-water Quality Data:

The Water Survey has been maintaining records of chemical analyses of ground water since 1890. Records of some 28,000 analyses conducted by the Water Survey, Illinois Department of Public Health, and Illinois Environmental Protection Agency have been placed in a machine readable storage and retrieval system. These records include data for public water supply wells, industrial wells, irrigation wells, and privately owned domestic wells.

Unfortunately, there has not been a systematic approach to collecting of ground-water samples for chemical analyses. For example, there are specific areas in Illinois where additional water-quality data are too sparse to characterize aquifer water quality. Except for a few municipal well fields, data are not available to identify water-quality trends. Complete and accurate information on well identification, depth, location, date of collection, and any special conditions associated with sampling (i.e., well just completed, contamination problem suspected, routine sampling, well just rehabilitated) is not always recorded. There are no standardized sample collection methods. Finally, data for certain constituents such as synthetic organic compounds are virtually non-existent at this time.

Objectives of a ground-water network include:

1) Detection of natural variations and trends in water quality.

2) Monitoring of water quality in area stressed by heavy use and/or contamination.

3) Identification of areas where the ground-water resource is deteriorating in quality.

Provided funds are available, the Water Survey and IEPA will plan a ground-water network design. A determination of the cost of maintaining a network will be included in the study.

Soil Moisture Data:

One of the primary data collection efforts launched by the Water Survey in 1981 was a soil moisture monitoring network. Soil moisture is measured by the neutron logging method at the sites of six climatological recording stations established in 1981. Also regularly monitored at the stations are air temperature, humidity, rainfall, insolation, wind speed and direction, and soil temperature. In addition, observation wells were constructed at the Bondville site to observe ground-water levels. It is planned to install observation wells at the remaining five sites. The sites are scattered around the State, located on agricultural experiment stations operated by the University of Illinois. It is planned to install six additional stations during 1982. Additional funding will be required for an additional neutron soil moisture logger and for network maintenance.

Statewide Streamgaging Support:

The Water Survey for many years has been a cooperator, with the USGS, in the statewide streamgaging network. The Water Survey has sponsored up to 40 continuous record stations. In recent years, the Water Survey's budget line for this support has not been able to keep up with the increasing cost of operation, and stations have gradually been discontinued. The current support of 37 stations will be cut dramatically in 1983. Depending on cost of operation, the Water Survey will only support 24 to 25 continuous record stations.

Unfortunately, this reduction in support comes when other cooperators such as the Division of Water Resources of the Department of Transportation (IDWR) and the U.S. Army Corps of Engineers, face similar budget pressure.

Reservoir Sediment Surveys:

During the period of years between 1940 and 1962, the Water Survey performed sediment surveys on reservoirs and lakes in Illinois on a regular basis. These were detailed surveys utilizing a boat crew to measure sediment depth with a spud bar or sounding pole along monumented cross sections of the lake. Since 1962, sediment surveys have been made on an irregular basis as funds are available, often with the financial or physical support of the lake owner. An effort is being made to keep this program alive and to perform 3-6 surveys per year, particularly on municipal water supply reservoirs and recreation lakes.

Stream Sediment Network:

For many years, the Water Survey has tried to garner support to establish a statewide stream sediment monitoring network. The USGS provided the first suspended sediment data on the Kankakee River basin with financial support from the Department of Energy and Natural Resources (DENR) and the Rock Island District of the Corps. In 1980, funds were made available from IEPA, DENR, and IDWR for the Water Survey to equip and establish a statewide network of 50 suspended-sediment monitoring stations located at streamgaging sites. Depth integrated suspended-sediment samples were collected on a weekly basis from all the sites and intensive sampling was done on a daily basis from 27 sites for a period of 4 months during the wet season.

Funding for FY 82 was cut back substantially with the only support coming from IDWR and DENR. The 38 stations operating at the beginning of the water year will be cut to 30 stations during the spring of '82. This will be accomplished by utilizing Water Survey personnel. Unless additional outside funds are obtained, the network will be closed at the end of August 1982.

The closure of this network with the collection of less than 2 years of data represents a severe loss of information at a high cost to the people of Illinois. A minimum of 5-10 years of statewide sediment data are required to characterize the sediment carried by Illinois streams. Due to the high start up costs of the program, and the early shut-down date, the costs of this data collection effort to the taxpayer has been inordinantly high. The longer the network is maintained, the lower the cost will be for each set of data. Illinois can ill afford to give up this data collection effort in the face of the high priority of soil erosion control in the State. Presently a substantial amount of money is being spent on soil erosion control projects without a sound data base or knowledge of exactly where the problems exist. When the time comes for agencies charged with the implementation of soil erosion control projects to evaluate those projects and justify the dollars spent, this data will certainly be needed.

Surface Water Quality Data:

The Water Survey's Bulletin 45 describes a pioneering effort to collect stream-water quality data at 22 sites for the period 1945-57. Constituents considered at these sites were temperature, turbidity, iron, manganese, fluoride, boron, silica, chloride, sulfate, nitrate, ammonia, calcium, magnesium, sodium, alkalinity, hardness, and total dissolved minerals.

Bulletin 54 describes the expansion of this network to 44 sites for the period 1957-66, with the addition of phosphate. During the period 1966-71, the network was down to 30 sites that were described in Bulletin 56.

Between 1971 and 1978, the network dwindled to about 8 sites and was formally discontinued in 1980. The ambient water-quality network operated by the IEPA and USGS has replaced this data collection effort but is now itself suf-

fering serious financial problems. As in the case of the statewide suspended-sediment network, it is imperative that a long-range surface-water quality network be retained.

Floodplain Information Repository:

The Flood Disaster Protection Act of 1973 ultimately caused the Flood Insurance Administration to fund 400 detailed Flood Insurance Studies in Illinois. The proliferation of these studies caused significant coordination problems particularly in the northeastern portion of Illinois. In 1978, IDWR funded the Water Survey to establish a Floodplain Information Repository. The Water Survey thus became a one-stop source for floodplain related information. In addition to the bibliographic information of all known floodplain studies, the Water Survey provides best available flood elevation data for purposes of floodplain regulation. IDWR's funding of this important activity ran out in 1981. Though funded at a reduced level by DENR for 1982, it also is in danger of extinction.

Water Use Data:

The first report summarizing water use data (water withdrawals) for all of Illinois was published in 1979 (State Water Survey Circular 140). The report, part of a cooperative program started in 1977 between the Water Survey and the U.S. Geological Survey, summarized the results of the 1978 Illinois Water Use Inventory. Water withdrawal data were presented for public water supply, self-supplied industry, rural water use, and fish and wildlife management areas. The data were then further categorized by county, district, hydrologic units, and standard metropolitan statistical areas. A second report summarizing water withdrawals in Illinois during 1980 is in press.

These reports are the only summaries of water withdrawals for all of Illinois although the Water Survey has been involved in evaluating water withdrawals since the early 1940's. Most of the prior reports emphasized withdrawals in regions when water resources were extensively developed or surveyed withdrawals by a major use category.

It was anticipated that these reports would be the forerunners of a continuous water use inventory program which would not only show changes in quantities of water used but also would indicate trends in use and provide the basic data required for establishing budgets, developing water use plans, and evaluating hydrologic unit and aquifer systems. Unfortunately, Federal funds supporting the program are being phased out. Further Federal funding support after September 1982 is unlikely.

It is mandatory to continue the water use program to permit planning and proper management of Illinois water resources. At the present time the Water Survey is seeking external support from other State agencies that have a need for water use data. Without external support the Water Survey will be able to only sustain a minimum program.

National Atmospheric Deposition Program:

The precipitation chemistry network for the National Atmospheric Deposition Program (NADP) began operation in the summer of 1978. The Water Survey's Analytical Chemistry Laboratory serves as the Central Analytical Laboratory for the program.

The NADP has two principal goals: 1) to establish a precipitation quality monitoring network to determine the spatial and temporal trends in the supply of beneficial nutrients and injurious substances in precipitation and dry particulate matter in various regions of the United States, and 2) to develop and coordinate research on the effects of changes in atmospheric deposition.

To participate in the monitoring program, each of the sites must be approved by a subcommittee of the NADP. The sites purchase their own monitoring equipment, furnish manpower to operate the site, and pay for the chemical analyses of the samples. Currently there are 100 sites, including sites in Alaska, Hawaii, and American Samoa. Six sites are presently in operation in Illinois. The Water Survey provides the manpower to operate the NADP site at Bondville, Illinois.

Summary:

The plight of the Water Survey in the above programs is indicative of the problems associated with data collection both statewide and nationwide. All of us must recognize the need for reliable long-term data to satisfy the missions of our various agencies. Availability of data is often assumed by the user and not all are aware of the threat to these data collection programs. We must all work together to define a minimum statewide data collection effort in all areas and then work together in support of this effort within our agencies, with our State government, and at the national level if basic data collection in Illinois is to survive.

Illinois State Geological Survey

Ross Brower

Water-related activities at the State Geological Survey have dealt principally with ground water; only a small amount of effort has gone into studies of surface water. The large collection of geologic information, which has been gathered since the present Survey began operations in the early 1900's, provides an excellent data base for evaluating the character and distribution of both the ground water and the materials in which it is found. Data collection efforts are related to both short-term and long-term programs and in many

cases may not be directly associated with ground water. The largest components of the data files consist of 270,000 drillers' logs, 98,000 geophysical logs, 63,400 sets of well cuttings, 12,780 sets of well cores, and several thousand chemical analyses of oil field brines, and so on. In addition to the raw data files, there are many publications reporting on research results, and offer summaries of data relative to specific topics. Some of these publications provide data for numerous water data users: maps showing the character, thickness, and depth of burial for specific water-yielding units; cross sections depicting the movement of infiltrating fluids in earth materials at specific sites; maps showing the character of surficial deposits. The Survey has placed a strong emphasis on the historical aspect of the raw data files; without these data, the geological framework controlling the occurrence and character of ground water could not be readily determined. Continuation of data collection in all types of projects is essential to all work in ground water.

The Survey's List of Publications and Bulletin 92 provide an index to identify Survey publications and maps completed in recent years.

Basic Data Collection:

The State Geological Survey collects all drilling records for all types of holes drilled into the subsurface. Water wells and tests, oil and gas exploration holes and wells, and mineral exploration test holes make up the bulk of the collected well records. Records from many other sources, such as engineering and highway borings, monitoring well borings, waste disposal well, stratigraphic test holes, and field study notes, are also collected whenever possible. Records from 14,000 to 17,000 wells are added annually to the Survey files. The file presently includes about 270,000 well logs and 98,000 sets of geophysical logs.

In addition to written records and geophysical logs, approximately 500 sets of drill cuttings per year (representing about 900,000 feet of drilling) are added to the file. Samples are collected from wells selected on the basis of their locations in areas where no samples for specific rock formations are on file. Last year 136 sets of cores (another form of samples) were filed, representing about 7,500 feet of drilling. Drill cuttings and cores currently in the ISGS files represent 735,000,000 and 700,000 feet of drilling, respectively.

Numerous projects conducted by 7 of the 10 sections in the Geological Survey contribute data to the files and to reports published by the Survey that may be directly or indirectly of interest to water data users.

Hydrogeology and Geophysical Exploration Data:

Much of the ground water research and the generation of water-related data takes place in this section. Public service activities have generated a large file of site-specific reports that summarize hydrogeologic conditions for development of ground-water supplies and the siting of solid waste disposal facilities. Surface resistivity surveys (EER) at more than 2,000 sites, downhole geophysical surveys, grain-size analysis of aquifer materials and glacial tills, and detailed studies of well cuttings and cores have also generated a very large supplemental data file on the character and water-yielding potential of earth materials. Additional data are collected on subsurface sources through activities associated with the storage or disposal of waste fluids, brines, and petroleum products.

Currently, the Survey is conducting a number of ground water geology studies describing the geology of local and regional aquifers and associated nonproductive units. Specific studies in progress or near completion include: 1) hydrogeology of the Saline Valley Conservancy District; 2) ground water assessment of potential public ground water supply aquifers outside the six-county northeastern Illinois area; 3) supplemental water supply for Danville; 4) central Illinois regional aquifer study; 5) preliminary reappraisal of the hydrogeology of the Mahomet Bedrock Valley; 6) aquifer transmissivity mapping by surface electrical methods; 7) water resource potential of basal Pennsylvanian sandstones in southern Illinois; 8) geologic studies to identify the source of high levels of radium and barium in Illinois ground water supplies; 9) glacial drift aquifers of northeastern Illiois; 10) evaluation of shallow ground water resources in Kane County through application of surface geophysical methods; 11) hydrogeology of the Mississippi River Valley in west-central Illinois; and 12) study of the ridged drift aquifer between Macon and Taylorville.

A growing file of permeability data is being built up from laboratory analyses routinely run on unconsolidated samples for saturated and unsaturated flow and soil moisture content.

Data from seismic surveys are available for a number of sites surveyed for specific projects around the State. The most recent work has involved running profile sections across the larger bedrock valleys. Some work has also been done on delineating structural features. An extensive data file is available for gravity and magnetometer surveys run throughout the State.

Waste management studies in recent years have generated an increasing number of data files, and have also stimulated the development of new equipment and techniques for collecting these data. The following list of projects indicates the various types of studies in progress: 1) trench cover study to characterize infiltration of water through multiple-layered covers and to design and test a cover that minimizes infiltration into waste disposal sites; 2) susceptibility of shallow aquifers to contamination by land disposal of wastes (landfills) and near land-surface disposal practices (septic systems, surface spreading, etc.); 3) water reuse through ground water recharge into

shallow aquifers in northeastern Illiois; 4) evaluation of disposal of low-level radioactive wastes at Sheffield; 5) history of the quarrying industry in northeastern Illinois (mostly old quarries filled with wastes); 6) study of gob piles in the longwall coal mining district; 7) identification of subsurface formations for deep-well disposal; 8) collection of representative samples from coal refuse for leachate generation studies; 9) geochemical and toxicological properties of coal wastes and coal fly ashes; 10) assessment of soil, clay, and caustic soda effects on land disposal of C-56; 11) and absorption of PCBs by cellulose fiber filteraids and carbonaceous adsorbents used in water treatment to assess use of these materials to clean up PCB contamination in Waukegan Harbor.

Geological studies of Lake Michigan, back water lakes of the Illinois River, Kankakee River system, wetlands at the Schaumburg Commuter Station, bogs and marshes, and the long-term ecological research (LTER) on the Illinois and Upper Mississippi Rivers are building up numerous data files on sediments and the biological-chemical processes operating in the sediment and the overlying surface water.

The Survey-operated drill rig drilled approximately 1,000 feet of shallow holes for the setting of piezometers and collection of controlled drilling samples in the past year.

Engineering Geology Data:

Data from slope stability and underground mining projects are being collected and evaluated to predict conditions that can be hazardous to surface and subsurface property and equipment. Ground water, which has a major controlling effect on these conditions, is being monitored through soil moisture tests, piezometers, and wells open to mine works. Mine subsidence data are being placed in a computer filing system for easy retrieval.

The Geological Survey has established a cooperative agreement with the U.S. Soil Conservation Service to provide geological services for watershed projects, resource conservation and development projects, rural clean water projects, and conservation operations programs. Much valuable data has been generated from the surficial deposits with such cooperative efforts.

Topographic mapping has been an area of strong activity in recent years as the Survey, in cooperation with the U.S. Geological Survey, pushes ahead to complete mapping of the entire State with 7.5-minute quadrangle maps. At present, first-time coverage at this scale is two-thirds completed. Mapping is in progress for 303 quadrangles. Authorization to begin mapping the remaining 68 quadrangles is pending. About half the 303 quadrangles in progress will have maps published in metric units. These units will also include the contour intervals.

The Geological Survey and the Map and Geography Library of the University of Illinois have become the Illinois Affiliate of the National Cartographic Information Center of the U.S. Geological Survey. This will make cartographic information more accessible to the public.

Industrial Minerals Data:

A large quantity of data related to various mineral production activities in the State is on file. Data are being collected on the geology, character of the mineral products and wastes, availability of adequate water supply problems with ground water quality and excess quantity, and production figures for mined products (sand and gravel, limestone, dolomite, glass sand, clay and shale, fluorspar, tripoli, lead, and zinc). Very limited water data are available for most mining operations; however, with the exception of sand and gravel operations, the amount of water needed is relatively minor, and relatively few problems have occurred in either surface or subsurface water as a result of these mining activities.

Environmental Geology Data:

Several types of studies have led to the development of interpretative maps prepared from the raw data files, controlled drilling test holes, and field work. Land-use planning studies (such as "Geology for Planning in De Witt County, Illinois") provide many useful maps. Maps prepared from all currently available surface and subsurface information include: a bedrock topography map, stack-unit map of surficial deposits, septic system and landfill suitability maps, and aquifer maps.

Such studies are in progress or completed in Boone-Winnebago Counties, Vermilion County, and Kankakee County. The Kankakee County study has been coordinated with the study of sediment accumulation in the Kankakee River. Similar studies are also in progress in Madison County, Champaign County, and at Illinois Synfuel sites.

Computer filing and retrieval programs are being developed for engineering, landfill, and highway reports.

Nuclear reactor site planning studies have been initiated to pull together all known information and technical data necessary to support planning for possible nuclear incidents. Maps and support information (including data on water supply sources and all geologic units in the vicinity of each site) will be gathered; if not available, the needed data will be generated. A related study has evaluated the geologic factors affecting environmental safety at a nuclear fuel reprocessing site. A critical factor to this study is the flow characteristics of tight materials that occur naturally or are implaced between the site facilities and ground water sources in the area.

Long-term Ecological Research on the Illinois and Upper Mississippi Rivers will focus on the sedimentological history of the rivers and associated backwater lakes. The sediment is of interest to those studying the surface water environment because it can act as a pollutant and also as an indicator of the biological and chemical history of the rivers. A lead-210 dating facility will be established to permit determination of the geochronology of the bottom sediments.

Clay and Clay Rock Data:

A large data base now exists that describes the occurrence and characteristics of clay and clayey rock deposits. Although these materials do not yield water, they are abundant and do significantly control the occurrence and movement of ground water, and to a certain degree, the chemical quality of ground water. These materials are also used as cap rock for wastes injected into disposal zones and are implaced as liners in surface disposal sites and impoundments. In the coal mining industry, fine-grained sediments act as both a source of pollutants and also as containments for the pollutants. Although this data base has no direct application for most water data users, some of the information compiled from it can be very useful.

Oil and Gas Data:

Data collected from oil and gas activities in Illinois represent a large part of the Survey's entire data collection. Many new logs have been added to the files as the result of the recent large increase in exploration activities. Much of this collected data is not of direct interest to most water data users; however, research activities have reduced some of this data to very useful forms. Detailed information on the character, distribution, and stratigraphic correlation of units, and on the movement of fluids through porous and fractured media has been worked out from these data. Gas storage projects have provided an abundance of data for the subsurface environment. In oil and gas producing areas the hydrogeology of shallow, fresh water aquifers can be determined in great detail from geophysical logs.

The presence of methane in many water wells has prompted studies to determine the origin, movement, and occurrence of this gas. Chemical analyses are on file for 2,600 samples of natural gas; at least half of these samples have been collected from water wells. A computer input and retrieval program can index the sample location, print out the chemical analysis results, and indicate whether a water sample analysis was also run for the gassy water wells. Dating and origin determinations of gas samples can be made from isotopic analysis of elemental components of the gas. Additional isotopic analyses of ground waters appear to be tools in determining the age of ground water, characteristics of the ground water flow system, the fate of various dissolved constituents in the water, and distribution of ionic and isotopic species in the flow system. Prediction of methane gas occurrence in water wells reduces the hazard to both drillers and water supply users.

Coal Data:

Coal mining has contributed a large amount of data to the files for the shallow bedrock deposits; these data are principally associated with areas where the bedrock is a poor yielder of water and where mineralized water occurs at relatively shallow depths. The location of coal mines is shown on a series of 28 mined-out area maps. (These maps have recently been updated to include all areas that have been mined out.) Computer storage and retrieval of the mapped information is under consideration and will begin as soon as funding becomes available. A computerized index of all known coal mines and pertinent information for each mine have already been compiled.

Coal resource studies have produced a series of publications that include maps indirectly useful to water users because they include much of the information describing water-bearing units associated with coal deposits. Ground water problems in underground mines have led to assessing ground water conditions in mines throughout Illinois. Company records, mine notes, and piezometers installed in strip mines and underground mines provide data on ground water flow conditions. Additional information on ground water conditions is expected as a byproduct of a study of channel sandstones which were deposited in valley cut into coal beds.

Geochemical studies show a direct correlation between trace element constituents in coal and the rocks overlying the coal seam and the chemistry of the ground water in the overlying rock units. The chlorine and sulfur content of coal is strongly affected by these conditions.

The Survey is participating in a program known as the Coal Planning Assistance Program that will publish a set of books containing technical and planning information associated with the development of large coal mines. Water-related topics are to be included.

Federal and mandated State regulations have required permits to mine coal; all operating mines must obtain such a permit from the Department of Mines and Minerals. Site-specific information is required at all mines for ground water and surface water conditions. A special assistance program for small operators (SOAP), which is federally funded, has been generating this data for about 23 small coal operations in Illinois. Another program that may generate similar data under federal funding is the Lands Unsuitable for Mining Program (LUMP). This program will evaluate study areas for a designation as unsuitable for strip mining.

Stratigraphic Data:

Geologic mapping and stratigraphic studies are devoted mainly to the acquisition and improvement of the data which is a fundamental source of geologic information for many other Survey activities. Projects that may be of interest to water data users include: 1) an investigation of soils and glacial deposits in an area bounded by Christian, Effingham, and Madison

Counties; 2) development of age dating and clay mineral identification techniques to be used for constructing the Quaternary history of the greater Chicago area; 3) revision of the glacial stratigraphy of north-central Illinois that will improve mapping of till units and their associated sand and gravel outwash deposits; 4) study of the stratigraphy and depositional environments of the Maquoketa Shale Group, a relatively impermeable unit that is used to contain landfills and to provide a cap for natural gas, liquid petroleum gas, and compressed air storage; 5) a general investigation of a clastic sediments lacustrine delta immediately above the Herrin (No. 6) coal in east-central Illinois and west-central Indiana; 6) structural geology in the vicinity of the Shawneetown Fault Zone in southeastern Illinois.

Chemical Analysis Data:

Chemical analyses are run routinely on several hundred samples per year (including rock samples, brines, landfill leachates, and water samples for isotopic analysis). Carbon 14 analysis is used to date recent glacial deposits.

Computer Activities:

ILLIMAP, the computer-plotter base map drawing system, draws base maps for designated areas in the State at a number of scales; it can also spot data on the map. Numerous State agencies and universities in Illinois are presently using this system.

MINERS, a computerized data management system, is capable of storage and retrieval of all data produced or collected by the Survey. This system requires some additional work to become functional.

The Well Data File is the largest data base being developed by the Survey. This data base is able to input 37 data items from all types of well logs on file. Approximately 70 percent of the well log file has been entered into the system.

Summary:

Illinois is fortunate in having many excellent, long-term data bases available to water data users. The Illinois State Geological Survey is very interested in maintaining adequate staff and funding to continue the excellent work already begun and to initiate new programs as the need arises.

Survival of adequate collection of water data in Illinois will depend on all the agencies involved defining the minimum effort necessary for all data collection programs and working together with available resources to support this effort within each agency.

Illinois Department of Conservation

Gregg Tichacek

The Illinois Department of Conservation (IDOC) has since 1948 been collecting and utilizing biological, physical, and chemical data on Illinois' surface waters, as well as information on the public's recreational use of these water areas. The Department has broad responsibility to manage the animal populations which occur in Illinois' waters and to provide and manage recreational use of our water areas.

To carry out its responsibilities, IDOC employs trained aquatic and wildlife biologists, botanists, engineers, resource and recreation planners and managers, and law enforcement officers. This multi-disciplinary team collects and utilizes a wide variety of water related information in carrying out its responsibilities. The following describes the IDOC's water related data collection efforts, the use of that data, and agency data needs.

Fisheries Management:

The Illinois "Fish Code", as well as other statutes, charges the IDOC with the protection of native stocks of aquatic organisms including all fish, crayfish, mussels, reptiles, and amphibians, both aquatic, semiaquatic and terrestrial. The Illinois Fisheries Management Program is divided into four component areas of responsibility.

The Lake Michigan Project is staffed with three biologists, who in coordination with the Great Lakes Basin Commission's Fish Technical Work Group, monitor fish stocks in the Lake and assess sport and commercial harvest of native and introduced fish species. While most of the data collected is on fish populations, IDOC biologists also collect limited data on the Lake's physical and chemical attributes, i.e., dissolved oxygen, trubidity and vertical water temperature profiles.

The Reservoir Project is staffed by two fisheries management specialists who are responsible for the management of fish stocks in Illinois' three large Corps of Engineers Reservoirs - Carlyle, Rend, and Shelbyville Lakes. Information is collected annually on the disposition of fish populations and commercial fish harvest, and periodic surveys of angler harvest (creel censuses) are carried out on both the reservoirs and their tailwater areas. Limited annual physical and chemical information is collected for the following parameters: secchi disc turbidity, dissolved oxygen, pH, alkalinity, and hardness. Camping and general attendance information is also collected for all IDOC-operated properties on the reservoirs.

The Streams Project is divided into two management units, "north" and "south", with the dividing line running from east to west along the north edge of the Vermilion (of the Wabash), Kaskaskia, and Sny basins. Each office is

staffed with three biologists and, in addition to collecting stream related fisheries information, this staff has field review responsibility for Federal and State waterway permits, and cooperates annually with the Pure Food and Drug Administration, IEPA, and Illinois Department of Public Health in the collection at 80 stations of fish flesh samples for pesticide and heavy metal contaminant analysis. Stream personnel are presently cooperating with IEPA in a joint aquatic sampling program of Illinois stream basins. Information is being collected on fish and other aquatic life, physical characteristics and a wide variety of water quality indices. Stream personnel are also cooperating with the IDOT, Division of Water Resources, and the University of Illinois, Department of Civil Engineering, in the calibration of the U.S. Fish and Wildlife Service's incremental methodology for assessment of instream flow needs for aquatic life, recreational use, and other forms of navigation and the development of baseline flow data for 18 major basins in Illinois.

The Impoundment Project, like streams, covers the entire State. There are 18 fisheries biologists, each responsible primarily for the management of the fish stocks in the impounded waters of a number of counties or districts. Annual fish population studies are carried out on all IDOC-owned and leased waters and periodic fish population studies are completed on major public, homeowner controlled, and certain private water areas. Assessments are made of fish stocks and aquatic vegetation abundance, along with depth soundings, secchi disc turbidity, vertical temperature, dissolved oxygen, pH, alkalinity, and hardness profiles. A number of the previously mentioned fish contaminant samples are taken from these impoundments. Angler creel surveys are periodically carried out on State-owned and leased impoundments.

Fish Hatcheries:

Another facet of the IDOC's water related programs is the rearing and stocking of important game fish. Records of these plantings of fish have been maintained for over 40 years. The IDOC's new fish hatchery system now under construction will be able to rear nearly 50 million fish of 15 species annually. The renovated Little Grassy Hatchery near Carbondale began production in the fall of 1981, and will annually produce over 5 million channel catfish and redear sunfish.

At Sand Ridge State Forest in Mason County, the newest addition to the fish hatchery system will initiate production in the fall of 1982. At Sand Ridge, 13 species of cold water (trout and salmon), cool water (pike and walleye), and warm water (bass and sunfish) fish will be reared simultaneously under intensive production conditions in raceways. Utilization of the fish produced by the new hatchery system will require a much more detailed data base for each of the receiving waters.

Commercial Fishery Management:

Data on the harvest in Illinois of commercially important species of fish and mussels have been collected annually for over 20 years. To further the efforts of achieving the goal of total resource management, the commercial fishery section was created in the Division of Fish and Wildlife Resources in December 1980. This section is responsible for the management of the commercial fish and mussel resources statewide, excluding the Lake Michigan commercial fishery.

The commercial fishery program includes the planning and supervision of special commercial fishing programs for both fishes and mussels, issuing of fishing permits for waters not normally open to commercial fishing, assessment of commercial fish and mussel populations, collection of commercial fish flesh samples for contaminant monitoring, tabulation of statewide harvest data, review of projects impacting the commercial fisheries or their environmental impact reports, working with the commercial fishing industry and fishermen, and conducting various informational and educational activities related to this program.

Waterfowl and Furbearers:

Waterfowl biologists, as well as district wildlife biologists, annually collect both population abundance and nesting success information and monitor the harvest of waterfowl by Illinois hunters. The IDOC's furbearer biologist annually collects information on the populations of these water dependent mammals and their harvest by licensed trappers.

Diagnostic/Feasibility Studies:

Over the past 4 years IDOC planners, biologists, and engineers, working with the IEPA, USEPA, and several contractors have, with the use of funds then available through Section 314 of the Federal Clean Water Act, initiated diagnostic feasibility studies on several State-owned lakes. These studies identify the magnitude and source of physical and chemical problems associated with the lake and its watershed and develop economically feasible solutions for these problems. The future of these efforts is uncertain at present due to budgetary constraints at both the State and Federal levels.

Local Boating Assistance Program:

Since 1959 when the General Assembly passed the "Illinois Boat Registration and Safety Act", the IDOC, working through local governments, has assisted in the development of over 200 boating access sites on the State's rivers and major public impoundments, including Lake Michigan. This program is financed by an excise tax on marine fuels and lubricants, boat title and registration fees, and fines from violations of the boating law. Over

$1 million are available annually from this earmarked fund. The Department is at present carrying out an internal analysis of this program's effectiveness. This analysis includes a statewide survey of existing boating access sites and a survey of the attitudes, needs, and desires of the boating public.

Illinois Stream Information System:

In spring 1981, the IDOC's Division of Planning entered into a contract with the University of Illinois' Department of Landscape Architecture for the development of a computerized stream information system.

Since April 1981, a joint steering committee comprised of persons from the IDOC and the Illinois Environmental Protection Agency (IEPA) has worked with the U of I researchers and, to date, the following items have been completed:

1) The data base management system SIR-II (Scientific Information Retrieval), which is operational at the U of I, has been chosen to organize the data and permit the flexible interactive retrievals required.

2) The data base will be stored at the U of I Computer Center on a Control Data Corporation CYBER-175 computer with remote links to Springfield and other locations.

3) A hydrologically-oriented stream segment numbering and river mile indexing system has been developed, and all Sangamon River basin segments have been coded.

4) A stream segment file structure has been designed and some data have already been entered in the system.

5) Operational definitions have been developed for each of the over 130 stream parameters.

6) Data sources for most of the stream parameters have been determined and a collection methodology developed.

7) Two seminars for potential system users in both the IDOC and other State and Federal agencies have been held to describe progress to date and future activities.

During the next few months, the U of I project staff will collect and encode the stream station data that was collected for the Sangamon River basin and tests will be run of the data file structure and the retrieval programs.

The Illinois Stream Information System (ISIS) will eventually include information on over 130 chemical, physical, biological, and recreational use parameters, as well as information on the impact of man's activities, such as

damming and channelizing, for each of the State's 2,000 streams with a watershed of 10 square miles or more. When the computerized information system is operational, reviewing State and Federal water construction permits and projects will be streamlined through reduced turnaround and field review time. Water resource planners will be able to develop more environmentally sensitive project plans with early feedback on the resource impact of alternative courses of action.

The information system will be helpful in State planning for constructing boat access sites and locating canoe trail facilities. IDOC fisheries biologists, who have collected over 20 years of detailed fish sampling information on streams, will have readily available data for analyses on a statewide basis. Information on permitted and other actions which have modified Illinois streams will also be available for the analysis of the cumulative impact of these activities on individual streams, stream basins, and streams statewide. Additional uses of this stream information will undoubtedly be discovered when the data base is complete and in daily use.

Illinois Fish and Wildlife Information System:

In September 1981, the IDOC was approached by the U.S. Fish and Wildlife Service, the Office of Surface Mining, and the Bureau of Land Management and asked if it was interested in developing a computerized life history information system for the many animal species which inhabit Illinois. Utilizing a grant from the above agencies, the IDOC has retained the Illinois Natural History Survey to develop the Illinois Fish and Wildlife Information System (IFWIS). This system, when completed, will include detailed information on the life history requirements of nearly 1,000 fish, mammals, birds, reptiles, amphibians, mollusks, crustaceans, and important insects and other invertebrates that are known to occur in Illinois. The availability of these data will greatly facilitate the assessment of the environmental impact of development projects and the development of recovery plans for Illinois and federally endangered species. A 50-species sample will be computerized and ready for use by the fall of 1982 with project completion slated for 1984.

LUDA/GIRAS:

In April 1980, the IDOC entered into a cost sharing agreement with the USGS to accelerate the completion of the Illinois portion of its National Geographic Information System on Land Use and Land Cover. This system involves the development of topographic base maps and overlays upon which land use is recorded in polygon form for 92 separate land cover designations (LUDA maps). These polygon maps are then digitized and entered into a computer based data management system (GIRAS) for interactive retrieval. Illinois' LUDA maps are scheduled for completion in 1982 with the GIRAS component due in 1983.

Data Needs:

The Department relies heavily on chemical and physical, as well as its own biological, information related to a water area when developing species and total aquatic population management recommendations. The availability of data on all aquatic parameters varies for the State's water bodies. Chemical and physical information is most available for streams due to IEPA, the U.S. Geological Survey, the Illinois Water Survey, and various other agencies' long history of data collection. Biological information on streams is deficient statewide, a situation the IDOC is in the process of remedying through their cooperative stream sampling program with IEPA. In 1981, an intensive joint sampling program was begun on the Sangamon River basin. This basin will be completed in 1982 and the Lower Kaskaskia and Fox basins will also be sampled.

The IEPA's voluntary water quality data collection program, begun in 1981, will eventually provide information on the State's most important impounded waters and allow more intensive management of them in the future.

There are several areas where either needed data are lacking or existing data need to be organized. Except for work carried out by the U.S. Fish and Wildlife Service in the 1950's, the extent and diversity of Illinois' wetland habitats has never been cataloged. As a part of the Section 208 water quality planning process, the IEPA began the development of an information base for the major public impoundments in Illinois; however, the wealth of fisheries information on these and other water areas has yet to be organized and included. These tasks and others are presently under consideration by the IDOC for incorporation into the developing Stream Information System to create a total surface water resource information base hydrologically organized and retrievable.

Illinois Division of Water Resources

Mel Allison

The Division of Water Resources (IDWR) cooperates in the USGS surface water network and operates a limited program for surface-water data collection needed for design and operations.

The Division is divided into six Bureaus, with three Bureaus directly involved with needs relative to either surface-water data or analyical results. The Bureau of Planning is the lead Bureau in this area and is responsible for the (1) planning and design of flood-control projects; (2) gate operation of McHenry Dam & Lock; and (3) cooperating with the National Weather Service for flood-forecasting efforts.

To achieve these goals the Division either cooperates in or operates the following gages:

In cooperation with the USGS

56 continuous recorders
11 crest gages
6 stage only recorders

Operated by IDWR

20 continuous recorders
15 Telemarks (cooperating with NWS)
166 crest gages
27 staff gages
6 rain gages

Data received from this network are utilized to produce (1) flood-frequency analysis, (2) rainfall-runoff modeling, (3) NWS flood-forecasting, and (4) operation of McHenry Dam.

The USGS gages are generally utilized for determination of long-term regional basin characteristics and rainfall-runoff models. When problems occur in the development of rainfall-runoff models, the Division has the capacity of placing continuous recorders at site specific locations which may be accompanied by rainfall gages. These stations are considered short-term stations, and are used for determining basin characteristics, hydrograph shape, and infiltration characteristics.

If information is desired from the Division of Water Resources by other agencies it is generally supplied in raw form and would have to be interpreted by the requestor. Generally this information is collected and utilized for high-flow conditions.

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

Bill Koellner

The Corps of Engineers (USCE), in its water management activities, either directly gathers or financially supports the gathering of water stage, flow, quality, sediment, precipitation, evaporation, and wind data.

The water related mission of the USCE can be classified primarily into three main categories: Real-Time operation of projects; Emergency Operations and/or Mobilization; and Design and/or Planning.

In the Rock Island District (RID) we operate three reservoirs with multiple-use purposes. Those purposes are flood control, water supply, low flow releases, and water quality. We also operate 19 Locks and Dams for navigation. The monitoring of streams which directly flow into these projects or are tributary to those streams requires a sophisticated network of data collection equipment and parameters sampled. The type of operation required dictates the accuracy and time interval of reporting for the parameters sampled. Obviously, in a real-time mode and particularly during either high or very low river conditions, the accuracy and frequency of samples collected dictates how well the agency can respond to the problems identified.

As an agency who has a large responsibility in water management, the importance of data availability by reliable equipment and in a "real-time" mode has forced us to begin planning for upgrading our existing system to an automation system for data collection.

Our first step was in December 1981, when we installed a Harris 500 Computer which is now presently being programmed to gather, compute, archive, and disseminate remote hydro data in a time frame which is necessary for the water manager to make decisions. We have begun, in 1982, a systematic upgrading of field equipment to support the accurate collection and reporting of the vital hydro and metro data.

In conjunction with other USCE Districts in the Upper Midwest, a Master Plan for water-data management and collection was prepared and approved by our Office of the Chief Engineer. This report initially identified specific types of equipment and the time frame in which either new gages or station modifications would be made.

We have purchased new pool and tail recording gages for the Illinois Waterway. These will be sending data automatically over leased telephone lines every 2 hours to the RID Harris Computer. These gages will be installed during 1982. Several other stations are planned to have auto-reporting capabilities added and these will be mainly on the larger tributaries to the Illinois Waterway.

This is mainly being done to provide an increased accuracy to our hydrologic model for flow forecasting on the Illinois Waterway and to aid in data availability during high water or potential emergency conditions. Eventually, all major tributary stations will have automatic real-time reporting stage gages and precipitation as minimum parameters sampled.

The specific type of remote data collection equipment could fall into one of several categories: leased telephone line, DARDC, telemark, radio telemetry, microwave, or DCP (satellite). The advent of more economical DCP's are trending many agencies to install this type of data collection equipment, particularily with the random access capability as compared to older equipment with only self-timed channels.

The upgrading of these field stations will improve data availability to all users. It is planned that the "real-time" field data will be made available to all users. For example, NWS is working with our office on establishing the appropriate communication protocol for their Data General Computer to talk to our Harris. During this conference, I look forward to discussing with the various agencies your needs for the data we collect. Not only is the information collected used for operation, but it is also archived and used in the Design/Planning function in our office.

Our office, as I'm sure do the other USCE offices, endorses as many agencies as possible in participation in data collection and publication. Projects would not be built today without that data, problems could not be solved if that data were not available. We strongly endorse continuation of data collection by your agencies. Hydropower studies would not be completed to an accuracy for determining project authorization if good hydro records were not available.

In several earlier eras such as the 30's and the 50's, the Federal government had to reduce funding and support to stations in Illinois and other States.

In some cases records were broken because of the lack of funding. We in the RID have felt the reductions of FY 82 budgeted money. This has heavily impacted on the station support in Illinois. It has been through the cooperative effort by other State agencies that water stations are to be continued. FY 83 is an unknown, but it is not too early to plan. This conference can serve as a catalyst to all of us to attempt to resolve problems before the rush of October is on us. I look forward to inter-relating my agencies specific needs and future plans.

U.S. Geological Survey

Gary Balding

The Water Resources Division (WRD) is only one of several Divisions within the U.S. Geological Survey. The stated mission of WRD is to provide hydrologic information and understanding needed for the optimum utilization and management of the Nation's water resources. Within this mission statement the WRD:

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

2) Conducts analytical and interpretative water resources appraisals describing the occurrence, availability, and physical, chemical, and biological characteristics of surface and ground water.

3) Conducts supportive, basic, and problem-oriented research in hydraulics, hydrology, and related fields to improve the scientific basis for investigation and measurement techniques.

4) Disseminates the water data and the results of these investigations and research through reports, maps, computerized information, and other public releases.

5) Coordinates the activities of Federal agencies in the acquisition of, and access to, water data.

To accomplish its mission the WRD receives funding from three principal sources:

1) Direct appropriations from Congress for programs of high priority, and national or regional in scale.

2) Funding from other Federal agencies to provide them data necessary to carry out their programs.

3) Direct funds, also appropriated by Congress, to be used solely in 50-50, cost sharing cooperative programs with State and local governments to provide information important to them that also supports the national evaluation program.

The activities of the Illinois District of the WRD fit into the mission and funding categories just mentioned. We have a handout available for you here today that describes the activities of the Illinois District in 1981. Many of you are listed as cooperators in this handout and many of the activities are those that are funded in total or in part by you and have been mentioned by some of you today.

Within the Illinois District the data-collection activities of stream gaging, sediment discharge, water quality, and water use are almost entirely within the cooperative program of shared funds or funded by other Federal agencies. (See Appendix C) In regard to stream gaging, the Illinois District is currently operating 166 gaging stations, approximately half of which are funded under the cooperative program and half are funded entirely by other Federal agencies, namely the four districts of the U.S. Army Corps of Engineers (USCE) represented in Illinois (Chicago, Rock Island, St. Louis, and Louisville).

In regard to sediment data collection activities, the Illinois District operated 31 sediment stations last year; 9 are presently still in operation. Most of the sediment data collection is funded by the Corps.

Water quality monitoring occurs at 207 sites in the District. Most of these are the ambient water-quality sites of the Illinois Environmental Protection Agency (IEPA).

The water-use program in the District is a cooperative program with the Illinois State Water Survey (ISWS).

A statewide ground-water quality program is currently being worked on in cooperation with the ISWS and IEPA. The effort involves designing and implementing a ground-water quality monitoring network in the State.

Other projects within the cooperative program include the following:

1) Measurement and regionalization of time of travel and stream dispersion for Illinois streams (IEPA).

2) Measurement of sedimentation rates during urban construction (IDWR).

3) Monitoring of water quality and sediment transport from a sewage sludge application site in Fulton County (MSDGC).

4) Measuring the effects that detention ponds in urban areas have on water quality (NIPC).

5) Determination of low-flow characteristics of Illinois streams (USCE, IDWR).

6) Evaluating the utility of using bedload samplers for measuring transport of sediment in Illinois (USCE, IDWR).

7) Developing a regionalization of time of concentration and storage coefficients and loss-rate parameters for Illinois (IDWR).

We are also evaluating the current stream-gaging network in Illinois in cooperation with IDWR; many of you have recently received a questionnaire concerning this evaluation. This questionnaire will be a major input toward a prioritization of needed stream gages and will be utilized for better network design or in the event that budget constraints force a streamlining of the gaging station network.

Federal agencies which have supported District project activities include the U.S. Army Corps of Engineers, the Nuclear Regulatory Commission, and the Department of Energy. These agencies have supported such diverse activities as:

1) Discharge ratings for dams on the Illinois and Des Plaines Rivers.

2) Estimating long-term sediment yields from small basins.

3) Time of travel studies in streams.

4) Studies of radionuclide migration in ground water.

Some of our project activities in Illinois are funded under the Federal programs that are of a national or regional scale. Basically they address two national concerns; namely, the availability of ground water as a water supply and concerns related to energy production. The Northern Midwest Regional Aquifer System Analysis is a study of the deep Cambrian-Ordovician sandstone aquifer in northern Illinois and in five neighboring States. Our study of this aquifer in Illinois involves the cooperative efforts of the Illinois State Geological Survey and the Illinois State Water Survey.

Our energy-related studies in Illinois are directed at the hydrology of the coal-producing areas and at the hydrologic problems associated with disposal of radioactive waste. We have a rather extensive program at the low-level radioactive-waste disposal site near Sheffield. Activities involve well drilling and tunneling in order to evaluate potential radionuclide migration in both the unsaturated and the saturated zones. Sediment transport studies are also being done at the site. We also have a project to evaluate the migration of tritium in ground water at the old Argonne Lab rad-waste site in the Palos Forest Preserve in Cook County.

Hydrologic studies of coal-producing areas in Illinois include a reconnaissance-type, basin-by-basin investigation as part of a broader study of all the Eastern Interior coal field. There are also site-specific studies to look at changes in the rates of sediment transport, changes in water quality, and in ground water hydrology that occurred during mining and reclamation operations.

FUNCTIONS AND ACTIVITIES OF OFFICE OF WATER DATA COORDINATION

Porter Ward

First, I want to thank you for allowing me to meet with you here in Peoria. I hope that while I have the floor the next several minutes, you will hear something useful or, at least, interesting. I would like to keep this informal, so if you have any questions, please interrupt me. First, I would like to tell you what the Office of Water Data Coordination (OWDC) is, why it exists, and how it came into being. I then would like to describe the general responsibilities of my office with emphasis on hydrologic data and information exchange. I will briefly describe some of the things we have done and how they might relate to the users of hydrologic data in Illinois. I will conclude with a few words on what we are currently trying to do and where I think we should be going in the future.

In the 1950's and 1960's, the environmental movement was gathering momentum. The actual beginning of this movement is not discernible, but the Senate Select Committee on Water made its recommendation somewhere near the beginning

of the movement. A major player in this activity was Senator Kerr of Oklahoma. During the 60's, there was a proliferation of environmental legislation at the Federal level, which was quickly followed by similar legislation by State and local agencies. Much of this legislation, of course, was water related. Within the Federal Government, many agencies were already collecting hydrologic data; others had need for such information and others were gearing up to collect hydrologic information so that they could meet their newly mandated responsibilities. Agencies, for the most part, were collecting their own data and for their own particular need. They were collecting it by different methods and at different levels of accuracy. Often, after the data were collected, it was filed, and, perhaps, even forgotten. In other words, the agencies were going in their own directions with little consideration for the needs of others and little perception of the potential for multiuse of hydrologic data.

As hydrologic activities accelerated in the Federal Government, the Office of Management and Budget (OMB) perceived the need for some type of coordination mechanism, so in August 1964, they issued Circular A-67. (See Appendix D) This circular calls for coordination of water data acquisition activities of the Federal Government.

The responsibility for coordination, as spelled out by this circular, was given to the Secretary of the Interior, who, at that time, established two Advisory Committees (see Appendix E) to advise and assist in carrying out the responsibilities of the circular. One Committee is the Interagency Advisory Committee on Water Data (IACWD); it is made up of members from 30 Federal agencies. The other Committee is the Advisory Committee on Water Data for Public Use; it consists of non-Federal members. The latter Committee has two types of members. The first group is made up of individual members chosen for specific knowledge or expertise in hydrologically related fields. The second group consists of representatives of various organizations such as the Association of State Geologists, Chamber of Commerce of the United States, National Governors' Association, and others. These two Committees meet at least annually and have influenced virtually all of the Survey's water programs.

Delegation of authority downward is standard practice in the Federal Government, and coordination is no exception. As I stated, OMB directed the Secretary of the Interior to be responsible for Circular A-67. The Secretary, in turn, delegated the Director of the Geological Survey responsibility for administrating the circular's responsibilities. The Director, in turn, delegated to the Chief Hydrologist of the Water Resources Division this responsibility; and he, in turn, created the Office of Water Data Coordination.

Very briefly, what the circular calls for is: (1) the maintenance of a central catalog of information on water data and on Federal activities being planned or conducted to acquire such data; (2) the continuing review of water data collection activities of all Federal agencies; (3) the design and operation of a national network for acquiring data on the quantity and quality of surface and ground waters, this network is operated and managed by the Water Resources Division, and its design, though complete, is being constantly

modified to meet the changing hydrologic needs of the Country; and (4) the establishment of a lead-agency concept and leadership in achieving coordination of water data activities. Another important requirement of the circular is that a "Federal plan" must be maintained for efficient utilization of network and specialized water data.

One of the items that I mentioned as being called for in A-67 was the maintenance of a catalog of information on water data and on Federal activities being planned and conducted to acquire water data. The information for this catalog is obtained from two principal sources. The first input is from field level Federal liaison officials, of which there are about 200 from 30 different agencies at the present time. Their input gets down to data station level. That is, they tell us what stations they will continue to operate, what stations they plan to install, and what stations they would like to put in, but do not have the resources to do so. Input is also made by interfacing with other computers. We add to our catalog file by interfacing with the Geological Survey's water data files, and USEPA's water quality file, and even the State of Texas' natural resources file. The catalog is housed in the Geological Survey and is called the Master Water Data Index, which is maintained by the National Water Data Exchange or NAWDEX. Some of you, I am sure, are familiar with that file. Though this file is not yet complete, and probably never will be, it contains a large amount of very valuable information. I would like to illustrate what is in this file from the State of Illinois (see Appendix F).

Now for some of the current activities my office is engaged in. (1) During the past few days, I have met on several occasions with personnel from the Department of the Interior engaged in developing an Office of Water Policy. The original intent of establishing a water policy office was to formulate policy for the entire Federal Government. However, as it now stands, it will only deal with water policy with the Department of the Interior. The people putting this office together are interested in our coordination mechanisms and activities, especially our many contacts and committees, including the Advisory Committees I mentioned previously. I feel that in order for the Policy office to have credibility among the States and other agencies, it must make decisions and establish policy based on sound scientific, hydrologic data and information, and that is why I have been working with them. (2) Another activity that I am currently involved in is that I am working with Federal agencies to improve the Federal Plan for Water Data Acquisition Activities. This plan is prepared by the IACWD. We are attempting to include information on such things as budgets and contract activities. (3) We have a new work group looking at what we refer to as automated networks. For example, we are getting the agencies together that are designing and beginning to use satellite systems for the transmission of hydrologic data. We want to insure that all the agencies' systems are compatible with each other and that there is no redundancy in these systems. Early on, my office recognized the need for more uniformity of methods for acquiring hydrologic data; so, we began the development of a National Handbook of Recommended Methods. Currently, 12 chapters are either completed or in preparation.

My personal feeling is that the coordination exercise which began in 1964 generally has been a success--agencies know pretty much what each other are doing; and to a large degree, they know what each are planning to do. This is continually insured by the many work groups, subcommittees, etc., and we all know each others methods for acquiring data, its accuracies, etc. We have a ways yet to go on getting the catalog of information to a more complete level, and we must constantly work with the non-Federal sector; but as for coordination in the Federal Government, I feel what we need to do now is enter into a new phase of coordination. We need to make a strong push toward interagency supported projects and programs. This will not be easy and may even require OMB to take some new approaches to the way they treat and view parts of agency water budgets. I feel this is very important; and with shrinking resources in the Federal Government, if we do not work together, we will not be able to provide the hydrologic information needed by various agencies to meet their mandated requirements.

WORK GROUP SUMMARIES

Surface Water Work Group Leader:

Robert P. Clarke,
Illinois Environmental Protection Agency

Twenty-nine individuals representing nine different Federal and State agencies attended the surface water work group. A list of those who attended either one or both days is given at the end of this summary. The work group had a broad discussion of resource management programs and concluded that an essential element of any resource management program is the data and information base. A good water assessment process requires the following levels of data management:

1) An adequate data/information base.

2) Data/information transfer and interactive capability.

3) Use of data/information in management decision making.

The group agreed that adequate data and other information is required to make informed decisions. The degree of detail and accuracy of information must be determined by the needs for the information. The following was defined as the basic needs for water information:

1) Basic resource data and information to evaluate long-term trends and ambient conditions from fixed benchmark sites.

2) Problem solving data and information to help define short and long-term formulation of control strategies.

3) Accountability of various resource management strategies for benchmark and special studies and/or problems.

The solutions to data needs must account for the degree and extent of a problem. In addition, data collection must respond to various demands ranging from site specific to regional/State concerns.

The general focus of work group discussions dealt with common problems and possible solutions. The following is a summary of and recommendations on some of the major problems discussed:

Problem 1: Station Identification

Considerable discussion centered around agencies being able to share data collected at sites when each agency stores their data, sometimes even in the same computer file, under different station ID numbers. A real need exists for a common coding index that may be used statewide and in conjunction with each agency's own coding system. The agencies represented were polled as to which system they use and the results are as follows:

USEPA: River Reach file
USGS: Downstream Ordering System
IEPA: Alpha-numeric basin
IDOC: Modified Minnesota System
ISWS: Hydrologic Unit Code, subwatershed system-less than 250,000 acres
USCE: Would have to use a nationwide system (could use a "Universal State code" as a cross-reference)
ISGS: Uses own codings based on watersheds

From the agencies responses, it was evident that some "Universal State code" system would be extremely beneficial. The USEPA River Reach file was discussed as a possibility.

Recommendation:

A work group be established to adequately consider using a uniform water data coding system for the State of Illinois.

Problem 2: Long-term vs. problem oriented data collection

With current funding projection, reductions in quantity and quality stations are being considered. Most agencies are having to take a good look at what stations are being funded and the justification for each. Concern was raised about the problems faced with trying to justify the "long-term benchmark" stations. The USGS and IDWR reported that they are presently evaluating the total USGS streamgaging network, and that questionnaires have been sent

out to all agencies who participate in the streamgaging program. IEPA indicated a significant cut in their ambient water quality network had been considered. USCE has had to cut back to a "bare bones" network which it needs to support its emergency flood warning network and to operate its projects. It was pointed out that many basin studies supplement the long-term station information but quite often the basin study time is too short to allow for the 5-10 years of data that is needed to define many hydrologic parameters.

In spite of recent GAO criticism, it was agreed that the concept of long-term stations and of ambient networks should not be dropped. Basin studies and special (intensive) surveys should build on ambient-benchmark programs.

Recommendation:

Identification of the significance of benchmark sites and networks for both water quality and quantity data would be beneficial in helping to retain these networks and should be done.

Problem 3: Maximizing Efforts

The concept of developing a schedule of when certain basins would be studied intensively was discussed. It was felt that maximum coordination and benefit could be achieved if a rotational schedule was developed. This schedule would lay out which basins would be studied during which years. This would allow agencies to plan ahead so that their study would coincide with other agencies' studies being conducted during the same years in the same basins. This would maximize the data collected while minimizing the cost and duplication of effort.

IEPA discussed its volunteer lake monitoring program as a way of cutting costs from large data collection programs. This program used treatment plant operators and citizens to do some of the data collection. Local park districts and public works departments were mentioned as other possible sources of volunteers.

Recommendations:

1) Develop a cooperative working agreement between agencies to identify a basin rotational schedule to be considered by all data collecting and using agencies.

2) To try to improve coordination and cooperation by agencies for ambient efforts and special studies.

3) To continue to use innovative approaches such as volunteer efforts to maximize data effectiveness.

Summary:

The general agreement of the cooperating agencies was that water monitoring agencies must work together to provide the most effective data decision base necessary for multipurpose programs. It was agreed that a committee of various State and Federal agencies should be formed and meet on a periodic basis. The general context of the discussion should be relayed to the State Water Plan Task Force so that data/information needs and systems are adequately considered in water management decisions and any constraints or contribution that can be made. A work group should meet during April to determine priority of ambient sites for a long-term flow and water quality network.

Surface Water Discussion Group

Name	Agency	Phone
Jill Hardin	IEPA, Springfield	217-782-3362
Nani G. Bhowmik	ISWS, Champaign	217-333-0238
Bill Koellner	USCE, Rock Island	309-788-6361
Vernon Norman	USGS, Wisconsin	608-262-1847
Gary R. Clark	IDWR, Springfield	217-782-3488
Louis K. Scheffel	USCE, Chicago	312-353-6470
Allen W. Noehre	USGS, De Kalb	815-752-1162
Ted Postol	USCE, St. Louis	314-263-5031
Eva Howard	USEPA, Chicago	312-886-6233
Ken Rogers	IEPA, Springfield	217-782-3362
Daniel Injerd	IDWR, Chicago	312-793-3123
Roger D. Selburg	IEPA, Springfield	217-782-1724
Ralph L. Evans	ISWS, Peoria	309-671-3196
Raman Kothandaraman	ISWS, Peoria	309-671-3196
Ben B. Ewing	UIUC Inst. Envir. Studies	217-333-2503

Surface Water Discussion Group--Continued

Name	Agency	Phone
Gary Balding	USGS, Urbana	217-398-5360
Bob Thomas	IEPA, Springfield	217-782-3362
Keith M. Donelson	SCS, Champaign	217-398-5298
Murray Pipkin	IDWR, Springfield	217-782-4637
Ming T. Lee	ISWS, Champaign	217-333-4959
Christine Liszewski	USEPA, Chicago	312-353-2155
Mike Terstriep	ISWS, Champaign	217-333-4959
Mel Allison	IDWR, Springfield	217-782-4637
Ivan L. Burmeister	USGS, Iowa City, Iowa	319-337-4191
Krishan Singh	ISWS, Champaign	217-333-0237
Jim Mick	IDOC, Springfield	217-782-6424
*Robert Clarke	IEPA, Springfield	217-782-3362
Jerry McCain	USGS, Reston, Virginia	703-860-6985
Porter Ward	USGS, Reston, Virginia	703-860-6931

* Group Leader

Ground Water Work Group Leader:

Ross Brower,
Illinois State Geological Survey

The meeting began with each participant giving a short summary of the current ground-water activities of their respective agencies. Eight agencies were represented; a list of participants is at the end of this summary.

A general discussion followed on ground water data needs and on how ground water data are used. The discussion centered around questions such as site specific vs. regional data collection, raw vs. summarized, and statiscal vs. measured. It was concluded that (1) Illinois has a strong ground-water data base but that gaps exist in both areal and subject coverage; (2) there is a need for standardization of field collection and laboratory analysis techniques; and (3) a need exists for the standarization of the definition of terms used in ground water hydrology.

Problems associated with ground-water data bases were then discussed. Typically the data in most data bases have been gathered for short periods of time for specific projects and thus, these data bases are usually site and objective specific. Funding problems seem to be the major controlling factor in trying to develop and maintain long term data networks. Some of the characteristics of the more useful data bases are (1) long term, (2) comprehensive, (3) accessible to users, and (4) data assurance is good for both the site location and the value of the parameters.

The following is a summary of the major problems identified during the ground water work groups discussion on data bases:

1) Access to data: several agencies are conducting studies into the problems associated with access to data. Problems are associated not only with privileged or limited access data but also with some data requiring special instructions for proper use and interpretation. These instructions should be identified in the data base.

2) The high cost involved with collecting, evaluating, and storing data in a format usable by other agencies.

3) Verification and assurance of the quality of the data.

4) Determining what data should be stored in a centralized file. No real problem exists when dealing with a small data base. However, problems grow as the size of the data base and number of parameters stored increases.

5) Many data bases are quite rigid and are oriented towards specific projects.

6) Too often, data collection and storage programs are developed as a result of some crisis situation (i.e., drought, toxic spill, etc.) which does not permit adequate planning to match-up the new data with existing data bases or related projects of other agencies.

A great deal of discussion centered around the concept of a centralized data system for Illinois. Different States have set up centralized data bases with varying degrees of success. The Illinois Natural Resources Information Center study is an initial intra-agency data management study being conducted in DENR. It was agreed that a centralized data base for Illinois would be

beneficial; however it would take approximately 3 years to develop such a data base and funding would be a major problem. Long-term funding commitments by the agencies involved would be necessary before the project could be undertaken. The data base system should be simple and non-rigid so that it can be comprehensive and usable by all agencies.

Recommendations:

1) All agencies need to cooperate and coordinate more effectively with each other in the collection, storage, and retrieval of data.

2) Standards be adopted for the collection and analysis of ground-water data in Illinois.

3) A glossary of standard ground water terms be developed.

4) The State should consider the establishment of a statewide data center that at its minimum operational level would index all data gathering activities and act as a coordinator for the placement of data from all water related activities of the various agencies operating within Illinois.

5) A centralized data base system be developed to store all water related data collected in Illinois. This data system should have adequate flexibility to accomodate present and future input and retrieval usage.

6) That an interagency committee be set up to discuss ground-water data base problems and to set up initial guidelines for the development of a centralized State data base.

7) That adequate funding be sought to fund long term data collection programs and to support the agencies operating the storage facilities for these data.

8) If a centralized data base is established, a system for periodic review of the system and data going into it should be set up.

Summary:

There is general agreement that groundwater data collectors and users should more closely coordinate many of their project activities to avoid duplication of effort, become more aware of related activities being done by other agencies, use available indexes describing the general content of the various data bases and projects, coordinate project funding, and find ways to reduce costs of collecting data and maintaining data bases. Groundwater is becoming increasingly important to our economy and in the next ten years it may become a very significant economic and political issue. Therefore, adequate data describing the distribution, availability, chemical-physical

characteristics, and character of the medium in which it is found will be needed for the development of water supplies, planning efforts, engineering studies, legal questions, etc. There is before us the awesome task of providing data that will allow us to make the best use of this valuable resource and at the same time understand the principles governing its occurrence so that it can be adequately protected.

Ground Water Discussion Group

Name	Agency
Rauf Piskin	IEPA, Springfield
Charles Bell, Jr.	IEPA, Springfield
Dick Schicht	ISWS, Champaign
Jim Pendowski	IEPA, Springfield
Bill Rice	IEPA, Springfield
Ray Giese	USEPA, Chicago
Marv Sherrill	USGS, Urbana
Sam Mostoufi	IDWR, Springfield
Glenn E. Stout	Water Resources Center, U of I
Jim Gibb	ISWS, Champaign
Porter Ward	USGS, Reston, Virginia
Gerald McCain	USGS, Reston, Virginia
*Ross D. Brower	ISGS, Champaign

* Group Leader

Data Management Discussion Group Leader:

Robert A. Sinclair,
Illinois State Water Survey

The discussion group first met at 1:30 P.M. on February 23, 1982. There were 10 people present for the discussion the first day (see attached list) and 14 were present on the second date.

The charge to the group was to discuss the following topics or areas:

1) Types of data available?

2) Where are the data?

3) Desired products and goals?

4) Real time data?

5) Machine readable data (MRD) - non-machine readable data.

6) How to accomplish better data accessibility and management.

The first 2 hours of the discussion were spent on items 1 and 2: types of water data and where the data are.

The Water Data Inventory Matrix (WDIM) (table 1) fairly well covers items 1 and 2. The group developed this matrix and Larry Toler has been kind enough to verify its accuracy and to develop it further if possible.

The discussion turned to the topic of what should the goals of water data management be? The group put forth the following goals:

1) Concept of all agencies sharing data must be encouraged.

2) Documentation of data collection and methods of collection should be done. The procedures described in the "National Handbook of Recommended Methods for Water-Data Acquisition" should be used if possible.

3) Documentation of the forms of the data should be done, e.g., MRD - non-MRD, extent of the data collection, geo-coding used.

4) The data should carry a level of quality assurance with it.

5) Data manager should be involved at the data collection stage of a project.

6) The goal of automated networks of data collection and entry in machine readable form is most desirable. Porter Ward pointed to the fact the most desirable factor about this goal is that it can save money.

7) Extensive work and coordination should be done to reduce duplication in data collection by various agencies.

8) Each agency should develop and maintain a data catalog and index.

9) Encourage training at all levels in automatic data management and/or processing. Many individuals feel that people in data management have not done enough work in the area of educating the users about the data processing and management tools that are available to them.

10) Increase coordination among agenices. This is to help the problem of duplication and in the area of the cost of data collection.

11) Make the raw data available to the public. Of course the raw data must be of good quality.

12) Increase multi-agency support for agency collection of data which has multi-agency importance. Gregg Tichacek of the Department of Conservation felt if various agencies found common good in various other agencies' data collection and management programs that they should be as vocal as possible.

At this point the discussion group directed its attention toward the products water data management should strive for:

1) Publish basic data.

2) Improved basic data reduction and analysis techniques.

3) More graphics type products.

4) Products should be presented in the form(s) best to meet the consumer/user needs.

5) Data compatibilities should exist between agencies for better product development and increased interaction between computers.

6) Development and use of non-MRD technology and products.

The final hour of the morning of February 24th was consumed talking about "how to accomplish better data accessibility and management." The plan of attack was as follows:

1) Verification of the data inventory matrix.

2) Larry Toler will chair the data matrix activities.

3) Further review by other agencies of our goals.

4) Statewide water coordination committee should be formed consisting of all water-related agencies.

5) The Army Corps of Engineers, the Illinois Environmental Protection Agency, the United States Geological Survey, and the State Water Survey will lead in forming such a committee.

Summary:

A most worthwhile exchange of thoughts, ideas, and plans were put forth at the group discussions. As Bob Clarke (IEPA) and Ross Brower (ISGS) pointed out in these group discussions wrap-ups, it remains to be seen if the interaction fostered among the water related agencies can be sustained upon returning to the day-to-day work routine and pressures within the individual's agency. There seemed to be the lack of a clear cut plan of action or well defined procedures on how to attain the goals or objectives the group discussions feel so strongly should be worked toward.

Data Management Work Group

Day 1, February 23, 1982

Name	Agency
Bob Culli	IDWR, Springfield
Arlan Juhl	IDWR, Springfield
Larry Toler	USGS, Urbana
Joseph Raoul	USCE, Chicago
Shundar Lin	ISWS, Peoria
Gregg Tichacek	IDOC, Springfield
Charles Specht	Farmers Home Administration, Champaign
Richard Lanyon	Metro. Sanitary Dist. of Greater Chicago, Chicago
Gary Williams	USEPA, Chicago
*Bob Sinclair	ISWS, Champaign

Day 2, February 24, 1982

Name	Agency
Larry Toler	USGS, Urbana
Vernon Norman	USGS, Madison
Ivan Burmeister	USGS, Iowa City
Charles Specht	Farmers Home Administration, Champaign
Eva Howard	USEPA, Chicago
Joseph Raoul	USCE, Chicago
Louis K. Scheffel	USCE, Chicago
Arlan Juhl	IDWR, Springfield
Richard Lanyon	Metro. Sanitary Dist. of Greater Chicago, Chicago
Ted Postol	USCE, St. Louis
Bob Culli	IDWR, Springfield
Mel Allison	IDWR, Springfield
Porter Ward	USGS, Reston, Virginia
*Bob Sinclair	ISWS, Champaign

* Group Leader

WATER DATA INVENTORY MATRIX

Table 1

	US FISH & WILDLIFE	US GEOLOGICAL SURVEY	ARMY CORPS OF ENGINEERS	IEPA	USEPA	DEPT OF CONSERVATION	DIV OF WATER RESOURCES	NATURAL HISTORY SURVEY	STATE GEOLOGICAL SURVEY	STATE WATER SURVEY	NOAA	LOCAL GOVERNMENT	PRIVATE INDUSTRY	UNIVERSITIES	IL DEPT OF AGRICULTURE	US DEPT OF AGRICULTURE
Streamflow		X	X		*		X									
Sediment		X	*	X	*					X					X	X
Water Quality (Physical-Ground)	*	*	X	X					X	X						
Water Quality (Chemical-Ground)	*	*	X	X					X	X						
Water Quality (Biological-Ground)			X							X						
Water Quality (Physical-Surface)		X	*	X	X	*		*		X				X	X	X
Water Quality (Chemical-Surface)		X	*	X	X	*		X		X				X	X	X
Water Quality (Biological-Surface)	X	*		X	X	X		X		X				X		
Precipitation		*	*	X	*		*			X	X			*		*
Evaporation			*							X	X					
Groundwater Levels		*	*	*					*	X						
Groundwater Hydraulics		*	*						X	X						
Aquifer Descriptors		*	*						X	X						
Water Use		X	X	X	X											
Recreation	X		*	X	X	X										
Public Supply		X	*	X	X		*			X						
Industrial Supply		X		X						X						
Irrigation					*					X				X	X	X
Navigation	*		X													
Withdraws		X								X						
Returns												X	X			
Aquatic Life	X					*		X		X				*		*
Watershed Characteristics		X	X	X			X			*				X	X	X

* some data

X extensive data

CLOSING REMARKS

Doug Glysson

I will keep my closing remarks short and will not try to summarize what has already been said. Bob Clarke, Bob Sinclair, and Ross Brower have just given excellent summaries of their work groups.

I think, if I had to pick one major thing that has emerged from this meeting, it would be that we all need to improve the coordination and cooperation between our agencies. We have laid the framework here to do that but I think we would all agree that much more can and needs to be done. As Porter Ward pointed out last night, the Federal agencies have been trying to coordinate their activities for over 15 years now and still have not completed the task.

During the last 2 days, we have closed the gaps between our agencies considerably. The proof, however, of how successful this meeting was lies with what we do after we leave here today. If we return to our offices and our old ways, the meeting will not have been a success. However, if we return to our agencies and push for future cooperation and coordination, then our time here will have been time well spent.

The work groups have suggested a number of committees and work groups be formed. These groups should go a long way in furthering the coordination activities within Illinois.

Before I close, I would like to thank all the speakers and group leaders for their help in putting on this meeting. I would especially like to thank Bob Clarke and IEPA for co-sponsoring the meeting with us and thank all of you for coming and participating.

APPENDIX A

List of Attendees

U.S. Geological Survey

Gerald F. McCain, Reston
Larry G. Toler, Urbana
Porter E. Ward, Reston
Dennis K. Stewart, Indiana
Vernon Norman, Wisconsin
G. Douglas Glysson, Urbana
Gary O. Balding, Urbana
Marvin G. Sherrill, Urbana
Linda R. Saban, Urbana
Allen W. Noehre, De Kalb
Ivan Burmeister, Iowa

U.S. Army Corp of Engineers

Bill Koellner, Rock Island Dist.
Paul R. Roberson, Louisville Dist.
Ted Postol, St. Louis Dist.
Louis K. Scheffel, Chicago Dist.
Joseph Raoul, Chicago Dist.

U.S. Environmental Protection Agency

Gary A. Williams
Eva Howard
Ray Giese
Chris Liszewski

U.S. Soil Conservation Service

Keith Donelson

U.S. Office of Surface Mining

Charles E. Sandberg

U.S. Fish and Wildlife Service

Gail Peterson

Farmers Home Administration

Charles Specht

Illinois Environmental Protection Agency

Rauf Piskin
Robert Clarke
Kenneth Rogers
Charles Bell
Bill Rice
Jill Hardin
Jim Pendowski
Richard J. Carlson
Roger Selburg
Bob Thomas

Illinois State Water Survey

Richard J. Schicht
Michael L. Terstriep
Ralph L. Evans
Nani Bhowmik
Raman Kothandaraman
Bob Sinclair
Ming Lee
Shundar Lin
Kris Singh
Don Roseboom
James Gibb

Illinois State Geological Survey

Ross D. Brower

Illinois Department of Transportation, Division of Water Resources

Murray Pipkin
Dan Injerd
Siavash Mostoufi
Arlan Juhl
Gary R. Clark
Robert Culli
Mel Allison

Illinois Department of Conservation

Gregg Tichacek
Jim Mick

Illinois Water Resources Commission

Ben B. Ewing

Metropolitan Sanitary District of Greater Chicago

Richard Lanyon

Water Resources Center, University of Illinois

Glenn E. Stout

APPENDIX B

Ambient Water Quality Monitoring Network

Water Column Parameters

Universal Parameters: pH (00400), temperature (00010), electrical conductivity (00094), dissolved oxygen (00300), total suspended sediment (00530), total volatile suspended sediment (00535), total ammonia nitrogen (00610), nitrite-nitrate nitrogen (00630), chemical oxygen demand (00335), fecal coliform (31616), and flow (00060 or 00061).

Total ICAP-OES Parameters*: Barium (01007), boron (01022), cadmium (01027), chromium (01034), copper (01042), iron (01045), lead (01051), manganese (01055), nickel (01067), silver (01077), zinc (01092), calcium (00916), magnesium (00927), sodium (00929), potassium (00937), beryllium (01012), cobalt (01037), strontium (01082), and vanadium (01087), calculated Hardness (00900).

Special Basin Parameters:

Big Muddy River basin: Copper (01042) and boron (01022).

Des Plaines-Lake Michigan basin (only in segments A-7, A-8, A-9, A-10, A-12, A-13, A-14, A-15, and A-16): Boron (01022), copper (01042), and cyanide (00720).

Fox River basin: Total phosphorus (00665), dissolved phosphorus (00666), total kjeldahl nitrogen (00625), copper (01042), and lead (01051).

Illinois River basin: Copper (01042), mercury (71900), lead (01051), and iron (01045).

Kankakee River basin: Copper (01042).

Kaskaskia River basin: No special parameters.

Mississippi River basin: Copper (01042), lead (01051), and mercury (71900).

Ohio River basin: Cadmium (01027), chloride (00940), copper (01042), and cyanide (00720).

Sangamon River basin: Copper (01042), and iron (01045).

Wabash River basin: Chloride (00940), copper (01042), lead (01051), and mercury (71900).

*Inductively Coupled Argon Plasma -- Optical Emission System

Sub-Networks with appropriate Parameters:

A. Agricultural Areas: No special parameters.

B. Silvicultural Areas: No special parameters.

C. Urban Areas: Chlorides (00940), lead (01051), oil and grease (00556), and sulfate (00945).

D. Mining Areas: Total acidity (00435), alkalinity (00410), iron (01045), manganese (01055), zinc (01092), mercury (71900), sulfate (00945), and lead (01051).

E. Public Water Supply Sources: No special parameters.

F. Lake (or lake like) Watersheds: Total phosphorus (00665), total kjeldahl nitrogen (00625), and dissolved phosphorus (00666).

G. Lake Michigan: Water temperature (00010), turbidity (00076), odor (00086), electrical conductivity (00095), chemical oxygen demand (00335), pH (00400), total nonfiltrable residue (00530), filtrable residue (00515), organic nitrogen (00605), ammonia nitrogen (00610), nitrite-nitrate nitrogen (00630), total phosphate (00650), dissolved phosphate (00653), sodium (00929), potassium (00937), chloride (00940), sulfate (00945), asbestos (00948), silica (00956), iron (01045), phenols (32730), plate count (31753), total coliform (31503), fecal coliform (31616), fecal strep (31697), actinomycetes (80148), plankton (60050), and fungi (31856).

H. Special Morphologic Zone: No special parameters.

I. Total IEPA Parameter Spectrum (Monthly): pH (00400), temperature (00010), electrical conductivity (00095), dissolved oxygen (00300), total suspended sediment (00530), nitrite-nitrate nitrogen (00630), total kjeldahl nitrogen (00625), chemical oxygen demand (00335), fecal coliform (31616), total phosphorus (00665), dissolved phosphorus (00666), flow (00060 or 00061), cyanide (00720), arsenic (01002), phenol (32730), fluoride (00951), mercury (71900), chloride (00940), oil and grease (00556), sulfate (00945), total acidity (00435), alkalinity (00410).

Total ICAP-OES Parameters: same as Universal ICAP-OES.

Dissolved ICAP-OES Parameters: Barium (01005), boron (01020), cadmium (01025), chromium (01030), copper (01040), iron (01046), lead (01049), manganese (01056), nickel (01065), silver (01075), zinc (01090), calcium (00915), magnesium (00925), sodium (00930), potassium (00935), beryllium (01010), cobalt (01035), strontium (01080), and vanadium (01085).

Biannual Water Column Synthetic Hydrocarbons: PCB's (39516), aldrin (39330), dieldrin (39380), DDT (39327, 39320, 39315, 39310, 39305, 39300), chlordane (39350, 39062, 39065, 39068, 39071), endrin (39390), methoxychlor (39480), hexachlorocyclohexane (39337,39340), hexachlorobenzene (39700), and pentachlorophenol (39032).

J. Macroinvertebrate Diversity:

K. Fish Filet Toxic Monitoring (Annually): Anatomy Code (84007-Filet), dieldrin (39404), total DDT (39376), PCB's (39515), aldrin (34680), endrin (34685), methoxychlor (81644), heptachlor (34687), heptachlor epoxide (34686), total chlordane (34682), lindane (39785), benzene hexachloride (BHC) (39074), toxaphene (34691), mirex (81645), hexachlorobenzene (HCB) (34688), mercury (71930).

L. Whole Fish Toxic Monitoring (Annually): Anatomy Code (84007-Whole), dieldrin (39404), total DDT (39376), PCB's (39515), endrin (34685), aldrin (34680), methoxychlor (81644), heptachlor (34687), heptachlor epoxide (34686), total chlordane (34682), benzene hexachloride (BHC) (39074), hexachlorobenzene (HCB) (34688), toxaphene (34691) 2,4-D (39734) and gas-chromatigraph/mass spectroscopy scan.

M. Bottom Sediment: Volatile solids, % (70322), total kjeldahl nitrogen (00627), total phosphorus (00668), COD (00339), lead (01052), copper (01043), iron (01170), mercury (71921), zinc (01093), manganese (01053), arsenic (01003), cadmium (01028), chromium (01029), PCB's (39519), aldrin (39333), dieldrin (39383), total DDT (39359), DDT analogs (39328, 39321, 39316, 39311, 39306, 39301), total chlordane (39350), isomers (39064, 39067, 39070, 39073), endrin (39393), methoxychlor (39481), hexachlorobenzene (39701), pentachlorophenol (39061), hexachlorocyclohexane alpha isomer (BHC) (39076), and gamma isomer (39343).

N. Ambient Lakes (Semi-annual, May-June and August): Turbidity (00076), COD (00335), total suspended solids (00530), volatile suspended solids (00535), ammonia nitrogen (00610), Kjelkahl nitrogen (00625), nitrite-nitrate nitrogen (00630), total phosphorus (00665), dissolved phosphorus (00666), total depth (72025), Secchi (00077), pH (00400), conductivity (00094), phenothalein alkalinity (00415), total alkalinity (00410), air temperature (00020), cloud cover, % (00032), wind velocity (00035), wind direction (00036), precipitation (00045), chlorophyll a (corrected) (32211), chlorophyll a (uncorrected) (32210), chlorphyll b (32212), chlorophyll c (32214), pheophytin a (32218), profiles of: water temperature (00010), and dissolved oxygen (00299).

O. Volunteer Lakes (Semi-monthly, May - October): Secchi (00077), total depth (72025).

Sampling Agency

IEPA - Illinois Environmental Protection Agency
USGS - United States Geological Survey
USGS-IBPH - Indiana Board of Public Health
City of Chicago

List of Recent IEPA Lake Reports

Boland, D. H. P., D. J. Schaeffer, D. F. Sefton, R. P. Clarke, and R. J. Blackwell. 1979. Trophic Classification of Selected Illinois Water Bodies: Lake Classification through Amalgamation of LANDSAT Multispectral Scanner and Contact-Sensed Data. EPA-600/3-79-123. Environmental Monitoring Systems Laboratory, USEPA, Las Vegas, Nevada. 225 p.

Hite, R. L., M. H. Kelly, and M. M. King. 1980. Limnology of Devil's Kitchen Lake, May-October, 1979. Monitoring Unit; Division of Water Pollution Control; Illinois Environmental Protection Agency; Marion, Illinois. 99 p.

Hite, R. L., M. H. Kelly, and M. M. King. 1980. Limnology of Mattoon Lake, May-October, 1979. Monitoring Unit; Division of Water Pollution Control; Illinois Environmental Protection Agency; Marion, Illinois. 79 p.

Hite, R. L., M. H. Kelly, and M. M. King. 1980. Limnology of Lake of Egypt, May-October, 1979. Monitoring Unit; Division of Water Pollution Control; Illinois Environmental Protection Agency; Marion, Illinois. 99 p.

Hite, R. L., M. H. Kelly, and M. M. King. 1980. Limnology of Paradise Lake, May-October, 1979. Monitoring Unit; Division of Water Pollution Control; Illinois Environmental Protection Agency; Marion, Illinois. 81 p.

Hite, R. L., M. H. Kelly, and M. M. King. 1980. Limnology of Raccoon Lake, May-October, 1979. Monitoring Unit; Division of Water Pollution Control; Illinois Environmental Protection Agency; Marion, Illinois. 80 p.

Hite, R. L., M. H. Kelly, and M. M. King. 1980. Limnology of Stephen A. Forbes Lake, May-October, 1979. Monitoring Unit; Division of Water Pollution Control; Illinois Environmental Protection Agency; Marion, Illinois. 76 p.

Illinois Environmental Protection Agency. 1980. Limnology of Cedar Lake, Lake County, Illinois, May-October, 1979. Monitoring Unit; Division of Water Pollution Control; Illinois EPA; Springfield, Illinois. 68 p.

Illinois Environmental Protection Agency. 1980. Limnology of Johnson Sauk Trail Lake, Henry County, Illinois, May-October, 1979. Monitoring Unit; Division of Water Pollution Control; Illinois EPA; Springfield, Illinois. 61 p.

Illinois Environmental Protection Agency. 1980. Limnology of Lake Taylorville, Christian County, Illinois, May-October, 1979. Monitoring Unit; Division of Water Pollution Control; Illinois EPA; Springfield, Illinois. 80 p.

Illinois Environmental Protection Agency. 1980. Limnology of Lincoln Trail Lake, Clark County, Illinois, May-October, 1979. Monitoring Unit; Division of Water Pollution Control; Illinois EPA; Springfield, Illinois. 85 p.

Illinois Environmental Protection Agency. 1980. Limnology of Long Lake, Lake County, Illinois, May-October, 1979. Monitoring Unit; Division of Water Pollution Control; Illinois EPA; Springfield, Illinois. 75 p.

Illinois Environmental Protection Agency. 1980. Limnology of Otter Lake, Macoupin County, Illinois, May-October, 1979. Monitoring Unit; Division of Water Pollution Control; Illinois EPA; Springfield, Illinois. 80 p.

Illinois Environmental Protection Agency. 1980. Limnology of Pittsfield City Lake, Pike County, Illinois, May-October, 1979. Monitoring Unit; Division of Water Pollution Control; Illinois EPA; Springfield, Illinois. 87 p.

Illinois Environmental Protection Agency. 1980. Limnology of Round Lake, Lake County, Illinois, May-October, 1979. Monitoring Unit; Division of Water Pollution Control; Illinois EPA; Springfield, Illinois. 67 p.

Illinois Environmental Protection Agency. 1980. Limnology of Shabbona Lake, DeKalb, County, Illinois, May-October, 1979. Monitoring Unit; Division of Water Pollution Control; Illinois EPA; Springfield, Illinois. 65 p.

Sefton, D. F. 1978. Assessment and Classification of Illinois Lakes, Vols. I and II. 208 Water Quality Management Planning Program Staff Report. Illinois Environmental Protection Agency; Springfield, Illinois.

Sefton, D. F. 1978. Clean Lakes Strategy for Illinois. 208 Water Quality Management Planning Program Staff Report. Illinois Environmental Protection Agency; Springfield, Illinois. 55 p.

Sefton, D. F., M. H. Kelly, and M. Meyer. 1980. Limnology of 63 Illinois lakes, 1979. Monitoring Unit; Division of Water Pollution Control; Illinois EPA; Springfield, Illinois. 247 p.

Kelly, M. H. and R. L. Hite. 1981. Chemical Analysis of the Surficial Sediments from 63 Illinois Lakes, Summer 1979. Monitoring Unit; Division of Water Pollution Control; Illinois Environmental Protection Agency; Marion, Illinois. 92 p.

Analyses performed for raw water from ground water supplies

Iron	Fluoride
Manganese	Chloride
Calcium	Nitrate and nitrite
Magnesium	Silver
Ammonium	Zinc
Sodium	Sulfate
Potassium	Alkalinity
Silicates	Specific conductance
Arsenic	Total dissolved solids/EC
Barium	Filterable residue
Boron	pH
Cadmium	Hardness
Chromium	Cyanide
Copper	Beryllium
Lead	Cobalt
Mercury	Lithium
Nickel	Strontium
Selenium	Vanadium

Analyses performed water supplies subject to pesticide contamination

Lindane	o,p'-DDE
Heptachlor	p,p'-DDE
Aldrin	o,p'-DDD
Heptachlor epoxide	p,p'-DDD
Alpha chlordane	o,p'-DDT
Gamma chlordane	o,p'-DDT
Dieldrin	Toxaphene
Endrin	Silvex
Methoxychlor	2.4-D

Background analysis for landfill monitoring

Alkalinity	Magnesium
Ammonia	Manganese
Boron	Mercury
Calcium	Nickel
COD	pH
Chloride	Phenolics
Chromium (tot.)	Potassium
Copper	TDS
Hardness	Sodium
Iron	Sulfate
Lead	Zinc

Background analysis for hazardous waste sites

All above landfill analyses	Endrin
Arsenic	Lindane
Barium	Methoxychlor
Cadmium	Toxaphene
Fecal coliforms	2,4-D
Fluoride	2,4,5-T (Silvex)
Nitrates-nitrites	TOC
Selenium	TOX
Silver	Gross Alpha
Specific conductance	Gross Beta
	Radium

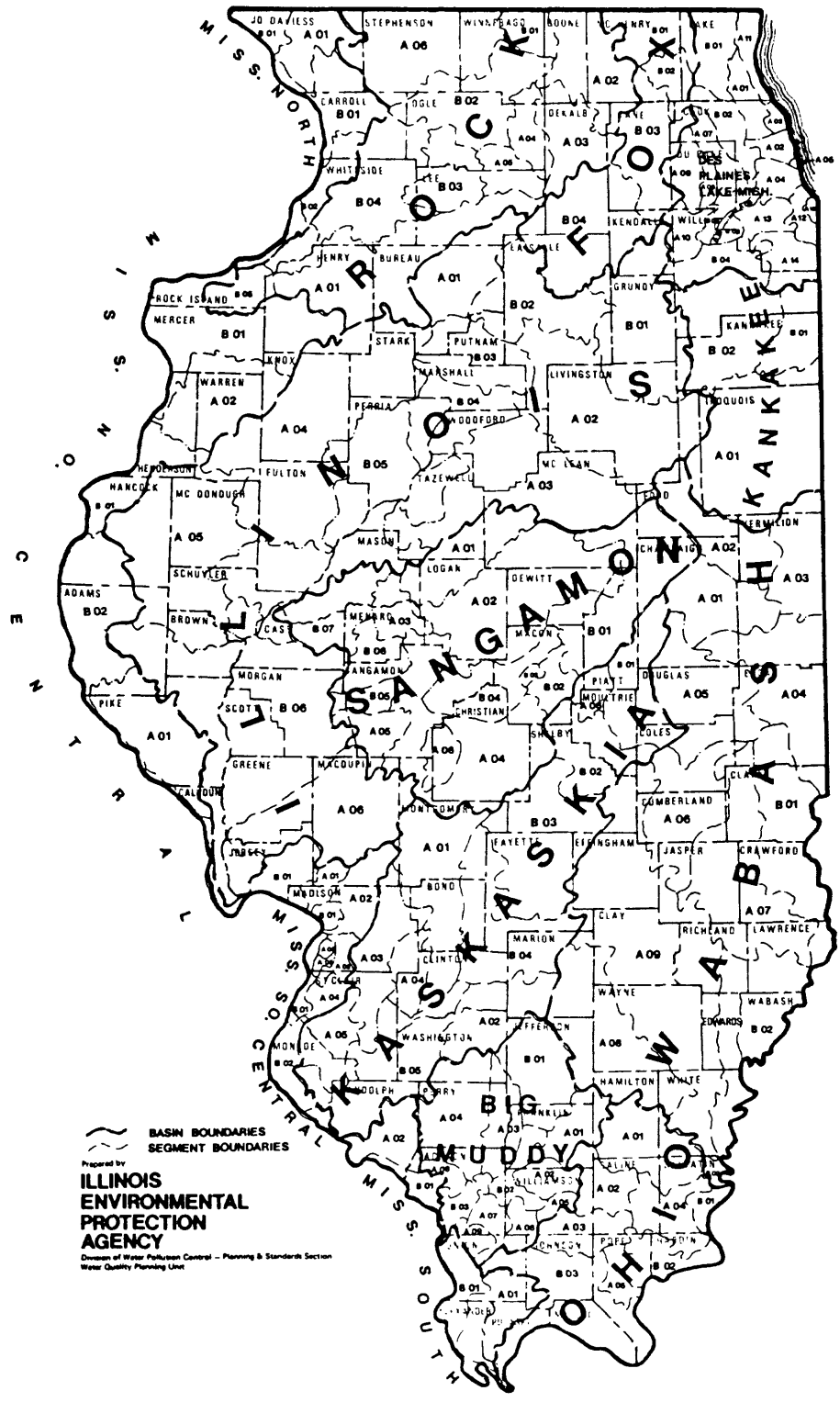

Figure B-1. Stream basin boundaries used by Illinois Environmental Protection Agency in Illinois.

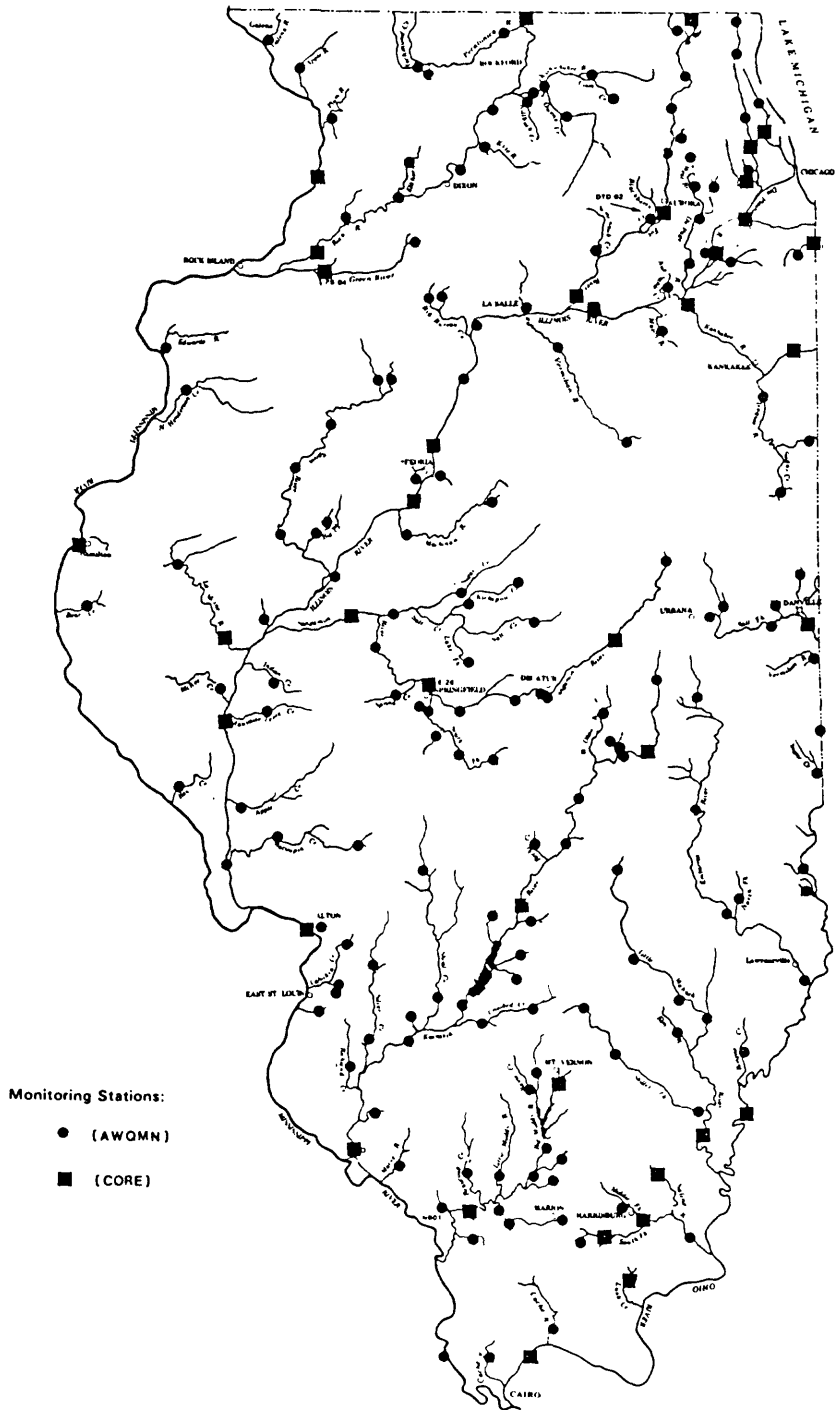

Figure B-2. Location of water-quality network sampling sites in Illinois.

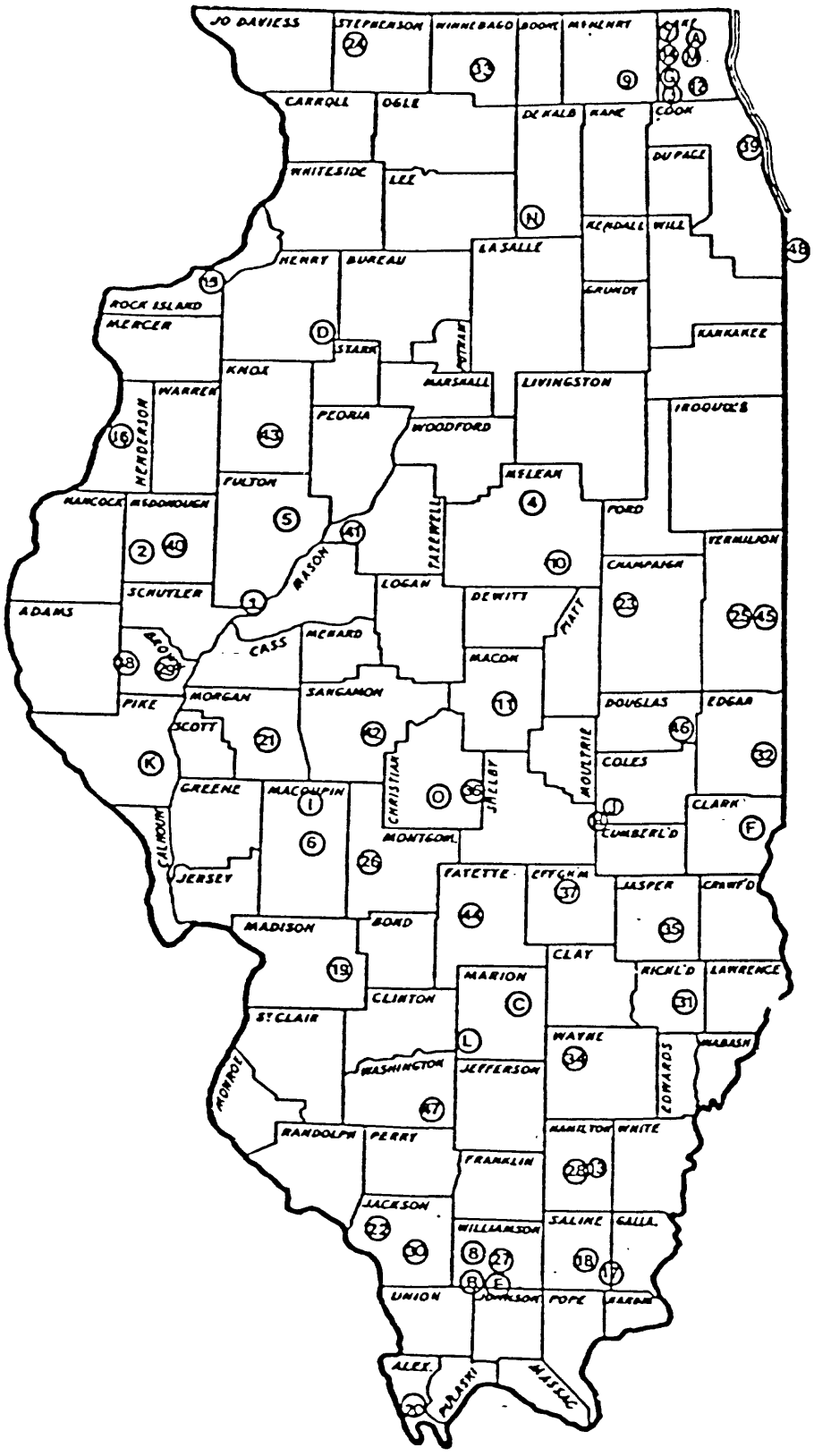

Figure B-3. Location of 63 lakes sampled by the Illinois Environmental Protection Agency in 1979.

APPENDIX C

Station No.	Station Name	Type of Data	Cooperator
03336500	Bluegrass Creek at Potomac, Ill.	C	DWR
03336645	Middle Fork Vermilion River above Oakwood, Ill.	CQ	IEPA
		D	DWR
03336900	Salt Fork near St. Joseph, Ill.	D	SWS
		CQ	IEPA
03337000	Boneyard Creek at Urbana, Ill.	D	SWS
03337700	Saline Branch near Mayview, Ill.	CQ	IEPA
03338000	Salt Fork near Homer, Ill.	C	LOU
03338097	Salt Fork near Oakwood, Ill.	CQ	IEPA
03338780	North Fork Vermilion River near Bismarck, Ill.	CQ	IEPA
03339000	Vermilion River near Danville, Ill.	D	SWS
		CQ	IEPA
03339147	Little Vermilion River near Georgetown, Ill.	CQ	IEPA
03341414	Brouilletts Creek near St. Bernice, Ind.	CQ	IEPA
03341540	Sugar Creek near Elbridge, Ill.	CQ	IEPA
03341920	Wabash River at Hutsonville, Ill.	CQ	IEPA
03342050	Sugar Creek at Palestine, Ill.	CQ	IEPA
03343395	Embarras River at Camargo, Ill.	CQ	IEPA
03343400	Embarras River near Camargo, Ill.	D	SWS
03343550	Embarras River at St Hwy 133 near Oakland, Ill.	D	LOU
		SD	LOU
03344000	Embarras River near Diona, Ill.	D	LOU
		CQ	IEPA
03344500	Range Creek near Casey, Ill.	D	SWS
03345500	Embarras River at Ste. Marie, Ill.	D	SWS
		CQ	IEPA
03346000	North Fork Embarras River near Oblong, Ill.	D	LOU
		CQ	IEPA
03346550	Embarras River near Billett, Ill.	CQ	IEPA
03378000	Bonpas Creek at Browns, Ill.	D	DWR
		CQ	IEPA
03378635	Little Wabash River near Effingham, Ill.	D	DWR
		CQ	IEPA
03378900	Little Wabash River at Louisville, Ill.	D	LOU
		CQ	IEPA
03379500	Little Wabash River below Clay City, Ill.	D	SWS
		CQ	IEPA
03379600	Little Wabash River at Blood, Ill.	S	LOU
		CQ	IEPA
03379950	Elm River near Toms Prairie, Ill.	CQ	IEPA
03380350	Skillet Fork near Iuka, Ill.	D	LOU
		CQ	IEPA
03380475	Horse Creek near Keenes, Ill.	D	SWS

APPENDIX C--Continued

Station No.	Station Name	Type of Data	Cooperator
03380500	Skillet Fork at Wayne City, Ill.	D	LOU
		CQ	IEPA
03381400	Skillet Fork near Carmi, Ill.	CQ	IEPA
03381495	Little Wabash River at Main St at Carmi, Ill.	CQ	FED
		MR	FED
03381500	Little Wabash River at Carmi, Ill.	DS	DWR
03382090	Sugar Creek near Stonefort, Ill.	CQ	IEPA
03382100	South Fork Saline River near Carrier Mills, Ill.	D	LOU
		CQ	IEPA
03382170	Brushy Creek near Harco, Ill.	D	DWR
03382185	Bankston Fork near Dorris Heights, Ill.	CQ	IEPA
03382205	Middle Fork Saline River near Pankeyville, Ill.	CQ	IEPA
03382325	North Fork Saline River near Texas City, Ill.	CQ	IEPA
03382510	Eagle Creek near Equality, Ill.	D	DWR
03382530	Saline River near Gibsonia, Ill.	CQ	IEPA
03384450	Lusk Creek near Eddyville, Ill.	D	SWS
		CQ	IEPA
03385000	Hayes Creek at Glendale, Ill.	C	LOU
03386500	Sugar Creek near Dixon Springs, Ill.	C	DWR
03612000	Cache River at Forman, Ill.	D	LOU
		CQ	IEPA
04092500	Wolf Lake at Chicago, Ill.	S	DWR
05414820	Sinsinawa River near Menominee, Ill.	D	DWR
05416000	Galena River at Galena, Ill.	CQ	IEPA
05418950	Apple River near Elizabeth, Ill.	CQ	IEPA
05419000	Apple River near Hanover, Ill.	D	RI
05420100	Plum River at Savanna, Ill.	CQ	IEPA
05435500	Pecatonica River at Freeport, Ill.	D	SWS
		CQ	IEPA
05435680	Yellow Creek near Freeport, Ill.	CQ	IEPA
05435800	Pecatonica River at Harrison, Ill.	CQ	IEPA
05437500	Rock River at Rockton, Ill.	D	RI
		CQ	IEPA
05437627	Spring Creek near Argyle, Ill.	C	DWR
05437630	Spring Creek at McFarland Rd nr Rockford, Ill.	MR	DWR
		SD	DWR
		SR	DWR
		D	DWR
05437631	Spring Creek tributary near Rockford, Ill.	C	DWR
05437632	Spring Ck at Rock Vly College at Rockford, Ill.	MR	DWR
		SD	DWR
		SR	DWR
		D	DWR
05437695	Keith Creek at Eighth St at Rockford, Ill.	D	RI

APPENDIX C--Continued

Station No.	Station Name	Type of Data	Cooperator
05437950	Kishwaukee River near Huntley, Ill.	L	RI
05438050	North Branch Kishwaukee River near Harvard, Ill.	L	RI
05438100	Kishwaukee River near Marengo, Ill.	L	RI
05438150	So Br Kishwaukee River (East) below Union, Ill.	L	RI
05438192	Rush Creek near Garden Prairie, Ill.	L	RI
05438201	Kishwaukee R. at GP Rd at Garden Prairie, Ill.	CQ	IEPA
		L	RI
05438215	Coon Creek at New Lebanon, Ill.	L	RI
05438230	Burlington Creek near Hampshire, Ill.	L	RI
05438250	Coon Creek at Riley, Ill.	D	SWS
		CQ	IEPA
05438320	Piscasaw Creek at Chemung, Ill.	L	RI
05438400	Piscasaw Creek near Capron, Ill.	L	RI
05438430	Piscasaw Creek near Belvidere, Ill.	L	RI
05438450	Beaver Creek near Poplar Grove, Ill.	L	RI
05438475	Beaver Creek near Belvidere, Ill.	L	RI
05438500	Kishwaukee River at Belvidere, Ill.	D	DWR
05438600	Kishwaukee R ab South Branch nr Perryville, Ill.	CQ	IEPA
		L	RI
05439000	South Branch Kishwaukee River at De Kalb, Ill.	D	RI
		SD	RI
05439130	Virgil Ditch No 3 at Virgil, Ill.	L	RI
05439200	Union Ditch No 3 near Maple Park, Ill.	L	RI
05439300	East Br of So Br Kishwaukee R at Sycamore, Ill.	L	RI
05439350	South Branch Kishwaukee River at Genoa, Ill.	L	RI
05439450	Owens Creek near Kirkland, Ill.	L	RI
05439500	South Branch Kishwaukee River near Fairdale, Ill.	D	DWR
		CQ	IEPA
05440000	Kishwaukee River near Perryville, Ill.	D	DWR
		CQ	IEPA
		SD	RI
05440400	East Branch Killbuck Creek near Creston, Ill.	L	RI
05440500	Killbuck Creek near Monroe Center, Ill.	L	RI
05440520	Killbuck Creek near New Milford, Ill.	CQ	IEPA
		L	RI
05440700	Rock River at Byron, Ill.	CQ	IEPA
05441000	Leaf River at Leaf River, Ill.	C	DWR
05442020	Kyte River at Daysville, Ill.	CQ	IEPA
05442200	Rock River at Grand Detour, Ill.	CQ	IEPA
05443500	Rock River at Como, Ill.	D	RI
		CQ	IEPA
05444000	Elkhorn Creek near Penrose, Ill.	D	DWR
		CQ	IEPA
05446000	Rock Creek at Morrison, Ill.	D	RI

APPENDIX C--Continued

Station No.	Station Name	Type of Data	Cooperator
05446100	Rock Creek near Erie, Ill.	CQ	IEPA
05446500	Rock River near Joslin, Ill.	D	RI
		CQ	FED
		MR	FED
		SD	RI
05447000	Green River at Amboy, Ill.	C	DWR
05447100	Green River near Deer Grove, Ill.	CQ	IEPA
05447500	Green River near Geneseo, Ill.	D	RI
		CQ	IEPA
		SD	RI
05448000	Mill Creek at Milan, Ill.	D	DWR
05466000	Edwards River near Orion, Ill.	D	SWS
05466500	Edwards River near New Boston, Ill.	D	DWR
		CQ	IEPA
		SD	RI
05467000	Pope Creek near Keithsburg, Ill.	D	RI
05467500	Henderson Creek near Little York, Ill.	C	DWR
05468500	Cedar Creek at Little York, Ill.	C	RI
05469000	Henderson Creek near Oquawka, Ill.	D	RI
		CQ	IEPA
		SD	RI
05469500	South Henderson Creek at Biggsville, Ill.	C	DWR
05495500	Bear Creek near Marcelline, Ill.	D	RI
		CQ	IEPA
05502020	Hadley Creek near Barry, Ill.	C	RI
05502040	Hadley Creek at Kinderhook, Ill.	D	RI
05512500	Bay Creek at Pittsfield, Ill.	D	RI
05513000	Bay Creek at Nebo, Ill.	D	RI
		CQ	IEPA
05520500	Kankakee River at Momence, Ill.	D	SWS
		CQ	IEPA
05525000	Iroquois River at Iroquois, Ill.	D	RI
		CQ	IEPA
05525500	Sugar Creek at Milford, Ill.	D	RI
		CQ	IEPA
05526000	Iroquois River near Chebanse, Ill.	D	DWR
		CQ	IEPA
05527500	Kankakee River near Wilmington, Ill.	D	SWS
		CQ	IEPA
		SD	CHI
05527800	Des Plaines River at Russell, Ill.	D	DWR
		CQ	IEPA
05528000	Des Plaines River near Gurnee, Ill.	D	DWR
		CQ	IEPA

APPENDIX C--Continued

Station No.	Station Name	Type of Data	Cooperator
05528500	Buffalo Creek near Wheeling, Ill.	D	DWR
05529000	Des Plaines River near Des Plaines, Ill.	D	DWR
		CQ	IEPA
05529500	McDonald Creek near Mount Prospect, Ill.	D	DWR
05530000	Weller Creek at Des Plaines, Ill.	D	DWR
05530590	Des Plaines River near Schiller Park, Ill.	CQ	IEPA
05530990	Salt Creek at Rolling Meadows, Ill.	D	DWR
05531500	Salt Creek at Western Springs, Ill.	D	DWR
		CQ	IEPA
05532000	Addison Creek at Bellwood, Ill.	D	DWR
		CQ	IEPA
05532500	Des Plaines River at Riverside, Ill.	D	SWS
		SD	CHI
05533000	Flag Creek near Willow Springs, Ill.	D	DWR
05534050	Des Plaines River at Lockport, Ill.	CQ	IEPA
05534500	North Branch Chicago River at Deerfield, Ill.	D	CHI
		CQ	IEPA
05535000	Skokie River at Lake Forest, Ill.	D	DWR
05535070	Skokie River near Highland Park, Ill.	D	CCFP
05535500	West Fk of N Br Chicago River at Northbrook, Ill.	D	DWR
05536000	North Branch Chicago River at Niles, Ill.	D	DWR
		CQ	IEPA
05536215	Thorn Creek at Glenwood, Ill.	D	DWR
05536235	Deer Creek near Chicago Heights, Ill.	D	DWR
05536255	Butterfield Creek at Flossmoor, Ill.	D	DWR
05536265	Lansing Ditch near Lansing, Ill.	D	DWR
05536275	Thorn Creek at Thornton, Ill.	D	DWR
		CQ	IEPA
05536290	Little Calumet River at South Holland, Ill.	D	DWR
05536340	Midlothian Creek at Oak Forest, Ill.	D	DWR
05536500	Tinley Creek near Palos Park, Ill.	D	DWR
05536700	Calumet Sag Channel at Sag Bridge, Ill.	CQ	IEPA
05537000	Chicago Sanitary and Ship Canal at Lockport, Ill.	DF	DWR
		CQ	IEPA
05537500	Long Run near Lemont, Ill.	D	DWR
05539000	Hickory Creek at Joliet, Ill.	D	CHI
		CQ	IEPA
05539900	West Branch Du Page River near West Chicago, Ill.	D	SWS
		CQ	IEPA
05540095	West Branch Du Page River near Warrenville, Ill.	D	DWR
		CQ	IEPA
05540210	East Branch Du Page River at Rt 34 at Lisle, Ill.	CQ	IEPA
05540290	Du Page River near Naperville, Ill.	CQ	IEPA

APPENDIX C--Continued

Station No.	Station Name	Type of Data	Cooperator
05540500	Du Page River at Shorewood, Ill.	D	DWR
		CQ	IEPA
05541710	Aux Sable Creek near Morris, Ill.	CQ	IEPA
05542000	Mazon River near Coal City, Ill.	D	RI
		CQ	IEPA
05543500	Illinois River at Marseilles, Ill.	D	FED
		CQ	FED
		MR	FED
05546700	Fox River near Channel Lake, Ill.	CQ	IEPA
05547000	Channel Lake near Antioch, Ill.	S	DWR
05547500	Fox Lake near Lake Villa, Ill.	S	DWR
05548000	Nippersink Lake at Fox Lake, Ill.	S	DWR
05548280	Nippersink Creek near Spring Grove, Ill.	D	DWR
		CQ	IEPA
05548500	Fox River at Johnsburg, Ill.	S	DWR
05549000	Boone Creek near McHenry, Ill.	D	SWS
05549500	Fox River near McHenry, Ill.	S	DWR
05549600	Fox River at Burtons Bridge, Ill.	CQ	IEPA
05550000	Fox River at Algonquin, Ill.	D	SWS
		CQ	IEPA
05550500	Poplar Creek at Elgin, Ill.	D	DWR
		CQ	IEPA
05551000	Fox River at South Elgin, Ill.	CQ	IEPA
05551200	Ferson Creek near St. Charles, Ill.	D	SWS
05551540	Fox River at Montgomery, Ill.	CQ	IEPA
05551700	Blackberry Creek near Yorkville, Ill.	D	SWS
		CQ	IEPA
05551995	Somonauk Creek at Sheridan, Ill.	CQ	IEPA
05552500	Fox River at Dayton, Ill.	D	DWR
		CQ	IEPA
05554000	North Fork Vermilion River near Charlotte, Ill.	C	RI
05554490	Vermilion River at McDowell, Ill.	CQ	IEPA
05554500	Vermilion River at Pontiac, Ill.	D	DWR
05555300	Vermilion River near Leonore, Ill.	D	SWS
		CQ	IEPA
		SD	RI
05555950	Little Vermilion River at La Salle, Ill.	CQ	IEPA
05556200	Illinois River at Hennepin, Ill.	CQ	IEPA
05556500	Big Bureau Creek at Princeton, Ill.	D	RI
		CQ	IEPA
05557000	West Bureau Creek at Wyanet, Ill.	C	RI
		CQ	IEPA
05557500	East Bureau Creek near Bureau, Ill.	C	RI
05558500	Crow Creek (West) near Henry, Ill.	C	DWR

APPENDIX C--Continued

Station No.	Station Name	Type of Data	Cooperator
05558995	Illinois River at Lacon, Ill.	CQ	IEPA
05559000	Gimlet Creek at Sparland, Ill.	C	DWR
05559500	Crow Creek near Washburn, Ill.	C	DWR
05559900	Illinois River at Water Company at Peoria, Ill.	CQ	IEPA
05560500	Farm Creek at Farmdale, Ill.	D	RI
05561500	Fondulac Creek near East Peoria, Ill.	D	RI
05562010	Farm Creek at Camp St Bridge at East Peoria, Ill.	CQ	IEPA
05563000	Kickapoo Creek near Kickapoo, Ill.	C	RI
05563500	Kickapoo Creek at Peoria, Ill.	C	RI
05563525	Kickapoo Creek at Bartonville, Ill.	CQ	IEPA
05563800	Illinois River at Pekin, Ill.	CQ	IEPA
05564400	Money Creek near Towanda, Ill.	D	SWS
05566500	East Branch Panther Creek at El Paso, Ill.	D	SWS
05567000	Panther Creek near El Paso, Ill.	C	RI
05567500	Mackinaw River near Congerville, Ill.	D	SWS
05567510	Mackinaw River below Congerville, Ill.	CQ	IEPA
05568000	Mackinaw River near Green Valley, Ill.	C	RI
05568005	Mackinaw River below Green Valley, Ill.	CQ	IEPA
05568500	Illinois River at Kingston Mines, Ill.	DS	DWR
05568775	Spoon River near Wyoming, Ill.	CQ	IEPA
05568800	Indian Creek near Wyoming, Ill.	D	SWS
		CQ	IEPA
05568915	Spoon River near Dahinda, Ill.	CQ	IEPA
05569500	Spoon River at London Mills, Ill.	D	RI
		CQ	IEPA
05570000	Spoon River at Seville, Ill.	D	DWR
		CQ	IEPA
		SD	RI
05570350	Big Creek at St. David, Ill.	D	MSD
		MR	MSD
		CQ	MSD
05570360	Evelyn Branch near Bryant, Ill.	D	MSD
		CQ	MSD
05570370	Big Creek near Bryant, Ill.	D	MSD
		SD	MSD
		MR	MSD
		CQ	MSD
05570380	Slug Run near Bryant, Ill.	CQ	MSD
		D	MSD
05570520	Illinois River at Power Company at Havana, Ill.	CQ	IEPA
05570910	Sangamon River at Fisher, Ill.	D	RI
		CQ	IEPA
05572000	Sangamon River at Monticello, Ill.	D	SWS
05572125	Sangamon R at Allerton Park nr Monticello, Ill.	CQ	IEPA

APPENDIX C--Continued

Station No.	Station Name	Type of Data	Cooperator
05572450	Friends Creek at Argenta, Ill.	D	RI
05573504	Sangamon River at Water Intake at Decatur, Ill.	CQ	IEPA
05573540	Sangamon River at Route 48 at Decatur, Ill.	CQ	IEPA
05573650	Sangamon River near Niantic, Ill.	CQ	IEPA
05573800	Sangamon River at Roby, Ill.	CQ	IEPA
05574000	South Fork Sangamon River near Nokomis, Ill.	C	RI
05574500	Flat Branch near Taylorville, Ill.	D	RI
		CQ	IEPA
05575500	South Fork Sangamon River at Kincaid, Ill.	C	RI
		CQ	IEPA
05575570	Sangchris Lake near New City, Ill.	CQ	IEPA
05575800	Horse Creek at Pawnee, Ill.	D	SPFD
05575830	Brush Creek near Divernon, Ill.	D	DWR
05576000	South Fork Sangamon River near Rochester, Ill.	DS	RI
05576022	South Fork Sangamon River below Rochester, Ill.	CQ	IEPA
05576250	Sugar Creek near Springfield, Ill.	CQ	IEPA
05576500	Sangamon River at Riverton, Ill.	C	RI
		CQ	IEPA
05577500	Spring Creek at Springfield, Ill.	D	SWS
05577505	Spring C at Burns Lane Bridge at Springfield, Ill.	CQ	IEPA
05578000	Sangamon River at Petersburg, Ill.	CQ	IEPA
05578500	Salt Creek near Rowell, Ill.	D	RI
		CQ	IEPA
05579500	Lake Fork near Cornland, Ill.	D	RI
		CQ	IEPA
05580000	Kickapoo Creek at Waynesville, Ill.	D	RI
		CQ	IEPA
05580500	Kickapoo Creek near Lincoln, Ill.	C	DWR
		CQ	IEPA
05580950	Sugar Creek near Bloomington, Ill.	D	BN
05581500	Sugar Creek near Hartsburg, Ill.	C	DWR
		CQ	IEPA
05582000	Salt Creek near Greenview, Ill.	D	SWS
		CQ	IEPA
05582500	Crane Creek near Easton, Ill.	C	DWR
05583000	Sangamon River near Oakford, Ill.	D	RI
		CQ	FED
		MR	FED
		SD	RI
05583915	Sugar Creek near Frederick, Ill.	CQ	IEPA
05584400	Drowning Fork at Bushnell, Ill.	D	SWS
05584500	La Moine River at Colmar, Ill.	D	RI
		CQ	IEPA

APPENDIX C--Continued

Station No.	Station Name	Type of Data	Cooperator
05584683	Grindstone Creek tributary near Doddsville, Ill.	D	FED
		CQ	FED
		MR	FED
		SD	FED
05585000	La Moine River at Ripley, Ill.	D	SWS
		CQ	IEPA
		SD	RI
05585275	Indian Creek at Arenzville, Ill.	CQ	IEPA
05585500	Illinois River at Meredosia, Ill.	DS	RI
05585830	McKee Creek at Chambersgurg, Ill.	CQ	IEPA
05586000	N Fk Mauvaise Terre Ck near Jacksonville, Ill.	C	DWR
05586040	Mauvaise Terre Creek near Merritt, Ill.	CQ	IEPA
05586100	Illinois River at Valley City, Ill.	CQ	FED
		MR	FED
		SD	STL
05586500	Hurricane Creek near Roodhouse, Ill.	C	STL
05586600	Apple Creek near Eldred, Ill.	CQ	IEPA
05586690	Macoupin Creek near Macoupin, Ill.	CQ	IEPA
05587000	Macoupin Creek near Kane, Ill.	D	DWR
		CQ	IEPA
05587060	Illinois River at Hardin, Ill.	CQ	IEPA
05587700	Wood River at East Alton, Ill.	CQ	IEPA
05587900	Cahokia Creek at Edwardsville, Ill.	D	DWR
		CQ	IEPA
05588000	Indian Creek at Wanda, Ill.	D	SWS
05589490	Cahokia Canal near Collinsville, Ill.	CQ	IEPA
05589500	Canteen Creek at Caseyville, Ill.	D	SWS
05589510	Canteen Creek near Collinsville, Ill.	CQ	IEPA
05589785	Harding Ditch at East St. Louis, Ill.	CQ	IEPA
05590000	Kaskaskia Ditch at Bondville, Ill.	D	SWS
05590420	Kaskaskia River near Tuscola, Ill.	CQ	IEPA
05590800	Lake Fork at Atwood, Ill.	D	DWR
05591200	Kaskaskia River at Cooks Mills, Ill.	D	STL
		CQ	IEPA
		SD	STL
05591300	Kaskaskia River at Allenville, Ill.	CQ	IEPA
05591400	Jonathan Creek near Sullivan, Ill.	CQ	IEPA
05591500	Asa Creek at Sullivan, Ill.	D	SWS
		CQ	IEPA
05591550	Whitley Creek near Allenville, Ill.	D	STL
05591700	West Okaw River near Lovington, Ill.	CQ	IEPA
		D	STL
05591950	Lake Shelbyville near Shelbyville, Ill.	R	STL

APPENDIX C--Continued

Station No.	Station Name	Type of Data	Cooperator
05592000	Kaskaskia River at Shelbyville, Ill.	D	STL
		CQ	IEPA
05592050	Robinson Creek near Shelbyville, Ill.	D	STL
05592100	Kaskaskia River near Cowden, Ill.	D	STL
		CQ	IEPA
05592195	Beck Creek at Herrick, Ill.	CQ	IEPA
05592300	Wolf Creek near Beecher City, Ill.	D	SWS
05592500	Kaskaskia River at Vandalia, Ill.	D	STL
		CQ	IEPA
05592600	Hickory Creek near Bluff City, Ill.	CQ	IEPA
		S	STL
05592800	Hurricane Creek near Mulberry Grove, Ill.	D	STL
		CQ	IEPA
05592900	East Fork Kaskaskia River near Sandoval, Ill.	CQ	IEPA
		D	STL
05592930	North Fork Kaskaskia River near Patoka, Ill.	CQ	IEPA
05592990	Carlyle Lake near Carlyle, Ill.	R	STL
05593000	Kaskaskia River at Carlyle, Ill.	D	STL
05593010	Kaskaskia River below Carlyle, Ill.	CQ	IEPA
05593505	Crooked Creek near Odin, Ill.	CQ	IEPA
05593520	Crooked Creek near Hoffman, Ill.	D	DWR
		CQ	IEPA
05593575	Little Crooked Creek near New Minden, Ill.	D	DWR
05593600	Blue Grass Creek near Raymond, Ill.	D	SWS
05593800	Shoal Creek near Panama, Ill.	CQ	IEPA
05593900	East Fork Shoal Creek near Coffeen, Ill.	D	SWS
05594000	Shoal Creek near Breese, Ill.	D	DWR
		CQ	IEPA
05594090	Sugar Creek at Albers, Ill.	D	DWR
		CQ	IEPA
05594100	Kaskaskia River near Venedy Station, Ill.	D	DWR
		CQ	FED
		MR	FED
		SD	STL
05594330	Mud Creek near Marissa, Ill.	D	DWR
05594450	Silver Creek near Troy, Ill.	D	SWS
		CQ	IEPA
05594800	Silver Creek near Freeburg, Ill.	D	STL
		CQ	IEPA
05595200	Richland Creek near Hecker, Ill.	D	STL
		CQ	IEPA

APPENDIX C--Continued

Station No.	Station Name	Type of Data	Cooperator
05595270	Plum Creek tributary near Tilden, Ill.	D	ED
		CQ	ED
		MR	ED
		SD	ED
		SR	ED
05595280	Plum Creek near Baldwin, Ill.	CQ	IEPA
05595400	Kaskaskia River at Roots, Ill.	CQ	IEPA
05595540	Marys River at Welge, Ill.	CQ	IEPA
05595700	Big Muddy River near Mt. Vernon, Ill.	CQ	IEPA
		S	STL
05595730	Rayse Creek near Waltonville, Ill.	CQ	IEPA
		D	STL
05595800	Sevenmile Creek near Mt. Vernon, Ill.	D	SWS
05595830	Casey Fork at Rt 37 near Mt. Vernon, Ill.	CQ	IEPA
		S	STL
05595950	Rend Lake near Benton, Ill.	R	STL
		CQ	IEPA
05596400	Middle Fork Big Muddy River near Benton, Ill.	CQ	IEPA
05597000	Big Muddy River at Plumfield, Ill.	DS	STL
		CQ	IEPA
05597040	Pond Creek at West Frankfort, Ill.	CQ	IEPA
05597280	Little Muddy River near Elkville, Ill.	CQ	IEPA
05597500	Crab Orchard Creek near Marion, Ill.	D	DWR
		CQ	IEPA
05598050	Crab Orchard Ck below CO Lake nr Carterville, Ill.	CQ	IEPA
05598245	Crab Orchard Creek near Carbondale, Ill.	CQ	IEPA
05599000	Beaucoup Creek near Matthews, Ill.	D	DWR
05599200	Beaucoup Creek near Vergennes, Ill.	CQ	IEPA
05599500	Big Muddy River at Murphysboro, Ill.	DS	STL
		CQ	FED
		MR	FED
		SD	STL
05599540	Kinkaid Creek near Murphysboro, Ill.	CQ	IEPA
05599565	Cedar Creek near Pomona, Ill.	CQ	IEPA
05600000	Big Creek near Wetaug, Ill.	C	DWR
05600150	Cache River at Sandusky, Ill.	CQ	IEPA

APPENDIX D

EXECUTIVE OFFICE OF THE PRESIDENT
BUREAU OF THE BUDGET
WASHINGTON, D.C. 20503

August 28, 1964 CIRCULAR NO. A-67

TO THE HEADS OF EXECUTIVE DEPARTMENTS AND ESTABLISHMENTS

SUBJECT: Coordination of Federal activities in the acquisition of certain water data

1. Purpose and coverage. This Circular prescribes guidelines for coordination of Federal activities in acquiring water data from streams, lakes, reservoirs, estuaries and ground waters. Included in such activities are the obtaining of quantitative and qualitative data, their processing, publication, and storage. Excluded are activities concerned with research plots and experimental watersheds, and data on precipitation, evaporation, snow accumulation and soil moisture.

The Geological Survey of the Department of the Interior acquires basic water data on the water resources of the Nation. A number of other agencies acquire special water data in support of their respective missions. The basic and the specialized activities need to be closely and continually coordinated to assure effective and economical management of resources in meeting essential user requirements.

The guidelines outlined in this Circular contemplate that (a) the Department of the Interior will operate a national network for acquiring water data; (b) the user agencies will arrange for the acquisition of specialized water data that cannot be provided efficiently, and in a timely manner, through the national network; (c) certain procedures will be followed to facilitate close interagency consultation in the acquisition of water data; and (d) the Department of the Interior will conduct a continuing and systematic review directed toward efficient coordination of Federal water data acquisition activities.

Agencies needing particular water data in support of their missions will, to the extent practicable, be responsible for funding for the attendant data acquisition activities. The Bureau of the Budget will assist agencies in effecting adjustments in funding arrangements required to conform with the division of responsibilities set forth in this Circular.

2. Responsibility for water data acquisition

a. The Department of the Interior is responsible for the design and operation of the national network for acquiring data on the quantity and quality of surface and ground waters, including sediment load of streams. Except as set forth in paragraph 2b below the network will meet the water quantity measurement requirements of all Federal agencies and will provide water quality measurements common to the needs of two or more agencies.

b. Departments and agencies whose operating requirements cannot be met efficiently through the national network, including appropriate adjustments therein, will arrange for specialized data acquisition. Determination as to the need for specialized data is entirely the responsibility of the user agencies.

Such data are normally obtained in circumstances characterized by:

(1) Short observation periods, e.g., measurements of streams during low flow to determine their capacity for receiving waste;

(2) unstable quantity and quality parameters, e.g., measurements of the drastic changes in dissolved oxygen content resulting from industrial pollution;

(3) need for costly and rarely used instrumentation, e.g., gas chromatographic equipment to measure minute concentrations of organic chemicals resulting from pesticide residues;

(4) concentration of measurements within a limited reach or area, e.g., measuring surface profiles of water for the design of levees in flood control programs;

(5) need for special skills not available in the agency operating the national network, e.g., detecting the presence of viruses and related living and physical properties;

(6) need for immediate reporting of data, from either a national network or special station, e.g., reports required for river forecasting.

c. In operating the national network the Department of the Interior will utilize the services of other agencies in acquiring national network water data when such cooperative arrangements are more effective or economical than having the Department acquire such data. Conversely, agencies needing water data to meet their special operating requirements should first determine the availability of the services of the Department

of the Interior. Only if such a cooperative arrangement or use of other agencies' facilities is found by the user agency, after consultation with potential cooperating agencies, to be less efficient or clearly impracticable, will the agency undertake data acquisition activities. Each agency will coordinate its activities with those of a similar nature being conducted under state and local auspices.

d. The Department of the Interior will maintain a central catalog on national network and specialized water data and on Federal activities being planned or conducted to acquire such data. That Department, with the assistance of user agencies, should organize the national network data and catalog of information on specialized data in such form as to facilitate maximum use by agencies and other interested parties of the cataloging facilities. In addition, user agencies will maintain on file such water data as are necessary in the efficient conduct of their respective operational missions, and to respond to requests for specialized data and their evaluation and interpretation.

3. Procedures for coordination.

a. The Department of the Interior is responsible for exercising leadership in achieving effective coordination of national network and specialized water data acquisition activities. The Department, with the participation of other agencies concerned, will undertake review of water data requirements and activities with the objectives of (1) identifying common needs for water data and establishing, and revising as appropriate, national network data acquisition activities; (2) advising user agencies promptly of the extent to which the national network can meet their special requirements for water data; and (3) achieving optimal coordination of network and specialized data activities in order to meet, effectively and economically, the variety of needs for water data. With the advice and assistance of other agencies concerned, the Department will establish procedures designed to carry out its responsibilities under this Circular.

b. In consonance with procedural objectives in paragraph 3a above the Department of the Interior will prepare and keep current a Federal plan, and the status of its implementation, for the efficient utilization of network and related specialized water data acquisition activities. Planning should be directed towards the establishment of both long-range and intermediate agency objectives and the development of water data acquisition activities related to both sets of objectives. The plan should clearly identify planning assumptions, any unresolved interagency issures, and the views of the agencies concerned. The Department of the

Interior should assure that the plan, relating proposed activities to fiscal year and longer range objectives, is available for review of the various agencies budgets for fiscal year 1966 and for annual previews of the budgets thereafter.

In preparing and revising the plan, the Department of the Interior will obtain the advice and assistance of the principal agencies providing or utilizing water data. The Department should exercise leadership in assuring that differences of opinion are resolved expeditiously.

c. Any major differences among agencies with respect to matters within the purview of this Circular, that cannot be resolved through consultation, may be referred by the head of any agency concerned to the Director of the Bureau of the Budget.

ELMER B. STAATS
Acting Director

APPENDIX E

INTERAGENCY COORDINATION

The Department of the Interior is responsible for coordinating water-data acquisition activities of all Federal agencies. Authority for this function is OMB Circular A-67 and annual appropriations legislation since the mid 1960's. Responsibility for water data coordination is delegated to the U.S. Geological Survey (USGS) through the Assistant Secretary for Energy and Minerals. National-level coordination is performed by the Office of Water Data Coordination. The USGS is responsible for the following activities under Circular A-67.

Undertake continuing review of water-data requirements and activities.

Exercise leadership in achieving effective coordination of water-data acquisition activities.

Prepare and keep current the Federal interagency plan for efficient water-data acquisition.

Maintain a central catalog of information on water-data acquisition in the United States.

Design and operate a national network for acquiring data on the quality and quantity of surface and ground waters, including the sediment load of streams.

In 1964, the Secretary of Interior established the following two advisory committees to assist the Department in fulfilling its coordination responsibilities.

Interagency Advisory Committee on Water Data. About 30 Federal agencies participate on this Committee. See attached membership list.

Advisory Committee on Water Data for Public Use. About 25 members participate as individual experts or as representatives of major organizations. See attached membership list.

INTERAGENCY ADVISORY COMMITTEE ON WATER DATA

CHAIRMAN: Philip Cohen
Chief Hydrologist
Geological Survey

ALTERNATE CHAIRMAN AND
EXECUTIVE SECRETARY: Porter E. Ward,
Chief, Office of Water Data Coordination
Geological Survey

Department/Agency	Representative	Alternate
AGRICULTURE		
Agriculture Research Service	J. B. Burford	David A. Farrell
Cooperative State Research Service	Paul E. Schleusener	Boyd W. Post
Economics, Statistics, and Cooperatives Service	Melvin L. Cotner	J. Horsfield
Forest Service	Robert H. Tracy	
Soil Conservation Service	Robert E. Rallison	
COMMERCE		
Bureau of the Census	Bernard J. Fitzpatrick	David T. Ely
National Bureau of Standards	William H. Kirchhoff	Lottie T. McClendon
National Oceanic & Atmospheric Admin.	Robert A. Clark	Allen F. Flanders
DEFENSE		
Army		
Corps of Engineers	Vernon K. Hagen	Eugene A. Stallings
Navy		
Naval Facilities Engineering Command	Jeanne A. Yacoub	
ENERGY		
Bonneville Power Administration	Roger G. Hearn	George E. Bell
Division of Operational and Environmental Safety	Carl G. Welty	
Division of Regional Assessments	Randolph R. Newton	
Federal Energy Regulatory Commission	Neal C. Jennings	Eugene A. Jarecki
HOUSING AND URBAN DEVELOPMENT	Truman Goins	

INTERAGENCY ADVISORY COMMITTEE ON WATER DATA--Continued

CHAIRMAN: Philip Cohen
Chief Hydrologist
Geological Survey

ALTERNATE CHAIRMAN AND
EXECUTIVE SECRETARY: Porter E. Ward,
Chief, Office of Water Data Coordination
Geological Survey

Department/Agency	Representative	Alternate
INTERIOR		
Bureau of Indian Affairs	Charles P. Corke	John Deason
Bureau of Land Management	Milton Schloss	Bernice Bigelow
Bureau of Mines	Wilton Johnson	
Bureau of Reclamation		Roy H. Boyd
Fish and Wildlife Service	Harvey R. Doerkson	
Geological Survey	R. H. Langford	Thomas J. Buchanan
National Park Service	N. Jay Bassin	Raymond Herrmann
Office of Surface Mining	John P. Mosesso	Douglas J. Growitz
Office of Water Research & Technology	Raymond A. Jensen	Ewell H. Mohler Jr.
TRANSPORTATION	Phillip L. Melville (Acting)	
INDEPENDENT AGENCIES		
Council on Environmental Quality	John F. Ficke	
Environmental Protection Agency	Edmund M. Notzon	
International Boundary & Water Comm.	Cruz Ito	
International Joint Commission	Vacant	
Nuclear Regulatory Commission	Thomas J. Nicholson	Myron Fliegel
Tennessee Valley Authority	William M. McMaster	Robert T. Joyce
Water Resources Council	Vacant	

ADVISORY COMMITTEE ON WATER DATA FOR PUBLIC USE

CHAIRMAN
Dallas L. Peck, Director
U.S. Geological Survey
Reston, Virginia

ALTERNATE CHAIRMAN
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EXECUTIVE SECRETARY
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MEMBER ORGANIZATIONS AND THEIR REPRESENTATIVES

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Mr. Kenneth R. Wright, Partner
Wright McLaughlin Engineers
Denver, Colorado

AMERICAN WATER WORKS ASSOCIATION
Mr. John A. Roller, Superintendent
Water Division, Dept. of Public Util.
Tacoma, Washington

ASSOC. OF AMERICAN STATE GEOLOGISTS
Mr. Vincent H. Dreeszen
State Geologist of Nebraska
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ASSOCIATION OF WESTERN STATE ENGINEERS
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Mr. Walter A. Lyon, Deputy Secretary
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APPENDIX F

Figures from Porter Ward's Office of Water Data Coordination presentation.
(Source of information: Master Water Data Index (MWDI), 1981)

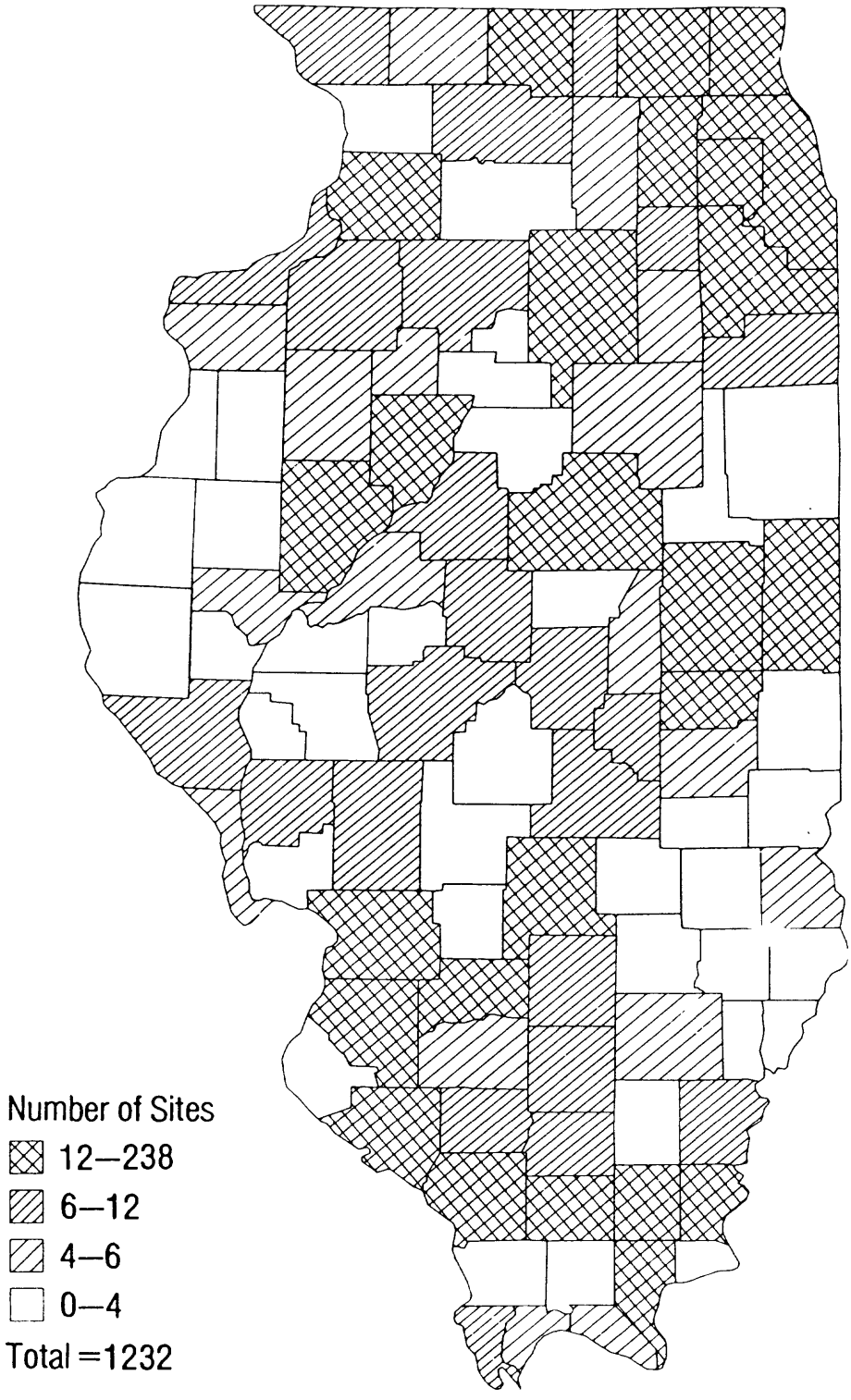

Figure F-1. Active surface-water quality sites in Illinois.

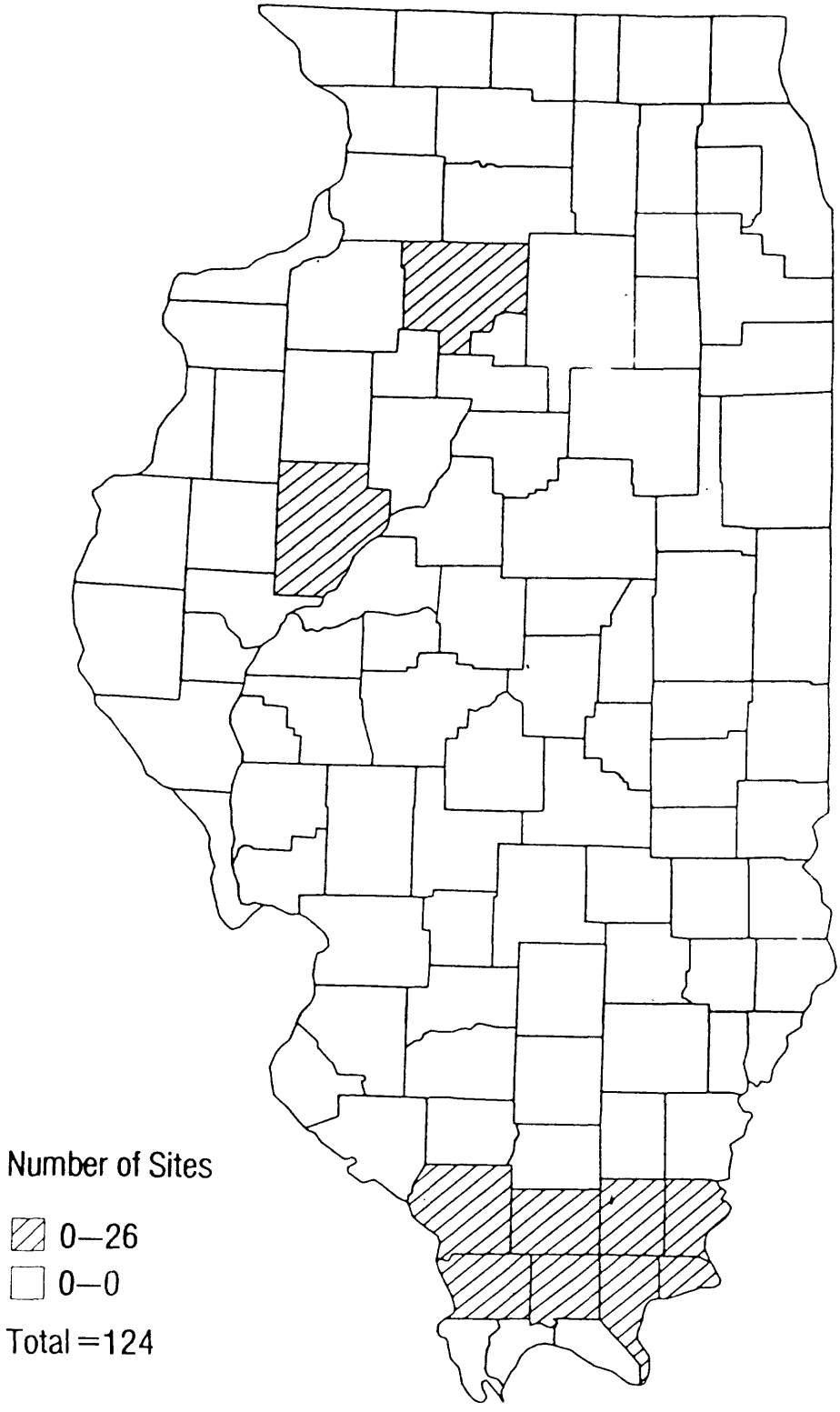

Figure F-2. Active ground-water quality sites in Illinois.

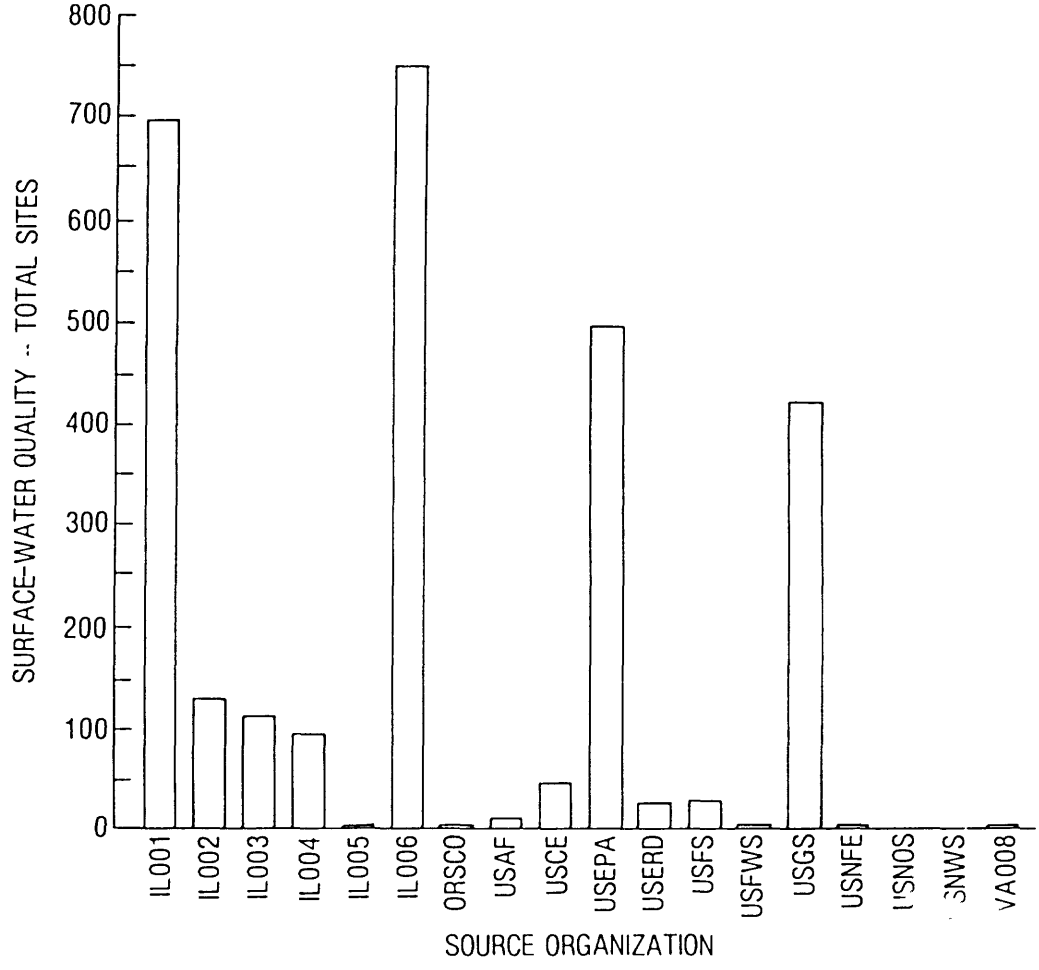

Figure F-3. Total surface-water quality sites in Illinois by organization.

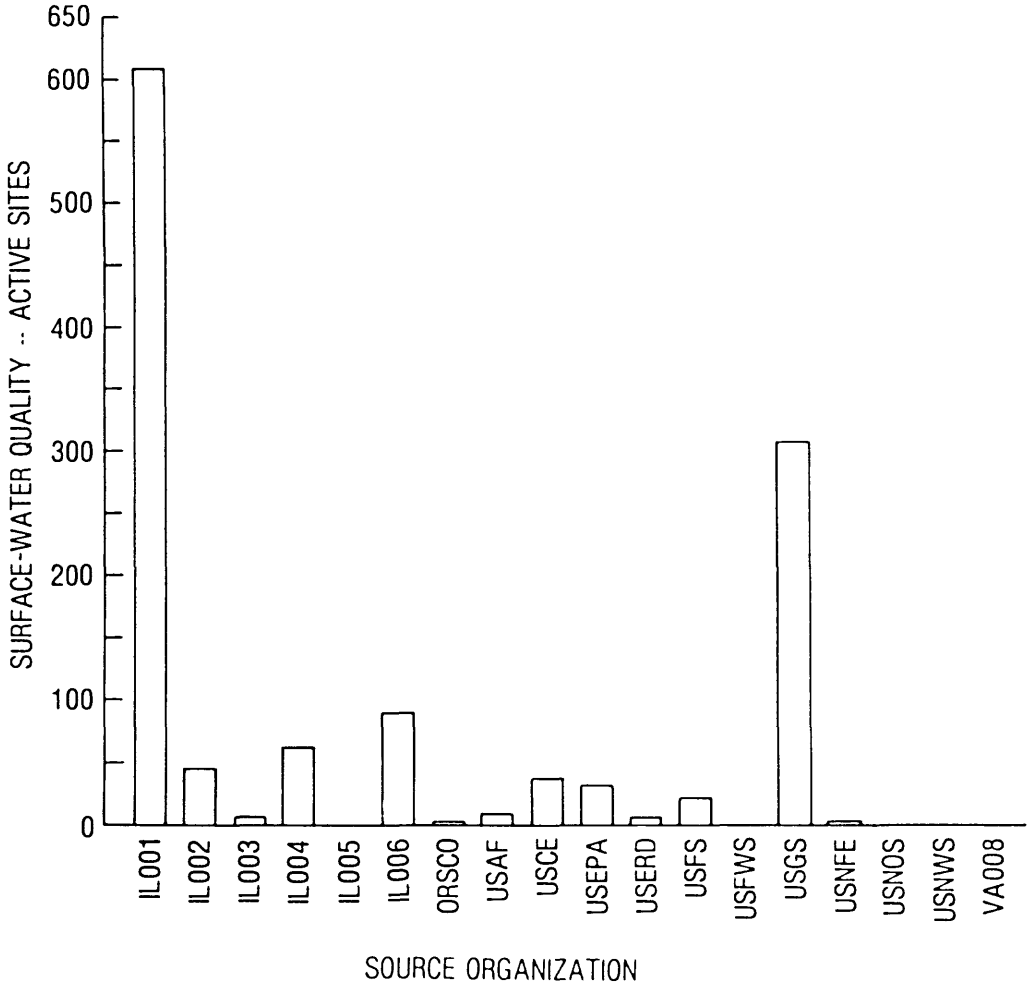

Figure F-4. Active surface-water quality sites in Illinois by organization.

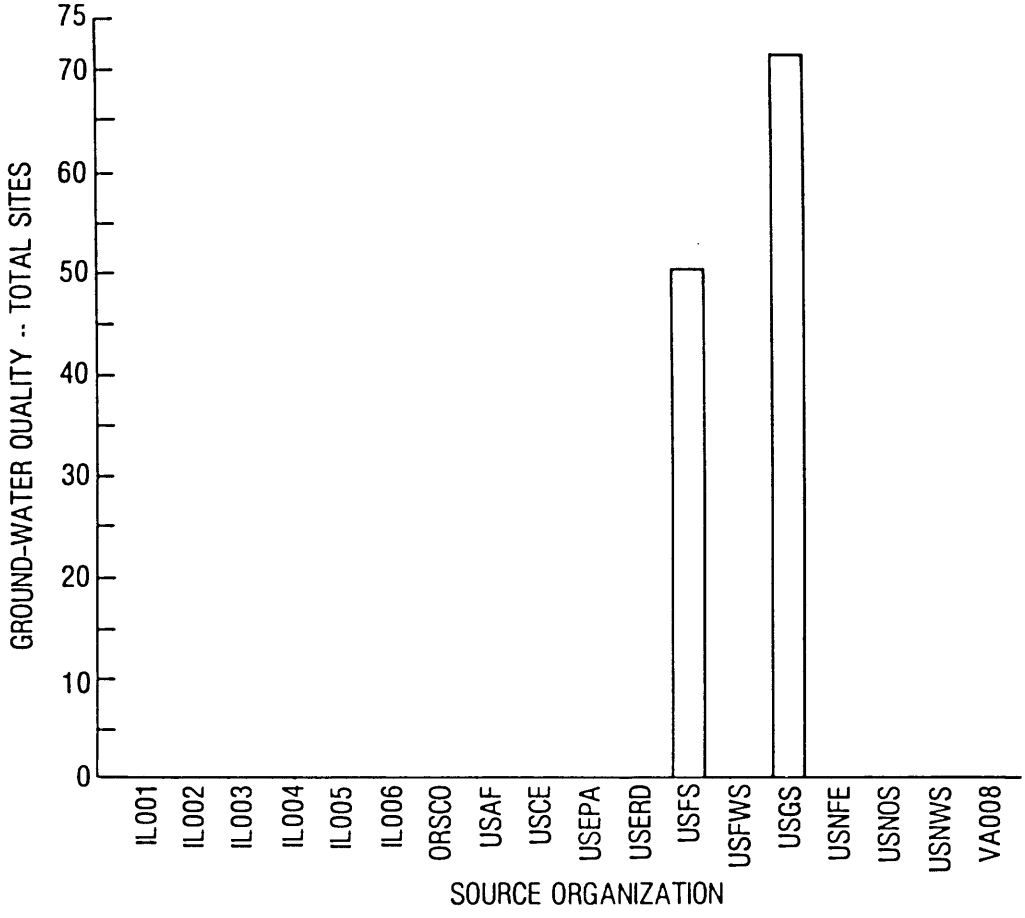

Figure F-5. Total ground-water quality sites in Illinois by organization.

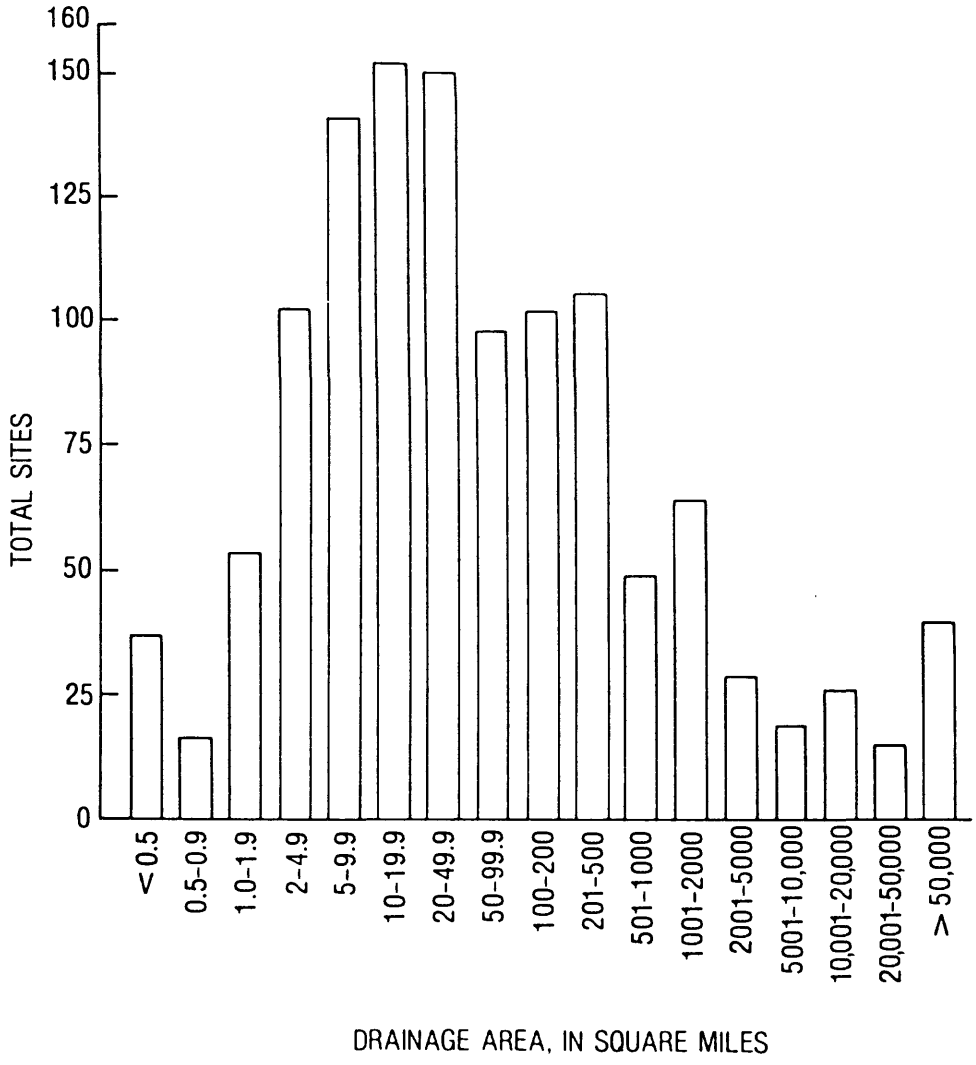

Figure F-6. Total data sites on streams in Illinois, by drainage area.

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