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Identification of Existing Surface Water Quality Monitoring Programs, Upper Illinois River Basin

by Robert A. Sinclair, Amelia Greene, Bonnie Weller, and Lisa Himick
Office of Spatial Data Analysis & Information

Prepared for the
U.S. Environmental Protection Agency

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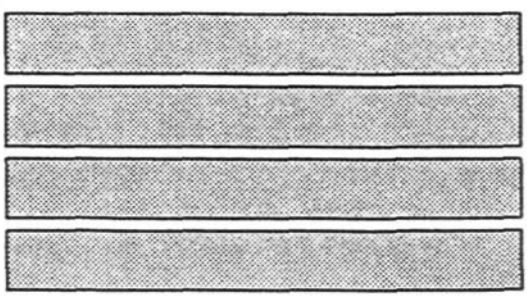

Illinois State Water Survey
Hydrology Division
Champaign, Illinois

A Division of the Illinois Department of Energy and Natural Resources

IDENTIFICATION OF EXISTING SURFACE WATER QUALITY MONITORING PROGRAMS, UPPER ILLINOIS RIVER BASIN

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Abstract

An inventory was conducted of the public and private water quality monitoring programs collecting surface water quality data since 1975 in the Upper Illinois River basin and those tributaries to that portion of the Illinois River basin (figure 1). Information in the inventory included the following: latitude and longitude to the second, responsible agency, parameters measured, contact person, and data collection period or the period for which the data were available. A Geographic Information System (GIS) database was built using the attributes listed above.

Introduction

A considerable amount of physical, chemical, and biological data were collected on the Upper Illinois River basin by various public and private organizations for the period 1975-1990. These data were inventoried so that other interested parties would have knowledge of their existence. An inventory was conducted of water quality monitoring programs currently active in both the Upper Illinois River basin (that portion of the basin above Chillicothe, river mile 181 - figure 1) and in those basins tributary to the Upper Illinois River basin (but not those portions within Indiana and Wisconsin). At present, no complete inventory of water quality monitoring programs in the Upper Illinois River basin exists. Assembling such an inventory would realize a number of benefits for water quality in the Upper Illinois River. With additional data available, state and federal agencies would be able to make better informed decisions about water use, conservation, and management. In addition, an inventory of the type described above would eliminate costly duplication of effort and allow more efficient allocation of scarce resources.

By means of both computer-generated databases and a personal contact survey, all types of private and public water quality monitoring activities on the Upper Illinois River basin were identified. The compiled database contains latitude and longitude to the second, agency station code, station type, responsible agency, contractor,

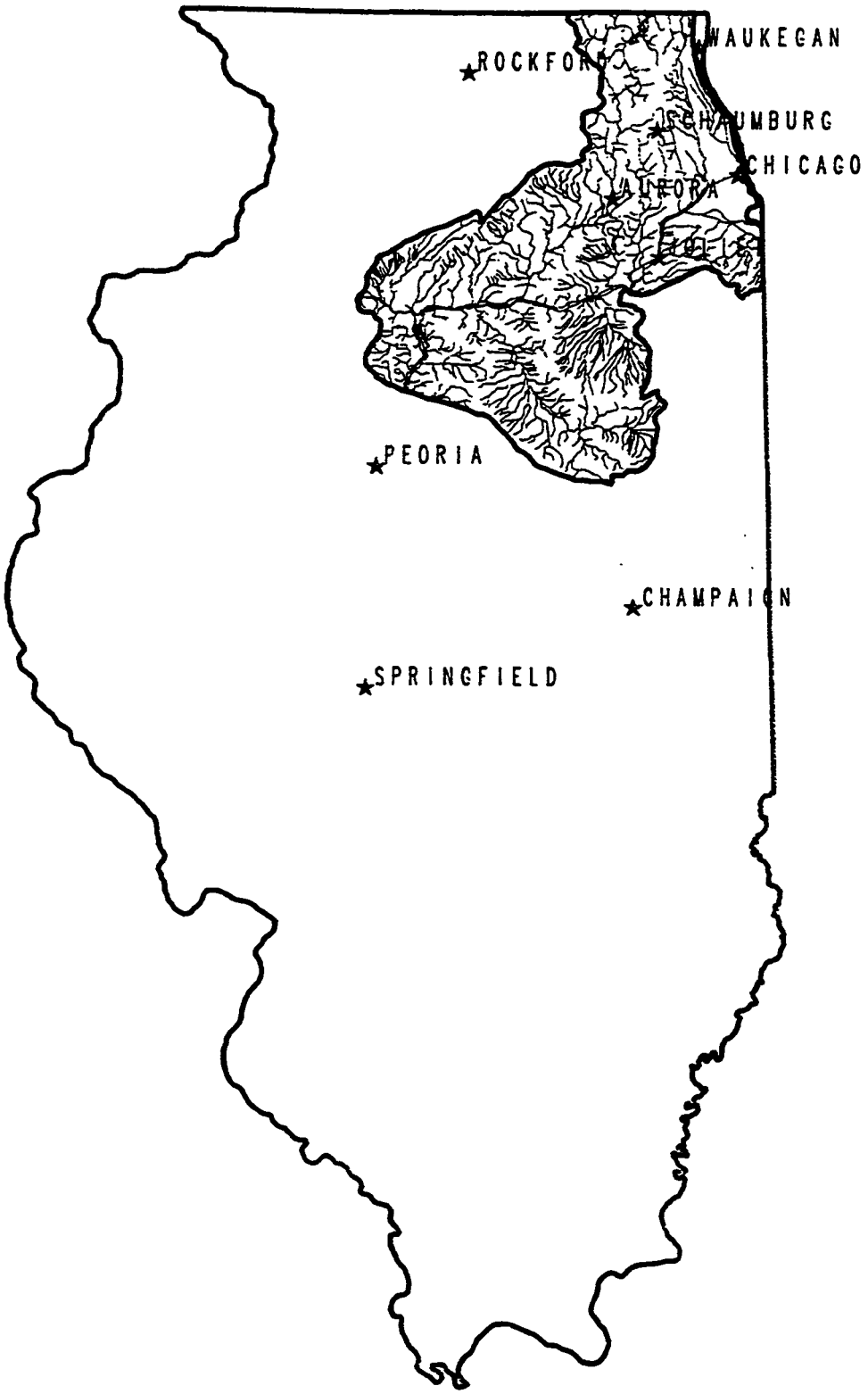

Figure 1. Identification of existing surface water quality monitoring programs, Upper Illinois River basin

parameters measured, data location and format, contact person, and data collection period. The difficult tasks of the survey were to 1) find all active agencies/ organizations in the field of water quality monitoring, 2) obtain a response with accurate information, and 3) present the monitored parameters correctly relative to sampling period, collection and analysis techniques, and reporting units. GIS ARC/INFO maps based on available automated streams information from a scale of 1:100,000 will be prepared showing monitoring locations and the type of data collected at those particular locations. Major transportation features, major towns, and other important landmarks will be included on the base maps.

Associated INFO files contain the attribute data indicated above. The compiled ARC/INFO datasets of monitoring sites were sent to the U.S. Environmental Protection Agency (USEPA) Region V on an 8-millimeter (mm) tape cartridge in UNIX TAR format.

Problem Statement

A considerable amount of water quality data was collected on the Upper Illinois River basin by public and private agencies/organizations for the period 1975-1990. However, because little, if any, exchange is made between these agencies/ organizations, no one really knows just how many collection sites exist in the Upper Illinois River basin or what type of water quality data collection occurs at these sites. The Illinois State Water Survey (ISWS) and the Illinois Environmental Protection Agency (IEPA) believed it would be beneficial to inventory these databases and create a centralized database identifying these sites and the parameters tested.

This report documents the active water quality data collectors of the Upper Illinois River basin, the location of the water quality monitoring sites, and the parameters of water quality data collected at these sites.

An inventory was conducted of water quality monitoring programs currently active in the Upper Illinois River basin. The study area includes the Illinois waterway and its tributaries above Chillicothe, river mile 181, but not the Kankakee and Fox River basins inside Wisconsin.

Objectives

One objective was to inventory data collection efforts by federal, state, municipal, and private entities pertaining to water quality in the Upper Illinois River basin. In addition, inventories will also be prepared for tributaries of the Upper Illinois River and those rivers whose water quality is directly affected by the Upper Illinois.

This includes the Upper Illinois, DesPlaines, and Fox Rivers, but not parts of the basin in either Wisconsin and Indiana or the Kankakee River basin. The survey was for monitoring work that was done for 1975 or later. The compiled data included the following: latitude and longitude to the second, agency station code, station type, responsible agency, contractor, parameters measured, data location and format, contact person, and data collection period. GIS maps at an appropriate scale were prepared showing monitoring locations and the type of data collected at particular locations. The compiled data sets of monitoring sites are on an 8-mm tape cartridge in the ASCII format.

The objectives of the Upper Illinois River basin project, as identified by the Upper Illinois River basin project team, were as follows:

1. Identify all active agencies/organizations with water quality monitoring programs in the study area.
2. Contact each one to determine the scope of their monitoring activities.
3. Present the location and scope of each monitoring program in tabular and mapped format using the ARC/INFO GIS.

Methodology

The GIS base map was developed, including 1:100,000 DLG streams coverage, selected transportation features, major towns, and other significant features for the study area as previously defined.

A near-term (1975 data or later) historical survey was performed on the water quality collection activities of various public and private agencies/organizations. The compiled inventory attributes are presented in a GIS format. The inventory and survey of water quality monitoring locations were done by both computer-generated databases and personal contact. The survey included all types of water quality monitoring activities on the Upper Illinois River basin (as previously defined) that were done by public and private agencies/organizations. Every attempt was made to find all active monitoring agencies/organizations in the field and to obtain accurate information about their water quality monitoring programs, but if an agency/organization refused to cooperate or make the data available, little could be done to obtain that data.

The compiled database contains latitude and longitude to the nearest second, agency station code, station type, responsible agency, contractor, parameters measured, data location and format, contact person, and data collection period.

The difficult tasks of the survey were 1) to find all active agencies/organizations in the field of water quality monitoring, 2) to get them to respond with accurate information, and 3) to present the monitored parameters correctly with respect to sampling period, collection and analysis techniques, and reporting units.

GIS ARC/INFO maps were prepared at an appropriate scale to show monitoring locations of the study area and the type of data collected at those particular locations. The compiled data sets of monitoring sites are on an 8-mm tape cartridge in the UNIX TAR archive format.

Overview of Products

1. One set of USGS (1:24,000) topographic paper maps of the project area for the USEPA Geographical Information Systems Management Office (GISMO)
2. One set of USGS (1:100,000) topographic paper maps of the project area (for GISMO)
3. Two paper and one digital copy (ARC/INFO) format on an 8 mm tape cartridge of the final map set produced from the project
4. If applicable, the documentation of the original sources' data sets used, both spatial and tabular, included the following:
    - Name of contact
    - Scale
    - Resolution
    - Projection
    - Item definitions
    - Coordinates system used (for GISMO)

5. Documentation of the final product data sets, both spatial and tabular used, included the following:
    - Name of contact
    - Scale
    - Resolution
    - Projection
    - Item definitions
    - Coordinates system
    - Final documentation with a description of the geoprocessing methodologies and techniques
    - Pre/post processing quality assurance/quality control (QA/QC) methods for GISMO

6. The GIS base map developed included 1:100,000 DLG streams coverage, selected transportation features, major towns, and other significant features
7. Appropriate INFO files updated to include sample locations and coded by type
8. Computer-based maps produced with the above information at appropriate scale
9. Identification of monitoring programs conducted on the Upper Illinois River basin by other agencies/organizations since 1975 (Compiled information on sampling points for each program included the following: latitude and longitude to the second, agency, station code, station type, responsible agency, contractor, parameters measured, data location and format, contact person, and data collection period)
10. Separate coverage to GIS base map (described as product 6) prepared to include data from product 9 (compiled data set of monitoring sites were on INFO file and also are on an 8-mm tape cartridge in the UNIX TAR format)
11. Provided the USEPA with information (described in products 9 and 10) for the tributary portion of the Upper Illinois River basin as described previously

System Design

The system design process for the Upper Illinois River basin project was conducted in two phases. The first phase, the database design process, involved designing a relational database specifically for the Illinois River basin project. The second phase, the data collection process, involved gathering the required information and entering it into the computer. The following process was used to design the database:

1. Create problem statement and list of objectives.
2. Identify and list tasks and activities.
3. Identify and list entities.
4. Identify and list attributes.
5. Refine attributes.
6. Establish relationships between entities.
7. Establish entity, relationship, and attribute view.
8. Implement database design.

To accomplish this first stage, the contract between the ISWS and the USEPA was examined. The writers of the contract were contacted and asked what they thought the goals and objectives were for the Upper Illinois River basin project. This information was then combined into a problem statement and list of objectives.

When determining tasks and activities, lists of general tasks and specific activities in the form of questions or statements were created. The following are examples of general tasks the users of the database believed to be essential in order to obtain the required information from the data.

- Manage Water Quality Monitoring Inventory
- Agency/organization mailing and phone list
- Location of sites listing
- Parameters list
- Questionnaire calculations
- Water quality and biological data collection calculation
- Source of data listing
- Data collection listing (Activities) more specific than database design process listing (Tasks)

The following are examples of activities that might be performed in the Upper Illinois River database. Again, the users of the database were consulted, and the following is a list of activities they expected to extract from the database.

- List the contact person and address for a specific agency/organization.
- Make a printout of all the agencies/organizations in Chicago, which do water quality monitoring.
- The phone number of the contact person for a specific agency/organization.
- The parameters for which a specific agency/organization tests.
- Respondents expressing a "willingness to participate in our questionnaire."
- Number of respondents willing to participate but not meeting our criteria.
- Respondents to our letter of inquiry. To our questionnaire.
- Number of agencies/organizations collecting water quality data. Biological data. Both.
- Locate a specific water monitoring site within the database.
- When did a specific respondent last test for arsenic at a specific water monitoring site?
- Which parameters are collected most often? (Rank them from most to least used.)
- What agencies/organizations should be sent a questionnaire? Respondents rejected.
- In Du Page county, list the agencies/organizations that test for copper, gold, and silver. What are their mailing addresses?

This list does not cover all the activities in which the users are engaged. It would be impossible to list all the activities required for a database as large and versatile as this. This list does, however, give a good overview of the type of information the users of the database expect to extract from it. These activities will aid in the identification of the database's entities and attributes further on in the design process.

In order to determine the entities of the database, the lists of tasks and activities were examined closely. The objective of the agency/organization was assessed, and who or what was targeted in this database was determined. The following entities were targeted by the enterprise using the Upper Illinois River basin database.

- Organizations
- Inquiry Results
- Background Information
- Water Quality Parameters

Again the lists of tasks and activities were consulted in order to determine the attributes required. A list of attributes was created and then shown to the users for further input and corrections. The following are the attributes of the Upper Illinois River basin database and their corresponding entities.

- Organizations
  -name
  - address
  - phone number
  - contact person

- Inquiry Results
  - responded to inquiry
  - collects water quality data
  - collects biological data
  - consented to participate in survey
  - questionnaire sent

- Background Information
  -ID#1
  -ID#2
  - county name
  - county number
  - legal location

- latitude
- longitude
- name of site
- method of determining location
- collection period
- frequency of sampling
- reason for sampling

• Water Quality Parameters
-ID#1
-ID#2
- parameter number
- parameter name
- collection period
- units of measurement
- analytical technique

The refinement stage required the elimination of redundant data and the subdividing of data deemed too general. During the refinement stage, duplicate data were removed. Files that could be generated with queries were deleted. The attribute address proved to be inadequate. Department, address, address2, city, state, and zip were all subsets of address and therefore became attributes themselves. Because there was no unique identifier, one was created. Each individual entity, or record, was given a unique mail_id number, which was then identified as a candidate key or a common identifier. Mail_id and ID#1 were the same. The name ID#1 was changed to reflect this.

How entities relate to one another determines their relationship. Initially, when the components for the Upper Illinois River basin project were first created, the preceding steps were not conducted. As increased knowledge about databases developed, excessive files were eliminated.

To determine the relationships between entities, required addressing the question "How does entity A interact with entity B?" If there was no interaction, as in INQUIRY RESULTS in relation to INQUIRY RESULTS and INQUIRY RESULTS, no relationship existed between those files. If there were interactions, the interaction, or relation, was determined and this relationship was worked into the system design.

Interaction between the entities ORGANIZATION (Big_List) and INQUIRY RESULTS (Datal) involved listing addresses stored in the file Big_List for specific records identified through a query process using data listed in the Datal file. Datal exists dependent upon Big_List. Without the addresses listed in Big_List, information

in Datal is useless. The reverse is not true, however; Big_List can exist without Datal.

The ORGANIZATIONS entity and the BACKGROUND INFORMATION entity (Site_Loc) have a similar relationship to the one described above. The differences are that each file (Big_List and Site_Loc) draws upon the other. The Big_List file not only lists addresses for the Site_Loc file, but the Site_Loc file also lists monitoring stations for the Big_List file. It tells the user where and how many monitoring stations a given agency/organization has. Site_Loc exists dependent on Big_List. The monitoring stations would not exist if the agencies/organizations did not exist. This is because the organizations set up the monitoring stations.

WATER QUALITY PARAMETERS (Raw_Data) also exist dependent upon the entity BACKGROUND INFORMATION. Without the monitoring sites, water quality data could not be collected.

In addition, INQUIRY RESULTS, WATER QUALITY PARAMETERS, and BACKGROUND INFORMATION exist dependent on the entity ORGANIZATIONS, without which none of the other files would exist. Thus ORGANIZATIONS is the focal entity or the center of the Entity Structural Relationship.

When determining the database design, it was important to know how the data were going to be stored. The database management system that was selected to a large degree determined the database structure. The Upper Illinois River basin database was created using a relational database system called dBASE IV, but ultimately all the data were attached to a site coverage in the GIS known as ARC/INFO. dBASE IV was better equipped to handle the first requirement of the Upper Illinois River basin project, that of data collection. It was easier to do all the day-to-day work in dBASE IV, and . when the bulk of the work was done, feed the data into the ARC/INFO GIS.

dBASE IV was organized around files, each reflecting a separate entity. Files consist of rows and columns. The columns represent the attributes of an entity. The rows are the values of the attributes. The files are interconnected by a common identifier, i.e., a candidate key. Rows and columns may be represented in any sequence without altering the meaning of the relationship.

dBASE IV has a few limitations that could affect the database structure. Attributes in dBASE IV are called fields. Field names are limited to ten characters. The maximum number of characters per field is 254. The maximum number of numeric digits per field is 20. Entities are called files. File names are also limited to eight characters. The data type, or domain, for a file can be either numeric, character, logical, date, or memo.

When determining the data structure, the largest number of characters in any one field became the field size. For example, the longest street address in the file Big_List was 31 characters. Thus the field size for address was set at 31. Since address has both numbers and characters, its domain was classified as character. In instances where the field contained numeric values only, and calculations were expected to be performed on these values, the domain was classified as numeric. To prevent errors, if the field had numeric values but no calculations were going to be used, the fields were classified as character. Yes or no, and true or false data were classified as logical data types. The fields in the file "Datal" are examples of logical fields. Fields using dates, such as "Collection Period", were classified as date. The memo field was used to log the correspondence between the users and the agencies/organizations listed in the mailing list.

The entities were given file names. They are identified in the database as follows:

Organization --- > Big_List (The master mailing list)
Inquiry Results -- > Datal
Background Information---> Site_Loc
Water Quality Parameters ---> Raw_Data

The database designs for the entities are shown below. As will be explained shortly, six different data files were sorted through and combined to create the mailing list called Big_List. The database structures were altered to allow the data to be successfully appended to Big_List. To do this, the field name, type, and width of each file had to match the fields in Big_List exactly.

Database Design for Mailing List for dBASE IV

Structure for database: C:\DBASE\BIG_LIST.DBF
Number of data records: 1044
Date of last update: 05/07/91

Field	Field Name	Type	Width	Index
1	FILENAME	Character	8	Y
2	MAIL ID	Character	5	Y
3	ORG NAME	Character	34	Y
4	DEPT	Character	34	N
5	CONTACT	Character	30	N
6	GREETING	Character	20	N
7	ADDRESS	Character	31	N
8	ADDRESS2	Character	23	N
9	CITY	Character	15	Y
10	STATE	Character	2	N
11	ZIP	Character	5	Y
12	PHONE	Character	10	N
13	MEMO	Memo	10	N
** Total **			227	

Database Design for Follow-up Queries Table for dBASE IV

Structure for database: C:\DBASE\DATA1.DBF
Number of data records: 1044
Date of last uDdate: 05/07/91

Field	Field Name	Type	Width	Index
1	MAIL_ID	Character	5	N
2	RESPOND	Logical	1	Y
3	H20QUAL	Logical	1	Y
4	BIOQUAL	Logical	1	Y
5	CONSENT	Logical	1	Y
6	QNAIRE	Logical	1	Y
** Total **			11	

Sources of Data

Data sources included public and private water quality monitoring programs currently active in the Upper Illinois River basin and those tributaries to that portion of the Illinois River basin. They did not include that portion of the Illinois River basin within Indiana and Wisconsin, nor the portion known as the Kankakee River basin.

Digital Base Map Creation

During the project, working or intermediate copies of the above products were made available to the USEPA Geographical Information Systems Management Office along with draft documentation and flow charts of proposed database development and geoprocessing methodologies.

Creation of the digital base map was done by quad sections on a 1:100,000 scale. There are ten quads within the Upper Illinois River basin, each with its own directory under its quad name. To access the coverages, you need to go into specific quad directory. The coverages were divided this way because some of them (i.e., roads and hydrology) were very large and working on them without decreasing their size was too time consuming on the slow Prime computer. It was decided that dividing them up according to how they would appear in final map form was best. Thus each coverage was clipped by quad sections and placed under its proper quad directory.

The HYDRO and ROADS directories only contain the annotation coverage for the entire Upper Illinois River basin. The QUAD directory contains the boundaries for township, range, and meridian; the boundaries for 1:100,000 and 1:24,000 quad sheets; and the boundaries and annotations for the counties.

The annotations for the streams coverages were created to be plotted out on a 1:100,000 quad sheet. Annotation was kept to a minimum to prevent information clutter when plotting out several coverages onto one map.

Annotations for streams coverages were created by overlaying the roads, streams, and towns coverage in areas where there were no or few overlaying coverages. In some areas, it was necessary to place the annotations some distance apart. In other areas, such as Chicago, it was impossible to place an annotation in its appropriate location without overlaying other coverages (usually the roads coverage). In these instances the least congested area along the stream was selected and the annotation was placed there. The annotation could not overlap the towns coverage, because this would make reading the names of the towns and the streams too difficult.

ARC/INFO Coverage Description

The actual coverages for each quad are in the QUAD directory. Each coverage contains the following base map coverages: ROADS, HYDRO, BOUNDARY, MAINROADS, INTERSTATES, INTERCHANGES, ANNO.ROADS, and ANNO.STREAM.

The MAINROADS coverage contains the main highways, including the interstates, and the INTERSTATES coverages contain interstates only. The

MAINROADS coverage was created by selecting the proper code from the INFO file and creating a new coverage called MAINROADS. However, not all of the data appear to be coded correctly, and thus there were gaps in the MAINROADS. The staff digitized these gaps in the coverages MAINROADS and INTERSTATES.

ANNO.STREAM AND ANNO.ROADS are annotation coverages for the streams and roads within the 1:100,000 quadrangle area.

The COUNTIES, QUAD100, QUAD75, TOWNSHIP coverages contain the boundaries for the counties, quadrangles (1:100,000 and 1:24,000), and townships.

The COUNTIES coverage contains the boundaries and county names.

The TOWNSHIP coverage contains the boundaries and townships, ranges, and meridian listing.

QUAD100 contains the boundaries for the 1:100,000 quadrangle maps and with the names attached to the labels as attributes.

QUAD75 contains the boundaries for the 1:24,000 (7.5") quadrangle maps with the quad names attached to the labels attributes.

The ANNOTATION coverages are as follows: Annotation coverage for the roads contains only the major highways: the state, the U.S., and the interstate highways. The ANNOTATION coverage was created to be plotted out on the 1:100,000 quadrangle area. The ROADS annotation was kept to a minimum to prevent excessive information clutter as coverages are added to maps when plotted out for viewing.

Coverages include ROADS, INTERSTATES, INTERCHANGES, MAIN-ROADS, and TOWNS.

The NPDES coverage identifies the National Pollution Discharge Elimination System (NPDES) monitoring sites within the Upper Illinois River basin.

The STORET coverage is a point coverage containing water quality monitoring sites for the state of Illinois. It also contains appended data from the STORET database. The data it contains are locational data. The STORET data management system is part of the USEPA.

The coverage TOWNS lists the towns in Illinois that have a population > 0 and have a listing in the zip code book. Those with a zero population and no listing in the zip code book were removed to eliminate excess clutter in regard to annotation.

The coverage TOWNS contains only the area within the Upper Illinois River basin.

To reduce excess clutter during plotting the text of the towns on a 1:100,000 quad sheet, the following criteria could be used: for a town with a population < 1000,

the text size was .08; if it was > 1000 and < 10,000, the text size was .1; if it was > 10,000 and < 50,000, the text size was .1375; if it was > 50,000 and < 1,000,000, the text size was .175; if it was > 1,000,000, the text size was .25. The text font was set at 5.

dBASEIV Database Descriptions

Many dBASE IV files were built during the project to create the mailing list, to track the mailings, to enter the data from the questionnaires, to enter data from paper documents, etc.

Below is a brief summary of some of the larger dBASE IV files:

BIG_LIST.DBF	ADDRESS1.DBF	QNAIREY.DBF	CONTACT.DBF
QRESPN.DBF	WATERUSE.DBF	SMALL.DBF	ADDNPDES.DBF
SMALL2.DBF	ORIGINAL.DBF	ADDRESS3.DBF	WDSD_ADD.DBF
NPDES.DBF			

The following is a description of the dBASE IV files that were built for the project.

BIG_LIST.DBF....This is the mailing list of all the addresses of possible water quality sites within the Upper Illinois River basin (and beyond). It is a compilation of addresses from the EPA, USGS, ISWS, Hazardous Waste Research and Information Center, University and State phone books, plus other leads. All agencies/organizations were contacted or attempts were made to contact them.

ADDRESS1.DBF....This file contains addresses taken from the Hazardous Waste Research and Information Center's mailing list.

QNAIREY.DBF....Those agencies/organizations that were sent questionnaires after they indicated they collected water quality data and would participate in our survey. This file was handy when trying to determine who was sent a questionnaire but did not return one.

CONTACT.DBF....This file contains contact names and NPDES ID#. It was appended to the NPDES file and added into the ARC/INFO GIS system.

QRESPN.DBF....Those agencies/organizations that returned a questionnaire or were told on the phone not to return one. This file only indicates those agencies/organizations in which some determination was made regarding the questionnaire. If marked "Y" this means the questionnaire was returned and completed. If marked "N" then the questionnaire was either returned and not

completed or a phone contact was made after it was sent telling them not to fill it out. Either way, the questionnaire was not filled out because the agency/organization did not really have the type of data we wanted.

WATERUSE.DBF....Original water use database file from ISWS.

SMALL.DBF....This is the file usually used to add a short list of names for sending out reports or to type out mailing labels.

ADDNPDES.DBF....This file contains addresses for the Upper Illinois River basin that were clipped from the NPDES coverage in ARC/INFO and entered into dBASE IV.

SMALL2.DBF....This file contains the address for the ISWS. It was used for mailing labels on return envelopes.

ORIGINAL.DBF...Explains the origin of each of the files in the ADDR_ORG.CAT.

ADDRESS3.DBF...This file contains addresses taken from IEPA "Illinois Water Data Catalog Report."

WDSD_ADD....The addresses extracted from the USGS WDSD database. The WDSD is the NAWDEX database, short for National Water Data Exchange. Also known as WDSD_AD.DBF.

NPDES.DBF....IEPA database of Illinois agencies that collect water quality data. Some of the data are also stored in the SITES.DIR in information under NPDES.SITES.PAT in the ARC/INFO system.

Data Collection

As noted earlier, this phase involved gathering information and inputting it into the computer. During this phase, agencies/organizations that collected water quality data and were willing to participate in the study were identified, the location of their monitoring stations determined, and the water quality parameters collected at these stations ascertained.

To identify those agencies/organizations that collect water quality data, a massive mailing list was compiled in the dBASE IV relational database management system. To create this mailing list, six files were condensed into one large dBASE IV file. The six files, identified as ISWS, HWRIC, WATERUSE WDSD, NPDES, and INHS, contained, among other things, addresses and phone numbers of potential water quality monitoring agencies/organizations within the state of Illinois. These files were queried to locate agencies/organizations within the Upper Illinois River basin. The

agency/organization's name, address, phone number, and contact person were extracted from the file and merged into the master mailing list file called Big_Iist.

The NPDES, WDSD and Wateruse data files came in computer-readable form. The agencies creating these files were the IEPA, the ISWS, and the USEPA, respectively. Other files were created manually, using resources such as the Illinois State Government phone book, Hazardous Waste Research and Information Center's (HWRIC) mailing list, Illinois Natural History Survey's (INHS) staff directory, and the "Illinois Water Data Catalog Report" put out by the IEPA in May 1985.

The NPDES file contained incomplete data. The contact information was inadvertently left out of the database that was sent to the ISWS. This data was therefore sent separately and needed to be added to the NPDES data file. This was done in dBASE IV by linking the records of both files (NPDES and CONTACT) using a common identifier (NPDES-ID#) and then executing the relate command. This joined the agency's name and address with its corresponding contact person.

The three machine-readable databases contained information outside the area of study. Data for these databases encompassed the entire state of Illinois. In addition to name and address information, these databases contained the latitude and longitude of the actual water monitoring sites targeted for this project. To get only the information within the Upper Illinois River basin, a point coverage for each database was created in the ARC/INFO GIS using the latitude and longitude information and the point's corresponding ID number. Each point had its own unique number. Since only the points falling within the Upper Illinois River basin were required, the coverage was clipped using a separate polygon coverage, which outlined the Upper Illinois River basin's border. This new clipped coverage contained only those points identified as having monitoring sites within the Upper Illinois River basin's boundaries. The ID numbers for these points were downloaded and placed in a separate ASCII file, which was loaded back into dBASE IV.

As stated earlier, the original computer-readable database files contained records for the entire state of Illinois. In order to separate the Upper Illinois River basin data from the original database file, the file containing the ID numbers for the clipped points was linked to the larger computer-readable database file. To do this, a common field, ID number, was identified. A query was designed to examine both files and then link the records together using their common field. Whenever a match was found, i.e., the same ID in both files, the matched record was appended to a smaller file. This smaller file contained only those records found within the Upper Illinois River basin. The agency/organization's name, address, phone number, and contact person were extracted

from this file and appended to the master mailing list. The remaining data were loaded into an ARC/INFO GIS database as discussed later in this section.

Once the creation of the mailing list was complete, letters of inquiry (appendix A) were sent out. These letters contained a letter of introduction outlining our reason for the survey plus a one-page form inquiring about agency/organization involvement in surface water data collection and their willingness to participate in the survey. They were asked to return the completed form in the enclosed, self-addressed stamped envelope. In all, 1,004 letters of inquiry were sent. In addition, 40 federal and state agencies with whom the ISWS has a personal working relationship, were contacted by telephone. Organizations, which did not respond to the letter of inquiry regarding their participation in water quality data collection, were also contacted by telephone. When this information was received verbally, the forms were filled out by the ISWS. Of the 1,044 organizations contacted, 442 forms were returned. Of these, only 163 met the required criteria and were sent water quality questionnaires. Initially, 50 questionnaires were sent. Thus if some confusion regarding the questionnaire arose, modifications were made and the modified questionnaire was sent to the remaining organizations.

Thirty-two agencies/organizations returned the forms indicating a willingness to participate in the survey but did not collect water quality data. The relevant Mail_ID was included on the forms. These ID numbers were used to extract mailing addresses from the Big_List file using the 'select' command. These organizations were then sent a letter thanking them for their good intentions and informed that their input was not needed at this time (appendix A).

The questionnaires were designed to extract information regarding an agency/organizations's water quality data collection activities and the specific location of their water quality monitoring sites. Once these questionnaires were returned, the data were loaded onto the computer.

Data from the questionnaires were manually entered into dBASE IV using a specially designed template. This template allowed for easier transfer of information. Instead of entering the names of each parameter identified on the questionnaire (see appendix B for sample questionnaire) an x was placed in the appropriate space. The computer would recognize that the space corresponded to a special command that told the computer how and where to place the data. This sped up the data entry process considerably. It was decided to enter the data into dBASE TV and then enter them into ARC/INFO GIS. It was felt that the dBASE IV system was easier to use for data entry of this nature and that the ARC/INFO system was not really designed to handle massive amounts of manually fed data.

Once the data from the questionnaire were entered, all the data from all sources were entered into the ARC/INFO GIS. This involved merging the computerized machine-readable databases containing the required data with those data taken from the questionnaire. Then the data were entered into dBASE IV to form a single water quality database management system, which needed to include a point coverage identifying each monitoring site. To accomplish this, the databases with geocoding were loaded onto the ARC/INFO GIS. A database structure was designed to allow for the import of data from both the computerized machine-readable databases and data taken from the questionnaires. Thus the domains and database structure designed for ARC/INFO had to be compatible (see end of this section for database structure of ARC/INFO files). Using the latitude and longitude data from the Site_Loc file, a point coverage was created using ARC/INFO's 'generate' command. Before this could be done, however, the latitude and longitude coordinates were converted to the Lambert conformal projection using the ARC 'project' command.

This point coverage contains the locations of all the water quality monitoring sites identified in our survey. The data contained in the ARC/INFO files called Site_Loc and Raw_Data were linked to the point coverage by a common ID# and retrieved with various queries in INFO.

The final products consist of six overlays containing previously created road, stream, and town coverages, and the recently created point coverage identifying all the monitoring stations within the Upper Illinois River basin. These overlays can be pulled up on the computer or plotted out as paper maps at any scale, using one or several of the coverages. However, the original plot files are designed to plot out maps on a scale of 1:100,000 using all the coverages.

Database Designs for Original Files

Structure for database: C:\DBASE\NPDES.DBF
Number of data records: 1138

Field	*Field Name*	*Type*	*Width*	*Index*
1	NPDES_ID#	Character	9	Y
2	ORG_NAME	Character	30	Y
3	MAILNAME	Character	30	N
4	PHONE	Character	10	N
5	ADDRESS	Character	30	N
6	CITY	Character	23	N
7	STATE	Character	2	N
8	ZIP	Character	5	N
9	ZIPN	Character	5	N
10	SICCODE	Character	4	N
11	LAT	Character	8	N
12	LONG	Character	9	N
13	RVRBRANCH	Character	11	N
14	COUNTY	Character	3	N
15	BASIN	Character	6	N
16	RECWTRCODE	Character	6	N
** Total **			192	

Structure for database: C:\DBASE\CONTACT.DBF
Number of data records: 571

Field	*Field Name*	*Type*	*Width*	*Index*
1	NPDES_ID#	Character	9	N
2	CONTACT	Character	30	N
** Total **			39	

Structure for database: C:\DBASE\WDSD_ADD.DBF
Number of data records: 42

Field	*Field Name*	*Type*	*Width*	*Index*
1	ORG_NAME	Character	34	Y
2	DEPT	Character	34	Y
3	CONTACT	Character	30	N
4	ADDRESS	Character	31	N
5	CITY	Character	15	Y
6	STATE	Character	2	N
7	ZIP	Character	5	Y
8	PHONE	Character	10	N
** Total **			161	

Structure for database: C:\DBASE\ISWS.DBF
Number of data records: 50

Field	*Field Name*	*Type*	*Width*	*Index*
1	ORG_NAME	Character	25	Y
2	ADDRESS	Character	30	N
3	CITY	Character	15	N
4	STATE	Character	2	N
5	COUNTY	Character	15	N
6	ZIP	Character	5	N
7	PHONE	Character	10	N
8	CONTACT	Character	25	N
** Total **			131	

Structure for database: C:\DBASE\INHS.DBF
Number of data records: 21

Field	*Field Name*	*Type*	*Width*	*Index*
1	ORG_NAME	Character	34	*Y*
2	DEPT	Character	34	N
3	ADDRESS	Character	30	N
4	ADDRESS2	Character	23	N
5	CITY	Character	15	N
6	STATE	Character	2	N
7	ZIP	Character	5	N
8	PHONE	Character	10	N
9	CONTACT	Character	30	N
** Total **			183	

Structure for database: C:\DBASE\WATER_USE.DBF
Number of data records: 396

Field	*Field Name*	*Type*	*Width*	*Index*
1	ID	Character	8	Y
2	ORG_NAME	Character	34	Y
3	ADDRESS	Character	30	N
4	CITY	Character	15	N
5	STATE	Character	2	N
6	ZIP	Character	5	N
7	CONTACT	Character	30	N
8	PHONE	Character	10	N
9	DEPT	Character	32	N
** Total **			166	

Structure for database: C:\DBASE\HWRIC.DBF
Number of data records: 33

Field	*Field Name*	*Type*	*Width*	*Index*
1	ORG_NAME	Character	34	Y
2	ADDRESS	Character	31	N
3	ADDRESS2	Character	30	N
4	CITY	Character	15	N
5	STATE	Character	2	N
6	COUNTY	Character	15	N
7	ZIP	Character	5	Y
8	PHONE	Character	10	N
9	CONTACT	Character	30	Y
** Total **			172	

Database Design for Location and ID

Info Database Design SITE_ LOC

****

Field Name	Width	Type
MAIL_ID	8	Character
ID#2	11	Character
County#	2	Character
County Name	12	Character
Legal Location	15	Character
Latitude	10	Numeric
Longitude	11	Numeric
Name of Site	40	Character
Method of determining Location	2	Character
Collection Period		
From	6	Date
To	6	Date
Frequency of Sampling	1	Character
Reason for Sampling	2	Character

Database Design for Raw Data

Info Database Design RAW DATA

****

Field Name	Width	Type
MAIL_ID	8	Character
ID#2	11	Character
PNUM	5	Character
PNAME	10	Character
Collection Period		
Beginning Date	6	Date
Ending Date	6	Date
Units of Measurement	8	Character
Analytical Technique	8	Character

Summary Statistics for the Project

The following is a summary of the statistics gathered from the records kept in dBASE tracking system throughout the Upper Illinois River project.

I. 1,044 total contacts.
   A. Letter of initial inquiries (1,004 sent + 40 federal and state agencies/organizations contacted by phone and data collected).
   B. 267 respondents replied that they were NOT interested.
   C. 497 respondents were phoned and the survey completed by ISWS or were determined "willing but ineligible."
   D. 240 respondents said YES they would participate:
      1. 46 respondents who said YES collected only Biological information for their EPA or NPDES contract. These collections were already targeted in Watstore and BIG_LIST.DBF and they were not sent questionnaires.
      2. 30 of the YES respondents were classified as "willing but ineligible" and were sent letters of thanks.
      3. 160 chemical questionnaires were mailed to the rest of the YES respondents.
      4. 4 chemical questionnaires were mailed to contacts given as leads by other questionnaire recipients.

II. Of the 164 chemical questionnaires mailed out
   A. 1 contact never responded and contact was never possible.
   B. 58 respondents returned the questionnaire or phoned with an explanation such as that they do not collect surface water.
   C. 104 respondents returned completed questionnaires.
      1. The data and locational information were put into dBASE files manually.
         a. HEADER.DBF contains 372 sites.
         b. WQDATA.DBF contains 8,026 records.
      2. These dBASE files were then transferred to ARC/INFO files, plotted, and digitized.

HI. After the chemical questionnaires were returned to the ISWS, those who had designated that they collect Biological data also were identified.
   A. 126 respondents had designated that they collect Biological data.
   B. 68 respondents either declined the chemical questionnaire (see II.b.) or collected only for EPA, NPDES permits and that information was extracted from Watstore and STORET.

C. 58 Biological questionnaires were mailed.
    1. 5 respondents said "We don't have the manpower or funding at this time to complete your survey."
    2. 14 nonrespondents (no phone calls were returned).
    3. 39 Biological questionnaires were completed and put into dBASE files:
        a. HEADTEMP.DBF has 59 additional sites.
        b. Biodata has 666 records.
    4. These dBASE files were transferred to ARC/INFO files, plotted, and digitized.

Quality Control/Quality Assurance

Several steps were involved in insuring the production of high quality products on the Upper Illinois River basin project. These steps involved entering, reviewing, hand checking, digitizing, plotting, and utilizing overlays of data, as well as running related programs, frequencies, and count checks of databases.

Upon the arrival of the initial data from the Water Quality Questionnaires, these data were manually entered into the dBASE databases. Data entry and verification were not done by the same individual. Following this procedure, individual locational information was manually checked against the completed database and any corrections were made at that time. Then independent checks were completed on the final databases by searching through the information for discrepancies or problems, which were either corrected or brought to the attention of the Project Manager for correction. The 'count' command in dBASE IV was utilized to ensure that all data was accounted for in the databases.

The databases were reviewed again through the use of a sampling study. In this sampling study, a random sample questionnaire was chosen after which every tenth questionnaire was drawn to provide a sample stack, which was once again checked for discrepancies or errors. The related program option in dBASE IV was used to check the flow of the data and how well the databases in question could be related to each other.

Once the databases were prepared and completed, they were transferred to the Sun System and coverages (appendix C) were completed for the datapoints listed in the locational database. These points were digitized from the 1:100,000 quads and then edited on-line with the 1:100,000 streams coverage as an ARCEDIT back cover. The new map quads were plotted and then checked by overlaying them onto the

corresponding 100K topographic quad sheets. Use of the light table enabled the staff to check the accuracy of the location of the labeled points on the newly digitized quads.

Conclusions

There are both strengths and weaknesses in the design of the Upper Illinois River basin database. The functionality of the database has not been fully tested, however, limited use of the database has been promising. In this section, the strengths and weaknesses of the design will be discussed, as well as recommended changes in the design for future databases.

Strengths of this database are the flexibility, maintainability, re-usability, and simplicity. All the data are contained in four files, with only the two candidate keys (Mail_ID and ID#2) duplicated. A minimum amount of space was utilized in part due to the design of the templates used to enter the data from the questionnaires into dBASE IV. Template design stipulated that only the data identified on the questionnaire would be added to the data file. For example, instead of listing all possible parameters for any given monitoring site and then 'checking[1] off those identified, only those parameters that were identified as being tested at each site were listed in the file. In addition, paring the database down to four files has made the design easy to understand. This simplicity allows for greater maintainability as the user does not spend a great deal of time looking for the 'right' file. In addition, all the files are linked by either one of two IDs. Having a small number of candidate keys allows for greater flexibility and re-usability as well. Records can be easily identified in and between files, easily updated, deleted or added to the file. It is also very easy to link two or more files and perform queries on them.

Weaknesses of the database are the multiple candidate keys and the retrieval problems with the INFO software. These problems can at times make data retrieval and analysis frustrating, although not impossible. Having two ID numbers as candidate keys can lead to confusion when deciding the field for a given ID number. Since the users of the database had devised their own form of identification of monitoring sites, they wanted their ID numbers to be a candidate key. The problem was that there were three groups of ID numbers. As the user, the IEPA had two separate ID numbers (STORET and EPA), both of which it wanted included in the data. The problem was that some of the data had both ID numbers, some had either the STORET ID or the EPA ID. In the original data, there was no discernible pattern as to how the data were assigned IDs. In addition, the agencies/organizations not included in the IEPA data had ID numbers created by the ISWS. ISWS ID numbers did not have IEPA numbers

and vice versa. Thus the ISWS ID number and the STORET ID number were placed in the first field called Mail_ID. The EPA ID numbers were placed in the second field called ID#2. The users did not want another ID number created. They felt it would create confusion, a premise highly questioned by the designers. Generally, having one key identifier per file reduces confusion and facilitates data retrieval. A better design would have been to create a single ID# for all monitoring stations and have this ID number be the key identifier for all the files.

Another weakness of the database is the way in which the ARC/INFO GIS retrieves information in INFO. The data cannot be retrieved unless the information used in the query is typed exactly as it is in the file. Some of the ID numbers have blank spaces before, after, and in the middle of the numbers, e.g.," D 10." Just where and how many spaces there are in the field is not always easily determined, thus it may take several attempts before the correct combination can be found. The ARC/INFO GIS system was selected because the users already had much of their data in ARC/INFO. It would have been wiser to either change the EPA ID numbers to have all numbers, or letters, and no spaces, or to have allowed the creators of the database to create a new, easier-to-use ID number, or to have purchased a GIS that had a better way of locating a given string. For instance, instead of having to type " find 'D 10 '," the system could successfully search for "D 10" and come up with the same record.

If this database were eliminated and recreated from the beginning, the following changes would be made. A single key identifier would be created. The ID numbers developed by the ISWS (when they formed the Big_List file) would be expanded into the EPA's data, which would remain in the database files. However, for easier retrieval of information in INFO, the ISWS ID number would be used. In addition, a different relational database besides INFO would be used. It is definitely the weakest link of ESRI's ARC/INFO GIS. Agencies/Organizations that both collect water quality data and were willing to participate in the study were identified and sent letters of inquiry regarding their water quality data collection activities. If the organizations indicated they collected water quality data and were willing to participate in our survey, a questionnaire was sent. Once the data were returned, they were loaded onto the ARC/INFO GIS. A database structure was designed to allow for the import of data from both the computerized machine-readable databases and data taken from the questionnaires. (Please see appendices.)

To identify those organizations that collect water quality data, a massive mailing list was compiled to the dBASE IV relational database management system. To create

this mailing list, six files were condensed into one large dBASE IV file. The six files, identified as: ISWS, HWRIC, WATER_USE, WDSD, NPDES, and INHS, contained, among other things, addresses and phone numbers of potential water quality monitoring agencies/organizations within the state of Illinois. Queries were done on these files to locate agencies/organizations within the Upper Illinois River basin. Name, address, phone number, and contact person were extracted from the file and merged into the master mailing list file (Big_List).

The NPDES, WDSD, and WATER_USE data files came in computer-readable form. The agencies who created these files were the IEPA, ISWS, and USEPA, respectively. The other files were created manually using resources, such as the Illinois State Government phone book, Hazardous Waste Research and Information Center's (HWRIC) mailing list, Illinois Natural History Survey's (INHS) staff directory, and the "Illinois Water Data Catalog Report" put out by the IEPA in May 1985.

The three computer-readable databases encompassed the entire state of Illinois. These databases contained the latitude and longitude of the actual monitoring sites. A point coverage for each database was created in the ARC/INFO GIS using the latitude and longitude information and the point's corresponding ID number. This number was unique to the point. Only the points falling inside the Upper Illinois River basin were required, therefore the coverage was clipped using a separate polygon coverage which outlined the Upper Illinois River basin's border. This new, clipped coverage contained only those points identified as having monitoring sites within the Upper Illinois River basin's boundaries. The ID numbers for these points were then down loaded and placed in a separate ASCII file, which was then loaded into dBASE IV. As stated earlier, the original computer-readable database files contained records for the entire state of Illinois. In order to separate the Upper Illinois River basin data from the original database file, the file containing the ID numbers for the clipped points needed to be linked to the larger computer-readable database file. To do this a common field, ID number, was identified. A query was designed to examine both files and link the records together using their common field. Whenever a match was found, i.e. the same ID in both files, the matched record was appended to a smaller file containing only those records found within the Upper Illinois River basin. The agency/organization's name, address, phone number, and contact person were extracted from this file and appended to the master mailing list (Big_List).

Once the creation of the mailing list was complete, about 1,000 letters of inquiry were sent out. These letters contained a contact letter introducing ourselves and

outlining our reason for the survey and a one-page form inquiring about the organization's involvement in surface water data collection and willingness to participate in the survey. We enclosed a self-addressed, stamp-envelope and asked them to return the completed form to us. We also contacted by phone about 40 federal and state agencies. Of the 1,044 organizations contacted, 442 returned our forms, but only 163 met our criteria and were sent water quality questionnaires. Initially only 50 questionnaires were sent out so that if there was some confusion regarding the questionnaire, modifications could be made prior to sending the questionnaire to the remaining agencies/organizations.

Some 32 respondents returned the forms indicating a willingness to participate in our survey, but they did not collect water quality data. They received a letter thanking them for their good intentions but informing them that their input was not needed at this time.

Nonrespondents to our letter of inquiry regarding their participation in water quality data collection were called on the phone. The list consists of sewage treatment plants, state and federal agencies, and other organizations deemed potential sources for water quality data collection.

Appendix C contains a detailed description of the GIS datasets that were built during the project. The description of the datasets are in the standard Illinois Geographic Information System format or structure. The following list contains the names of the 25 ARC/INFO databases developed for this project.

25 ARC/INFO Databases Developed

1. Annotation for 100K DLG Streams
2. Annotation for 100K DLG Roads
3. Biological STORET Database
4. ISWS Survey of Biological Sampling Points
5. The Metropolitan Sanitary District of Greater Chicago
6. County Boundaries
7. Lakes in the Fisheries Analysis System
8. 100K DLG Streams
9. Documentation for DLG Hydrology Coverages
10. Illinois Waterway
11. 100K DLG Road Interchanges
12. 100K DLG Interstate Highways
13. USEPA Lake Michigan Survey Stations for 1988-89 within Illinois

14. 100K DLG Main Roads
15. Northeastern Illinois Planning Commission (NIPC)
16. NPDES Locations
17. 100K Mapscale Quadrangles
18. 7.5-Minute Quadrangles
19. 100K DLG Roads
20. STORET Locations
21. ISWS Water Quality Monitoring Stations
22. Towns
23. U.S. Public Survey (USPLS) Townships
24. Surface Water Treatment Facilities
25. ISWS Survey of Water Quality Sampling Points

Appendix E contains the compilation, in alphabetical order, of all the different water quality and biological parameters that have been or are being collected in the Upper Illinois River basin.

This was a personally rewarding project. Many people wanted to help and cooperate in any way possible. It is the general feeling there are more water quality data collectors in the Upper Illinois River basin and in the state than we reported. Some of the persons who have water quality data just did not have the time and/or staff to document their efforts and respond to our questionnaires. Even though we tried very hard, it is also possible, in the case of large organizations, that we did not always reach the right individual.

Appendix A

Letters Used in the Questionnaires

Illinois State Water Survey

Hydrology Division
2204 Griffith Drive
Champaign, Illinois 61820-7495
Telephone (217) 333-9545
Telefax (217) 333-6540

November 28,1990

Illinois Power Company
Mr. Roger Cruse
Environmental Specialist
500 South 27th St.
Decatur, IL 62525

Dear Sir:

The Illinois State Water Survey is attempting to identify the agencies and companies within the State of Illinois that have collected water quality or biological data for the period of 1975 to the present. If your organization has or has not been involved in this type of data collection, would you please return the completed enclosed survey.

If you have answered "yes" to the willingness to complete a Data Collection questionnaire, we will be mailing you a copy of the questionnaire a few days after receiving the completed survey.

The completed questionnaire will help us determine the scope of your data collection program. We are interested in what data is being collected, where it is being collected and in what quantity. We are not interested in the actual data.

Thank you for your time and help in this investigation.

Very truly yours,

Robert A. Sinclair
Senior Professional Scientist
Tele. (217) 333-4952
FAX (217) 333-6540

Illinois State Water Survey

Hydrology Division
2204 Griffith Drive
Champaign, Illinois 61820-7495
Telephone (217) 333-9545
Telefax (217) 333-6540

January 22, 1992

Illinois Power Company
Mr. Roger Cruse
Environmental Specialist
500 South 27th St.
Decatur, IL 62525

Dear Mr. Cruse,

Thank you for expressing a willingness to participate in our questionnaire. It is always refreshing to see people responsive to becoming involved in such an endeavor.

Enclosed is our questionnaire. Please fill one questionnaire for each monitoring site. Depending on the number of monitoring sites, and the parameters collected, we suggest following one of the strategies described below when filling out this questionnaire.

1. If you have only one monitoring site, simply fill the enclosed questionnaire out and return to us.

2. If you have more than one monitoring site but collect the same parameters for each site, we suggest filling out everything except for the information enclosed in the box. You should then xerox the questionnaire for each monitoring site. Once you have a copy of the questionnaire for each site, you need to go back and fill in the boxed area. The boxed area is for the information specific to each site, and needs to be filled out individually.

3. If you have more than one monitoring site and collect different parameters for each site, please make xerox copies for each site and fill them out separately.

We would like to stress that we are interested in the type of data collected, not in the data itself. If you have any questions regarding this questionnaire, please feel free to call us at 333-4952. We will be happy to answer questions or assist in anyway we can.

Again, thank you for participating in our survey. Without the help of people such as yourselves, we could never gather enough information to adequately examine the issues targeted in this survey.

Sincerely,

Robert A. Sinclair
Senior Professional Scientist
Office of Spatial Data Analysis and Information
Phone: (217) 333-4952
FAX: (217) 333-6540

Illinois State Water Survey

Hydrology Division
2204 Griffith Drive
Champaign, Illinois 61820-7495
Telephone (217) 333-9545
Telefax (217) 333-6540

January 23, 1992

Illinois Power Company
Mr. Roger Cruse
Environmental Specialist
500 South 27th St.
Decatur, IL 62525

Greetings,

Thank you for expressing a willingness to participate in our questionnaire. It is always refreshing to see people responsive to becoming involved in such an endeavor. Our survey, however, only encompasses questions related to surface water quality data collection. Since you have indicated your organization is not involved in this type of data collection, your participation in our survey is not required at this time.

We will be keeping your organization's name and address on file. Should we decide in the future that your input would be applicable to our research, we will get back in touch with you. If you have any further questions regarding this survey, or other water quality issues, please feel free to contact me.

Again, thank you for you prompt response to our questionnaire. We appreciate your cooperativeness in this endeavor.

Sincerely,

Robert A. Sinclair
Senior Professional Scientist
Office of Spatial Data Analysis and Information
Phone: (217) 333-4952
FAX: (217) 333-6540

Illinois State Water Survey

Hydrology Division
2204 Griffith Drive
Champaign, Illinois 61820-7495
Telephone (217) 333-9545
Telefax (217) 333-6540

23 October 1991

Illinois Power Company
Mr. Roger Cruse
Environmental Specialist
500 South 27th St.
Decatur, IL 62525

Dear Mr. Cruse,

Thank you for responding to the first portion of our surface water quality questionnaire on chemical data. We greatly appreciate your willingness to share your information. As you know, it is vital in such an endeavor to include all the available data to ensure a comprehensive study.

Enclosed you will find the second and last portion of the survey which deals with biological data collection. You will find it is less time consuming than the first portion. As with the chemical questionnaire, please fill one questionnaire for each monitoring site. Depending on the number of monitoring sites, and the parameters collected, we suggest following one of the strategies described below when filling out this questionnaire.

1. If you have only one monitoring site, simply fill the enclosed questionnaire out and return to us.

2. If you have more than one monitoring site but collect the same parameters for each site, we suggest filling out everything except for the information enclosed in the box. You should then xerox the questionnaire for each monitoring site. Once you have a copy of the questionnaire for each site, you need to go back and fill in the boxed area. The boxed area is for the information specific to each site, and needs to be filled out individually.

3. If you have more than one monitoring site and collect different parameters for each site, please make xerox copies for each site and fill them out separately.

We would like to stress that we are interested in the type of data collected, not in the data itself. If you have any questions regarding this questionnaire, please feel free to call us at 333-4952. We will be happy to answer questions or assist in anyway we can.

Again, thank you for participating in our survey. Without the help of people such as yourselves, we could never gather enough information to adequately examine the issues targeted in this survey.

Sincerely,

Robert A. Sinclair
Senior Professional Scientist
Office of Spatial Data Analysis and Information
Phone: (217) 333-4952
FAX: (217) 333-6540

Illinois State Water Survey

Hydrology Division
2204 Griffith Drive
Champaign, Illinois 61820-7495
Telephone (217) 333-9545
Telefax (217) 333-6540

Greetings,

Thank you for expressing a willingness to participate in our questionnaire. It is always refreshing to see people responsive to becoming involved in such an endeavor. Our survey, however, only encompasses questions related to surface water quality data collection. Since you have indicated your organization is not involved in this type of data collection, your participation in our survey is not required at this time.

We will be keeping your organization's name and address on file. Should we decide in the future that your input would be applicable to our research, we will get back in touch with you. If you have any further questions regarding this survey, or other water quality issues, please feel free to contact me.

Again, thank you for you prompt response to our questionnaire. We appreciate your cooperativeness in this endeavor.

Sincerely,

Robert A. Sinclair
Senior Professional Scientist
Office of Spatial Data Analysis and Information
Phone: (217) 333-4952
FAX: (217) 333-6540 ld

Appendix B

Questionnaires

Survey Questionnaires
Chemical Water Quality
Biological Water Quality

Illinois State Water Survey

Telephone (217) 333-9545
Surface Water Section
2204 Griffith Drive
Champaign, Illinois 61820-7495

For the period 1975 to the present, have you collected:
surface water quality data (yes/no) Yes
and/or surface biological data(yes/no) Yes

Would you be willing to complete a questionnaire(s) pertaining to your data collection program? (yes/no) Yes

If yes, person(s) to contact regarding data:

(1) Richard Johnson (Water Quality) **Phone** (312) S63-S913 ext. 2556

(2) Irwin Polls (Biological) **Phone** (708) 529-7700 ext. 308

Please check the address below. If it is incorrect, please make appropriate corrections.

RESEARCH AND DEVELOPMENT DEPARTMENT
100 EAST ERIE STREET
CHICAGO, IL 60611

Corrections below please:

Organization's name Metropolitan Water Reclamation District of Greater Chicago
Department Research and Development
Address 100 East Erie Street
City Chicago **State** IL **Zip** 60611
Comments: None

10764

Illinois State Water Survey
2204 Griffith Drive
Champaign, Illinois 61820

Surface Water Quality Data Collection Questionnaire

Illinois Power Company 10448

Stream or tributary name: _____

Sampling site name: _____

*Sampling Location: Longitude _____ Latitude _____
(in degrees, minutes, and seconds, please)
Or township _____, range _____, section _____ 1/4 sec _____
Method of determining location information: for example from topographic maps, global positioning system, etc. _____

Grab or composite sample: _____
Collection period (months and years): From _____/_____ To _____/_____
Frequency of Sampling (monthly, weekly, daily, etc.): _____
Brief reason(s) for sampling: _____

* A map showing site locations would be very helpful, if available.

Physical and Agregate Properties

Constituents	*Method of Analysis*				*UNITS of Measurement (mg/l,ug/l, etc. and NH3-N, P as P04)*
	Std. Methods	*ASTM*	*EPA*	*Other*	
Flow or discharge					
Color					
Turbidity					
Odor					
Taste					
Acidity					
Total Alkalinity					
Calcium Carbonate Saturation					
Total Hardness					
Conduct ivity					
Salinity					
Floatables					
Solids					
Temperature (Water)					
Temperature (air)					
Test on Sludges					
Sludge Digester Gas					
Diss. Gas Supersaturation					
Residue, Filterable					
Residue, Non-filterable					
Residue, Total					
Residue, Volatile					
Settleable Matter					
pH					
Other					
Other					

Determination of Metals

Constituents	*Method of Analysis*				*UNITS of Measurement (mg/l,ug/l, etc. and NH3-N, P as P04)*
	Std. Methods-	*ASTM*	*EPA*	*Other*	
Al Aluminum					
Total					
Dissolved					
Sb Antimony					
Total					
Dissolved					
AS Arsenic					
Total					
Dissolved					
Ba Barium					
Total					
Dissolved					
Be Beryllium					
Total					
Dissolved					
Bi Bismuth					
Total					
Dissolved					
Cd Cadmium					
Total					
Dissolved					
Ca Calcium					
Total					
Dissolved					
Cs Cesium					
Total					
Dissolved					
Cr Chromium					
Total					
Dissolved					
Co Cobalt					
Total					
Dissolved					
Cu Copper					
Total					
Dissolved					
Au Gold					
Total					
Dissolved					
Ir Iridium					
Total					
Dissolved					

Determination of Metals (continued)

Constituents	*Method of Analysis* — *Std. Methods-*	*ASTM*	*EPA*	*Other*	*UNITS of Measurement (mg/l,ug/l, etc. and NH3-N, P as PO4)*
Fe Iron					
Total					
Dissolved					
Pb Lead					
Total					
Dissolved					
Li Lithium					
Total					
Dissolved					
Mg Magnesium					
Total					
Dissolved					
Mn Manganese					
Total					
Dissolved					
Hg Mercury					
Total					
Dissolved					
Mo Molybdenum					
Total					
Dissolved					
Ni Nickel					
Total					
Dissolved					
Os Osmium					
Total					
Dissolved					
Pd Palladium					
Total					
Dissolved					
Pt Plantinum					
Total					
Dissolved					
K Potassium					
Total					
Dissolved					
Re Rhenium					
Total					
Dissolved					
Rh Rhodium					
Total					
Dissolved					
Ru Ruthenium					
Total					
Dissolved					
Se Selenium					
Total					
Dissolved					

Determination of Metals (continued)

Constituents	*Method of Analysis* Std. Methods-	ASTM	EPA	Other	*UNITS of Measurement (mg/l,ug/l, etc. and NH3-N, P as PO4)*
Ag Silver					
Total					
Dissolved					
Na Sodium					
Total					
Dissolved					
Sr Strontium					
Total					
Dissolved					
Tl Thallium					
Total					
Dissolved					
Th Thorium					
Total					
Dissolved					
Sn Tin					
Total					
Dissolved					
Ti Titanium					
Total					
Dissolved					
V Vanadium					
Total					
Dissolved					
Zn Zinc					
Total					
Dissolved					
Other _____					
Other _____					
Other _____					
Other _____					
Other _____					
Other _____					
Other _____					
Other _____					
Other _____					
Other _____					
Other _____					
Other _____					
Other _____					
Other _____					
Other _____					
Other _____					
Other _____					
Other _____					
Other _____					
Other _____					
Other _____					

Determination of Inorganic Nonmetallic Constitutents

Constituents	*Method of Analysis* Std. Methods-	ASTM	EPA	Other	*UNITS of Measurement (mg/l,ug/l, etc. and NH3-N, P as PO4)*
B Boron					
Br^- Bromide					
$C0_2$ Carbon Dioxide					
CN Cyanide					
CI Chlorine (RESIDUAL)					
Cl^- Chloride					
$C10_2$ Chlorine Dioxide					
F^- Fluoride					
H^+ Ph Value					
I Iodine					
I^- Iodide					
N Nitrogen					
NH_3 Nitrogen (Ammonia)					
$N0_2^-$ Nitrogen (Nitrite)					
No_3^- Nitrogen (Nitrate)					
Nitrogen (Nitrate-Nitrite)					
Norg Nitrogen (Organic)					
Norg Nitrogen, Kjeldahl,Tota					
O Oxygen (Dissolved)					
O_3 Ozone (Residual)					
P Phosphate, Total					
P Phosphate, Total diss.					
P Phosphate, Total ortho					
P Phosphate, Diss, ortho					
P Phosphorus, Total Organic					
P Phosphorus, Susp. Organic					
Si Silica					
S^{2-} Sulfide					
$S0_3^{2-}$ Sulfite					
$S0_4^{2-}$ Sulfate, Total					
SO4 Sulfate, Diss.					
Other					
Other					

Determination of Organic Constituents

Constituents	*Method of Analysis* Std. Methods-	ASTM	EPA	Other	*UNITS of Measurement (mg/l,ug/l, etc. and NH3-N, P as PO4)*
Biochemical Oxygen Demand 5-Day BOD Test					
Chemical Oxygen Demand (COD)					
Total Organic Carbon (TOC)					
Dissolved Organic Halogen					
Aquatic Humic Substances					
Oil and Grease					
Phenols					
Surfactants					
Tannin and Lignin					
Organic and Volatile Acids					
Trihalomethane Formation					
Other					

Determination of Organic Constituents (continued)

Compounds	*Method of Analysis*				*UNITS of Measurement*
	Std. Methods-	*ASTM*	*EPA*	*Other*	*(mg/l,ug/l, etc. and NH3-N, P as PO4)*
Acenaphthene					
Acenaphthylene					
Aldrin					
Anthracene					
Benzene					
Benzidine					
Benzo(a)anthracene					
Benzo(a)pyrene					
Benzo(b)fluoranthene					
Benzo(ghi)perylene					
Benzo(k)fluoranthene					
BHC(s)					
Bromobenzene					
Bromochloromethane					
Bromodichloromethane					
Bromoform					
Bromomethane					
Bromophenoxybenzene					
Bromophenyl phenyl ether					
Butyl benzyl phthalate					
Butylbenzene(s)					
Captan					
Carbon tetrachloride					
Chlordane					
Chlorobenzene					
Chloroethane					
Chloroethoxy methane					
Chloroethyl ether					
Chloroethylvinyl ether					
Chloroform					
Chloroisopropyl ether					
Chloromethane					
Chloromethyl benzene					
Chloromethylphenol					
Chloronaphthalene(s)					
Chlorophenol(s)					
Chlorophenoxy benzene					
Chlorophenyl phenyl ether					
Chlorotoluene					
Chrysene					

Determination of Organic Constituents (continued)

Compounds	*Method of Analysis* — *Std. Methods-*	*ASTM*	*EPA*	*Other*	*UNITS of Measurement (mg/l, ug/l, etc. and NH3-N, P as PO4)*
2,4-D (dichlorophenoxyacetic acid)					
DDD					
DDE					
DDT					
Dibenzo (a,h) anthracene					
Dibromochloromethane					
Dibromochloropropane					
Dibromoethane					
Dibromomethane					
Dibutyl phthalate					
Dichloran					
Dichlorobenzene(s)					
Dichlorobenzidine					
Dichlorodifluoromethane					
Dichloroethane					
Dichloroethene(s)					
Dichlorophenol(s)					
Dichloroprapane(s)					
Dichloropropene					
Dieldrin					
Diethyl phthalate					
Dimethyl phthalate					
Dimethylphenol(s)					
Dimitrophenol(s)					
Dimitrotoluene(s)					
Di-n-octyl phthalate					
Diphenyl hydrazine					
Endosulfan					
Endosulfan sulfate					
Endrin					
Endrin aldehyde					
Ethenyl benzene (styrene)					
Ethylbenzene					
Ethylhexyl phthalate					
Fluoranthene					
Fluorene					
Geosmin					
Heptachlor					
Heptachlor epoxide					
Hexachlorobenzene					
Hexachlorobutadiene					
Hexachlorocyclopentadiene					
Hexachloroethane					
Indeno(l,2,3-cd) pyrene					
Isobutylmethoxy pyrazine					
Isophorone					
Isopropylbenzene					
Isopropyl methoxy pyrazine					
Isopropyltoluence					

Determination of Organic Constituents (continued)

Compounds	Method of Analysis: Std. Methods-	ASTM	EPA	Other	UNITS of Measurement (mg/, ug/1, etc. and NH3-N, P as P04)
Lindane (g-BHC)					
Malathion					
Methane					
Methoxychlor					
Methyldinitrophenol(s)					
Methylene chloride					
Methylisoborneol					
Methyl parathion					
Mirex					
Naphthalene					
Nitrobenzene					
Nitrophenol(s)					
Nitrosodi-n-propylamine					
Nitrosodimethylamine					
Nitrosodiphenylamine					
Parathion					
PCB-1016, 1221, 1232, 1242, 1248, 1254, 1260					
Pentachloronitrobenzene					
Pentachlorophenol					
Phenanthrene					
Phenol					
Phenylbenzamine					
Propylbenzene					
Pyrene					
Silvex (trichlorophenoxy propionic acid)					
Strobane					
Styrene (ethenyl benzene)					
2,4,5-T (trichlorophenoxy acetic acid)					
Tetrachloroethane(s)					
Tetrachloroethene					
Toluene					
Toxaphene					
Trichloanisole					
Trichlorobenzene(s)					
Trichloroethane(s)					
Trichloroethene					
Trichlorofluoromethane					
Trichlorophenol					
Trichloropropane					
Trifluralin					
Trimethylbenzene(s)					
Vinyl chloride					
Xylene(s)					
Other					
Other					
Other					
Other					
Other					

Illinois State Water Survey
2204 Griffith Drive
Champaign, Illinois 61820

Surface Hater Quality Data Collection Questionnaire

Illinois Power Company 10448

Lake, stream or tributary name: _____

Sampling site name: _____

*Sampling Location: Longitude _____ Latitude _____
(in degrees, minutes, and seconds, please)

Or township _____, range _____, section _____ 1/4 sec _____

Method of determining location information: for example from topographic maps, global positioning system, etc. _____

Grab or composite sample: _____

Collection period (months and years): From _____/_____ To _____/_____

Frequency of Sampling (monthly, weekly, daily, etc.): _____

Brief reason(s) for sampling: _____

* A map showing site locations would be very helpful, if available.

	Method of Analysis	
	Std. Methods	*Other*
Macrophytes	_____	_____
Periphyton	_____	_____
Zooplankton	_____	_____
Macroinvertebrates	_____	_____
Phytoplankton	_____	_____
Fish	_____	_____
Mussels	_____	_____
Protozoa	_____	_____
Aquatic Insects	_____	_____
Benthic Macroinvertebrates	_____	_____
Amphibia and reptiles		_____
Birds		_____
Mammals		_____

The following parameters can affect the results of the parameters above. Which of the these do you test for? If you test for these parameters, is this data

	Yes, collect for this	Yes, data is available
Weather Conditions	_____	_____
Schessi Disk	_____	_____
Rainfall	_____	_____
Watershed Area	_____	_____
pH	_____	_____
Sediment Oxygen Demand (SOD)	_____	_____
Time of Day	_____	_____

Physical and Aggregate Properties

Constituents	*Method of Analysis* Std. Methods-	ASTM	(mg/l, EPA	Other	*UNITS of Measurement* u g / 1 , NH3-N, P as PO4) etc. and
Color					
Turbidity					
Total Hardness					
Salinity					
Solids					
Temperature (Water)					
Temperature (air)					
Other					
Other					
Other					
Other					

Determination of Metals

N Nitrogen					
NH_3 Nitrogen (Ammonia)					
$NO2^-$ Nitrogen (Nitrite)					
$NO3^-$ Nitrogen (Nitrate)					
Nitrogen (Nitrate-Nitrite)					
Norg Nitrogen (Organic)					
Norg Nitrogen, Kjeldahl,Total					
O Oxygen (Dissolved)					
O_3 Ozone (Residual)					
P Phosphate, Total					
P Phosphate, Total diss.					
P Phosphate, Total ortho					
P Phosphate, Diss, ortho					
P Phosphorus, Total Organic					
P Phosphorus, Susp. Organic					
Si Silica					
S^{2-} Sulfide					
$S0_3^{2-}$ Sulfite					
$S0_4^{2-}$ Sulfate, Total					
SO_4 Sulfate, Diss.					
Other					
Other					
Other					
Other					

Determination of Organic Constituents

Biochemical Oxygen Demand 5-Day BOD Test					
Chemical Oxygen Demand (COD)					
Total Organic Carbon (TOC)					
Sediment Oxygen Demand (SOD)					
Other					
Other					
Other					

Appendix C

GIS Data Sets

Annotation for 100K DLG Roads
Annotation for 100K DLG Streams
Biological STORET Database
ISWS Survey of Biological Sampling Points
The Metropolitan Sanitary District of Greater Chicago
County Boundaries
Lakes in the Fisheries Analysis System
100K DLG Streams
Documentation for DLG Hydrology Coverages
Illinois Waterway
100K DLG Road Interchanges
100K DLG Interstate Highways
USEPA Lake Michigan Survey Stations for 1988-89 within Illinois
100K DLG Main Roads
Northeastern Illinois Planning Commission (NIPC)
NPDES Locations
100K Mapscale Quadrangles
7.5-Minute Quadrangles
100K DLG Roads
STORET Locations
ISWS Water Quality Monitoring Stations
Towns
U.S. Public Land Survey (USPLS) Townships
Surface Water Treatment Facilities
ISWS Survey of Water Quality Sampling Points

ANNOTATION FOR 100K DLG ROADS

Coverage Name: anno-roads

Coverage Contents: road numbers for 100k dlg roads; positioned so as to not overwrite 100k roads or streams, or 100k stream names; only the major roads were annotated: interstate highways, US and ILL roads.

Size of Coverage: watershed boundary of the upper Illinois River

Coverage Type: ANNOTATION

Mapscale: created for 1:100,000 scale maps

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
In 1991 the annotation was created using ARC/INFO software. Both the 100k DLG streams and 100k DLG roads were used as a background so that the annotation would be properly placed and easily read. The work was done by the Illinois State Water Survey.

INFO Item Description:

1 RECORD(S) SELECTED
DATAFILE NAME: ANNO-ROADS.PAT
4 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	ANNO-ROADS#	4	5	B	-	
13	ANNO-ROADS-ID	4	5	B	-	

Coding for INFO Items:

1 AREA
5 PERIMETER
9 ANNO-ROADS#
13 ANNO-ROADS-ID

Bibliography
U.S. Geological survey 1,100:000 mapscale topographic maps

ANNOTATION FOR 100K DLG STREAMS

Coverage Name: anno-hydro

Coverage Contents: stream names for 100k dlg streams; positioned so as to not overwrite 100k roads or streams, or 100k stream names; only the major streams were annotated.

Size of Coverage: watershed boundary of the upper Illinois River

Coverage Type: ANNOTATION

Mapscale: created for 1:100,000 scale maps

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
In 1991 the annotation was created using ARC/INFO software. Both the 100k DLG streams and 100k DLG roads were used as a background so that the annotation would be properly placed and easily read. The work was done by the Illinois State Water Survey.

INFO Item Description:
1 RECORD(S) SELECTED
DATAFILE NAME: ANNO-HYDRO.PAT
4 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	ANNO-HYDRO#	4	5	B	-	
13	ANNO-HYDRO-ID	4	5	B	-	

Coding for INFO Items:

1 AREA
5 PERIMETER
9 ANNO-HYDRO#
13 ANNO-HYDRO-ID

Bibliography
U.S. Geological Survey 1:100,000 scale topographic maps

Coverage Name: biostoret

Coverage Contents: biological storet locations

Size of Coverage: watershed boundary of the upper Illinois River

Coverage Type: POINT

Mapscale: generated from coordinates

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
The biological storet location coverage was generated from coordinates supplied in machine readable form as retrieved from the USEPA Biostoret system.

INFO Item Description:

DATAFILE NAME: BIOSTORET.PAT
3842 RECORDS
13 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	BIOSTORET#	4	5	B	-	
13	BIOSTORET-ID	4	5	B	-	
17	STATION#	10	10	C	-	
27	P#	5	5	C	-	
32	PNAME	20	20	C	-	
52	UNITS	10	10	C	-	
62	BEGIN-DATE	6	6	I	-	
68	END-DATE	6	6	I	-	
74	WQ-OR-BIO	3	3	C	-	
77	X-LAMBERT	7	7	I	-	
84	Y-LAMBERT	7	7	I	-	

DATAFILE NAME: BIOSTORET.STATIONLIST
110 RECORDS
13 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	STATION*	10	10	C	-	
11	STATION#2	10	10	C	-	
21	X-LAMBERT	7	7	I	-	
28	Y-LAMBERT	7	7	I	-	
35	LATITUDE	10	10	C	-	
45	LONGITUDE	10	10	C	-	
55	LOCATION	50	50	C	-	
105	STATE#	5	5	I	-	
110	LOCATION#2	32	32	C	-	
142	LOCATION#3	50	50	C	-	
192	COUNTY-FIPS#	3	3	I	-	
195	STORET-FILE-NAME	10	10	C	-	
205	REACH#	23	23	C	-	

DATAFILE NAME: BIOSTORET .PARAMETERLIST
72 RECORDS
4 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N .DEC	ALTERNATE NAME
1	P#	5	5	C	-	
6	PNAME	20	20	C	-	
26	UNITS	10	10	C	-	
36	WQ-OR-BIO	3	3	C	-	

Coding for INFO Items:

DATAFILE NAME: BIOSTORET,.PAT

1	AREA	square feet, generated by software
5	PERIMETER	feet, generated by software
9	BIOSTORET#	internal ID, generated by software
13	BIOSTORET-ID	processing ID, supplied by ISWS
17	STATION#	supplied by USEPA
27	P#	USGS parameter code
32	PNAME	USGS parameter name
52	UNITS	units of measurement
62	BEGIN-DATE	yymmdd
68	END-DATE	yymmdd
74	WQ-OR-BIO	WQ = water quality parameter BIO = biological parameter

DATAFILE NAME: BIOSTORET.STATIONLIST

1	STATION#	supplied by USEPA
11	STATION#2	supplied by USEPA
21	X-LAMBERT	x coordinate, lambert conformal
28	Y-LAMBERT	y coordinate, lambert conformal
35	LATITUDE	degrees, minutes, seconds
45	LONGITUDE	degrees, minutes, seconds
55	LOCATION	
105	LOCATION#2	basin
137	LOCATION#3	basin
187	COUNTY-FIPS#	
190	STORET-FILE-NAME	name of original source file
200	REACH*	

DATAFILE NAME: BIOSTORET .PARAMETERLIST

1	P#	USGS parameter code
6	PNAME	USGS parameter name
26	UNITS	units of measurement
36	WQ-OR-BIO	WQ = water quality parameter BIO = biological parameter

Bibliography:

Storet User Handbook, USEPA, Washington, D.C. 20460, January, 1989.

ISWS SURVEY OF BIOLOGICAL SAMPLING POINTS

Coverage Name: biosurvey

Coverage Contents: locations of biological sampling points located as a result of a survey done by the Illinois State Water Survey in 1990-91

Size of Coverage: watershed boundary of the upper Illinois River

Coverage Type: POINT

Mapscale: generated from coordinates and digitized at mapscale 1:100,000

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
In 1991, the Illinois State Water Survey created the coverage biosurvey from information supplied by the returned ISWS questionaires. Locations of approximately one third of the points were supplied as latitude, longitude; another third were supplied as township, range, section and the remaining third were provided by locational descriptions. Points were initially positioned using the supplied information. The 1:100,00 scale stream coverage was then used as a backcover and adjustments were made as needed so that sampling points would be located on streams.

INFO Item Description:

DATAFILE NAME: BIOSURVEY.PAT
343 RECORDS
12 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	BIOSURVEY#	4	5	B	-	
13	BIOSURVEY-ID	4	5	B	-	
17	STATION#	7	7	I	-	
24	SAMPLING-PERIOD	15	15	C	-	
39	BEGIN-DATE	6	6	I	-	
45	END-DATE	6	6	I	-	
51	P#	5	5	C	-	
56	PNAME	40	40	C	-	
96	METHOD	1	1	I	-	
97	UNITS	15	15	C	-	

DATAFILE NAME: BIOSURVEY.STATIONLIST
149 RECORDS

18 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	STATION#	7	7	I	-	
8	LOCATION	50	50	C	-	
58	LOCATION#2	50	50	C	-	
108	LATITUDE	9	9	C	-	
117	LONGITUDE	9	9	C	-	
126	X-LAMBERT	4	12	F	3	
130	Y-LAMBERT	4	12	F	3	
134	TOWNSHIP	3	3	C	-	
137	RANGE	3	3	C	-	
140	SECTION	14	14	C	-	
154	QSECTION	2	2	C	-	
156	LOCATION-METHOD	70	70	C	-	
226	SAMPLING-TYPE	3	3	C	-	
229	SAMPLING-PERIOD	15	15	C	-	
244	BEGIN-DATE	6	6	I	-	
250	END-DATE	6	6	I	-	
256	SAMPLING-FREQ	5	5	C	-	
261	SAMPLING-REASON	122	122	C	-	

67 RECORDS
DATAFILE NAME: BIOSURVEY.PARAMETERLIST

2 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	P#	5	5	C	-	
6	PNAME	40	40	C	-	

Coding for INFO Items:

DATAFILE NAME: BIOSURVEY..PAT

1	AREA	generated by software
5	PERIMETER	generated by software
9	BIOSURVEY#	generated by software
13	BIOSURVEY-ID	assigned by ISWS during processing
17	STATION*	assigned by ISWS
24	SAMPLING-PERIOD	begin date - end date
39	BEGIN-DATE	yymmdd
45	END-DATE	yymmdd
51	P#	USGS water quality parameter number
56	PNAME	USGS water quality parameter name
96	METHOD	numbers 1- 9 1 = standard methods 2 = ASTM 3 = EPA 4 = other 5 = standard + EPA 6 = EPA + other 7 = ASTM + EPA 8 = standard + ASTM 9 = standard + EPA + other
97	UNITS	measurement units

DATAFILE NAME: BIOSURVEY..STATIONLIST

1	STATION#	assigned by ISWS
8	LOCATION	stream name
58	LOCATION#2	site name
108	LATITUDE	degrees, minutes, seconds
117	LONGITUDE	degrees, minutes, seconds
126	X-LAMBERT	x coordinate, lambert conformal
130	Y-LAMBERT	y coordinate, lambert conformal
134	TOWNSHIP	
137	RANGE	
140	SECTION	
154	QSECTION	
156	LOCATION-METHOD	
226	SAMPLING-TYPE	g = grab; c = composite
229	SAMPLING-PERIOD	collection date (begin - end)
244	BEGIN-DATE	yymmdd
250	END-DATE	yymmdd
256	SAMPLING-FREQ	frequency of collection
261	SAMPLING-REASON	reason for sampling

DATAFILE NAME: BIOSURVEY.PARAMETERLIST

1	P#	USGS water quality parameter number
6	PNAME	USGS water quality parameter name

Bibliography:

Biological Data Collection Questionnaire, 1991, Illinois State Water Survey, Champaign, IL.

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

Coverage Name: chisanitary

Coverage Contents: metropolitan sanitary district of greater Chicago water quality sampling locations

Size of Coverage: metropolitan sanitary district of greater Chicago

Coverage Type: POINT

Mapscale: approximately 1:500,000

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
In 1991, points were digitized from a paper map of approximately 1:500,000 mapscale. These points were then overlaid with the dlg streams of 1:100,000 mapscale and moved closer to the appropriate stream. The distance being moved was approximately 1000 feet. Site names were taken from the same paper map as accurately as possible.

INFO Item Description:

DATAFILE NAME: CHISANITARY.PAT
7344 RECORDS
13 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	CHISANITARY#	4	5	B	-	
13	CHISANITARY-ID	4	5	B	-	
17	STATION#	5	5	I	-	
22	LOCATION	45	45	C	-	
67	SAMPLING-PERIOD	9	9	C	-	
76	BEGIN-DATE	6	6	I	-	
82	END-DATE	6	6	I	-	
88	P#	5	5	C	-	
93	PNAME	35	35	C	-	
128	UNITS	15	15	C	-	
143	SAMPLE-PROGRAM	3	3	C	-	

DATAFILE NAME: CHISANITARY.STATIONLIST 72 RECORDS
6 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	STATION#	5	5	I	-	
6	LOCATION	45	45	C	-	
51	X-LAMBERT	4	12	F	3	
55	Y-LAMBERT	4	12	F	3	
59	SAMPLE-TYPE	1	1	I	-	
60	SECOND-WATERS	1	1	I	-	

DATAFILE NAME: CHISANITARY.PARAMETERLIST
102 RECORDS
8 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	STATION#	5	5	C	-	
6	P#	5	5	C	-	
11	PNAME	35	35	C	-	
46	UNITS	15	15	C	-	
61	SAMPLE-FREQ	8	8	C	-	
69	SAMPLING-PERIOD	9	9	C	-	
78	BEGIN-DATE	6	6	I	-	
84	END-DATE	6	6	I	-	
90	SAMPLE-PROGRAM	3	3	c	-	

Coding for INFO Items:

CHISANITARY.PAT

1	AREA	square feet, generated by software
5	PERIMETER	feet, generated by software
9	CHISANITARY#	internal ID, generated by software
13	CHISANITARY-ID	added for processing by ISWS
17	STATION#	supplied by Chicago sanitary district
22	LOCATION	
67	SAMPLING-PERIOD	sampling period (begin - end)
76	BEGIN-DATE	yymmdd
82	END-DATE	yymmdd
88	P#	USGS parameter code supplied by ISWS
93	PNAME	parameter name supplied by Chi. sant. dist.
128	UNITS	units of measurement
143	SAMPLE-PROGRAM	WQ = water quality BIO = biological

CHISANITARY.STATIONLIST

1	STATION#	supplied by Chicago sanitary district
6	LOCATION	name of sampling location
51	X-LAMBERT	x coordinate, lambert conformal projection
55	Y-LAMBERT	y coordinate, lambert conformal projection
59	SAMPLE-TYPE	1 = bridge grab sample 2 = treatment plant effluent 3 = daily composite of several daily grab samples 4 = automatic monitoring station (daily composite)
60	SECOND-WATERS	secondary contact waters in Chicago and Calumet River systems

CHISANITARY.PARAMETERLIST

1	STATION#	ALL = all stations
6	P#	USGS parameter code supplied by ISWS
11	PNAME	parameter name supplied by Chi. sant. dist.
46	UNITS	units of measurement
61	SAMPLE-FREQ	frequency of samples
69	SAMPLING-PERIOD	sampling period (begin - end)
78	BEGIN-DATE	yymmdd
84	END-DATE	yymmdd
90	SAMPLE-PROGRAM	WQ = water quality, BIO = biological

Bibliography:

Research and Development Department of the Metropolitan Sanitary District of Greater Chicago, Description of Routine Monitoring for Water Quality of Lake Michigan and Inland Waterways, August 1986.

COUNTY BOUNDARIES

Coverage Name: counties

Coverage Contents: county boundaries clipped to the upper Illinois River basin

Size of Coverage: watershed boundary of the upper Illinois River

Coverage Type: POLYGON

Mapscale: 1:24,000

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
The original state wide county boundary coverage was digitized from 7.5 minute and 15 minute U.S. Geological Survey topographic maps by the State Geological Survey. Updates have been made as new 7.5 minute topographic maps became available.

INFO Item Description:
27 RECORDS
DATAFILE NAME: COUNTIES.PAT
6 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	COUNTIES#	4	5	B	-	
13	COUNTIES-ID	4	5	B	-	
17	COUNT-FED-FIPS	7	6	I	-	
24	COUNTY NAME	16	16	C	-	
	** REDEFINED ITEMS **					
17	FIPS_CO	4	4	I	-	

Coding for INFO Items:

1	AREA
5	PERIMETER
9	COUNTIES#
13	COUNTIES-ID
17	COUNT-FED-FIPS
24	COUNTY NAME

Bibliography:
U.S. Geological Survey 7.5 and 15 minute topographic maps.

Coverage Name: fishlakes

Coverage Contents: lakes included in the database for the Fisheries Analysis System maintained by the Center for Aquatic Ecology at the Illinois Natural History Survey

Size of Coverage: watershed boundary of the upper Illinois River

Coverage Type: POINT

Mapscale: generated from coordinates

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
In 1991, the staff of the Illinois State Water Survey used ARC/INFO software to create the fishlakes coverage from coordinates supplied in machine readable form by Doug Austen of the Center for Aquatic Ecology at the Illinois Natural History Survey. The water quality data supplied by him were averaged values for each parameter for each lake. The averaged values were based on all available data for the last two weeks of July through the first two weeks of August, from all available data sources.

INFO Item Description:

DATAFILE NAME: FISHLAKES.PAT
168 RECORDS
14 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	FISHLAKES#	4	5	B	-	
13	FISHLAKES-ID	4	5	B	-	
17	STATION#	3	3	I	-	
20	LOCATION	30	30	C	-	
50	LOCATION2	20	20	C	-	
70	FREQ-COLLECT	25	25	C	-	
95	SAMPLING-PERIOD	12	12	C	-	
107	BEGIN-DATE	6	6	I	-	
113	END-DATE	6	6	I	-	
119	P#	5	5	C	-	
124	PNAME	35	35	C	-	
159	UNITS	15	15	C	-	

```
DATAFILE NAME: FISHLAKES.STATIONLIST             42 RECORDS
   25 ITEMS: STARTING IN POSITION    1
 COL  ITEM NAME          WDTH OPUT TYP N.DEC  ALTERNATE NAME
   1  STATION#             3    3  I    -
   4  LOCATION            30   30  C    -
  34  LOCATION2           20   20  C    -
  54  X-LAMBERT            4   12  F    3
  58  Y-LAMBERT            4   12  F    3
  62  LATITUDE             6    6  I    -
  68  LONGITUDE            7    7  I    -
  75  TRS                 34   34  C    -
 109  FREQ-COLLECT        25   25  C    -
 134  SAMPLING-PERIOD     12   12  C    -
 146  BEGIN-DATE           6    6  I    -
 152  END-DATE             6    6  I    -
 158  HA                  10   10  N    1
 168  MAX-DEPTH-METERS    10   10  N    2
 178  MEAN-DEPTH-METER    10   10  N    2
 188  SHORE-LEN-KM        10   10  N    2
 198  SDI                 10   10  N    3
 208  WATERSHED-HA        10   10  N    1
 218  DV                  10   10  N    2
 228  STORAGE-CAP         10   10  N    2
 238  ST-ORDER-1000M3      2    2  I    -
 240  YEAR-CONSTRUCT       4    4  I    -
 244  RETENTION-TIME      10   10  N    2
 254  GROW-DEG-DAYS        5    5  I    -
 259  GROW-SEASON-DAYS     3    3  I    -

4 RECORDS
DATAFILE NAME: FISHLAKES.PARAMETERLIST
    4 ITEMS: STARTING IN POSITION    1
 COL  ITEM NAME          WDTH OPUT TYP N.DEC  ALTERNATE NAME
   1  STATION#             3    3  C    -
   4  P#                   5    5  C    -
   9  PNAME               35   35  C    -
  44  UNITS               15   15  C    -
```

Coding for INFO Items:

```
DATAFILE NAME: FISHLAKES..PAT

DATAFILE NAME: FISHLAKES,.PAT
   1  AREA                 square feet, generated by software
   5  PERIMETER            feet, generated by software
   9  FISHLAKES#           internal ID, generated by software
  13  FISHLAKES-ID         processing id, assigned by ISWS
  17  STATION#             assigned by Illinois Natural History Survey
  20  LOCATION             lake name
  50  LOCATION2            county
  70  FREQ-COLLECT
  95  SAMPLING-PERIOD      sampling period (begin - end)
 107  BEGIN-DATE           yymmdd
 113  END-DATE             yymmdd
 119  P#                   USGS parameter number
 124  PNAME                USGS parameter name
 159  UNITS                units of measurement
```

DATAFILE NAME: FISHLAKES..STATIONLIST

1	STATION#	assigned by Illinois Natural History Survey
4	LOCATION	lake name
34	LOCATION2	county
54	X-LAMBERT	x distance, lambert conformal
58	Y-LAMBERT	y distance, lambert conformal
62	LATITUDE	degrees, minutes, seconds
68	LONGITUDE	degrees, minutes, seconds
75	TRS	township, range, section
109	FREQ-COLLECT	
134	SAMPLING-PERIOD	sampling period (begin - end)
146	BEGIN-DATE	yymmdd
152	END-DATE	yymmdd
158	HA	hectares - area of lake
168	MAX-DEPTH-METERS	maximum depth, meters
178	MEAN-DEPTH-METER	mean depth, meters
188	SHORE-LEN-KM	shore length, kilometers
198	SDI	shoreline development index

SDI = shore length(in meters) / (2 x (pi x surface area (in m2))1/2

208	WATERSHED-HA	hectares - area of watershed
218	DV	volume development index (VDI=3 x (mean depth/max. depth))
228	STORAGE-CAP	storage capacity at normal pool level
238	ST-ORDER-1000M3	7 indicates a perched cooling lake with no natural outlet but obtain water pumped from river of order 7
240	YEAR-CONSTRUCT	-9 indicates lakes of galcial origin so date of construction is not applicable
244	RETENTION-TIME	
254	GROW-DEG-DAYS	Growing degree days: the difference between average daily temperature and the base of 50 degrees F for each day summed over the entire year
259	GROW-SEASON-DAYS	Growing season: number of days between the last low of 32 degrees F in the spring and the first 32 degrees F day in the fall

DATAFILE NAME: FISHLAKES,.PARAMETERLIST

1	STATION#	ALL = all stations
4	P#	parameter number
9	PNAME	parameter name
44	UNITS	parameter units

Bibliography:

Austen, Doug, Memorandum dated November 19, 1991, Center for Aquatic Ecology, Illinois Natural History Survey, Champaign, IL.

Coverage Name: hydro (10 coverages with directories)

Coverage Contents: USGS 100k dlg hydrology lines

Size of Coverage: upper Illinois River watershed boundary

Coverage Type: LINE

Mapscale: 1:100,000

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
Purchased U.S. Geological Survey 100k DLG files were converted to ARC/INFO coverages and edge matched by the Illinois State Water Survey using the techniques described by USEPA-Las Vegas.

The original INFO coding included only the MAJOR and MINOR items. This USGS coding was retained in the MAJOR# and MINOR# items; however, the width of the original fields was reduced from six to three bytes to conserve storage space. All absent data was indicated by -99. Additional INFO items were added to make the data easier to use and to facilitate searches and graphic displays. Some of the added items aggregated the original DLG data to make it immediately useful. For example, the new item STREAMS_ALL contains a 1 if the code 412 was present in either MINOR1, MINOR2, or MINOR3. If the code was missing, the field contains a 0.

Additional INFO items and corresponding DLG codes in the .AAT file:

INFO item	DLG codes	DLG description
STREAMS ALL	412	stream
DITCH OR CANAL	414	ditch or canal
INTERMITTENT ALL	610	intermittent
SHORELINE ALL	200	shoreline
	201	manmade shoreline
	203	indefinite shoreline
	207	apparent shoreline

The following INFO items were derived using the above INFO items:

INTERMITTENT_STR	intermittent streams
PERENNIAL_STREAM	perennial streams
WIDE_STREAMS	double line streams
PONDS	waterbodies

Procedure used to derive INTERMITTENT_STR: RES (STREAMS_ALL = 1
OR DITCH_OR_CANAL = 1)
AND INTERMITTENT_ALL = 1 CALC INTERMITTENT_STR = 1

Procedure used to derive PERENNIAL_STREAM:
RES (STREAMS_ALL = 1 OR DITCH_OR_CANAL = 1)
AND INTERMITTENT_ALL = 0 CALC PERENNIAL_STREAM = 1

Procedure used to derive WIDE_STREAMS:
RES STREAMS_ALL = 0 AND DITCH_OR_CANAL = 0
AND SHORELINE_ALL = 0 AND INTERMITTENT_ALL = 0

/* 204 IS apparent boundary - indicates wetland -
swamp boundary RES MINOR1 NE 204 AND MINOR2 NE 204
AND MINOR3 NE 204 AND MINOR4 NE 204 CALC WIDE_STREAMS = 1

Procedure used to derive PONDS:
RES SHORELINE_ALL = 1 AND WIDE_STREAMS = 0, CALC PONDS = 1

INFO Item Description

DATAFILE NAME: HYDRO.AAT
23 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	FNODE#	4	5	B	-	
5	TNODE#	4	5	B	-	
9	LPOLY#	4	5	B	-	
13	RPOLY#	4	5	B	-	
17	LENGTH	4	12	F	3	
21	RACINE#	4	5	B	-	
25	RACINE-ID	4	5	B	-	
29	MAJ1	3	3	I	-	
32	MIN1	3	3	I	-	
35	MAJ2	3	3	I	-	
38	MIN2	3	3	I	-	
41	MAJ3	3	3	I	-	
44	MIN3	3	3	I	-	
47	MAJ4	3	3	I	-	
50	MIN4	3	3	I	-	
53	STREAMS_ALL	1	1	I	-	
54	DITCH_OR_CANAL	1	1	I	-	
55	INTERMITTENT_ALL	1	1	I	-	
56	SHORELINE_ALL	1	1	I	-	
57	INTERMITTENT_STR	1	1	I	-	
58	PERENNIAL_STREAM	1	1	I	-	
59	WIDE_STREAMS	1	1	I	-	
60	PONDS	1	1	I	-	

Coding for INFO Items

Bibliography

James, D.E. and Dulaney, R.A., GIS Technical Memorandum 2, DLG Processing Using ARC/INFO. USEPA, P.O.Box 93478, Las Vegas, Nevada 89193-3478.

DOCUMENTATION FOR DLG HYDROLOGY COVERAGES

Amelia V. Greene Illinois State Water Survey April, 1991.

The DLG hydrology coverages originated from purchased USGS 100k DLG files. Each original hydrology file contained line, polygon, point and node data for a single 7.5' or 15' USGS quadrangle. During processing, each file was converted into three ARC/INFO coverages - point, node and net. The net coverages were then visually edge matched, appended and further divided into a line coverage containing all original lines and a net coverage containing the polygon features. Since the division of the original ne-t coverage into the line and net products was based on INFO coding, errors in the original INFO coding resulted in errors in the two products. It is apparent at this time that some of the larger streams (represented by two lines rather than just a center line) are missing from the net coverages. Four layers now exist for all parts of the state:

HYDRO-LN - line data, has .AAT file
HYDRO-PY - polygon data, has .PAT and .AAT files
HYDRO-PT - point data, has .PAT file
HYDRO-ND - node data, has .PAT file

The final size of the coverages within each layer is still being investigated, since the transition from the Prime computer to the Sun workstations is currently underway. There has always been a tradeoff between the size of coverages and the speed of the computer; what was appropriate for the relatively slow Prime computer may not be appropriate for the faster Sun workstations. Currently, HYDRO-LN and HYDRO-PY are located on the Prime computer at ILLINOIS2>DLG>S####, where S#### is the name of the tile. Each tile is 30 minuetes x 30 minutes or 16 7.5 minute quads in size. The coverages HYDRO-PT and HYDRO-ND are located at ILLINOIS2>DLG and exist as state wide coverages. This documentation file is also located at ILLINOIS2>DLG as the file HYDRO.DOCUMENTATION.

The original INFO coding included only the MAJOR and MINOR items. This USGS coding was retained in the MAJOR# and MINOR# items; however, the width of the original fields was reduced from six to three bytes to conserve storage space. All absent data was indicated by -99.

Additional INFO items were added to make the data easier to use and to facilitate searches and graphic displays. Some of the added items aggregated the original DLG data to make it immediately useful. For example, the new item STREAMS_ALL contains a 1 if the code 412 was present in either MINOR1, MINOR2, or MINOR3. If the code was missing, the field contains a 0. Other added items are just empty fields and were added for the convenience of users. These were named AAA, BBB and CCC and are three byte in-teger fields.

****
***** Documentation for the LINE coverages HYDRO-LN *****
****

Additional INFO items and corresponding DLG codes in the .AAT file:

INFO item	DLG codes	DLG description
STREAMS ALL	412	stream
DITCH OR CANAL	414	ditch or canal
INTERMITTENT ALL	610	intermittent
SHORELINE ALL	200	shoreline
	201	manmade shoreline
	203	indefinite shoreline
	207	apparent shoreline

The following INFO items were derived using the above INFO items:

INTERMITTENT_STR	intermittent streams
PERENNIAL_STREAM	perennial streams
WIDE_STREAMS	double line streams
PONDS	waterbodies

Procedure used to derive INTERMITTENT_STR:

```
RES ( STREAMS_ALL = 1 OR DITCH_OR_CANAL = 1 ) AND INTERMITTENT_ALL
= 1 CALC INTERMITTENT_STR = 1
```

Procedure used to derive PERENNIAL_STREAM:

```
RES ( STREAMS_ALL = 1 OR DITCH_OR_CANAL = 1 ) AND INTERMITTENT_ALL
= 0 CALC PERENNIAL_STREAM = 1
```

Procedure used to derive WIDE_STREAMS:

```
RES STREAMS_ALL = 0 AND DITCH_OR_CANAL = 0 AND SHORELINE_ALL = 0
AND NTERMITTENT_ALL = 0

/* 204 IS apparent boundary - indicates wetland - swamp boundary
RES MINOR1 NE 204 AND MINOR2 NE 204 AND MINOR3 NE 204 AND MINOR4
NE 204 CALC WIDE_STREAMS = 1
```

Procedure used to derive PONDS:

```
RES SHORELINE_ALL = 1 AND WIDE_STREAMS = 0
CALC PONDS = 1
```

Contents of the HYDRO-LN.AAT file for the line coverages:

26 ITEMS

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	FNODE#	4	5	B	-	
5	TNODE#	4	5	B	-	
9	LPOLY#	4	5	B	-	
13	RPOLY#	4	5	B	-	
17	LENGTH	4	12	F	3	
21	HYDRO-LN#	4	5	B	-	
25	HYDRO-LN-ID	4	5	B	-	
29	MAJOR1	3	3	I	-	
32	MINOR1	3	3	I	-	
35	MAJOR2	3	3	I	-	
38	MINOR2	3	3	I	-	
41	MAJOR3	3	3	I	-	
44	MINOR3	3	3	I	-	
47	MAJOR4	3	3	I	-	
50	MINOR4	3	3	I	-	
53	STREAMS ALL	1	1	I	-	
54	DITCH OR CANAL	1	1	I	-	
55	INTERMITTENT ALL	1	1	I	-	
56	SHORELINE ALL	1	1	I	-	
57	INTERMITTENT_STR	1	1	I	-	
58	PERENNIAL STREAM	1	1	I	-	
59	WIDE STREAMS	1	1	I	-	
60	PONDS	1	1	I	-	
61	AAA	3	3	I	-	
64	BBB	3	3	I	-	
67	CCC	3	3	I	-	

****

***** Documentation for the NET coverages HYDRO-PY *****

****

Each polygon coverage is a net coverage and has a .PAT and .AAT file. When doing additional processing, use the poly option to retain both the .PAT and .AAT files.

Additional INFO items and corresponding DLG codes for the .PAT file.

INFO item	DLG code	DLG description
STREAM	412	stream
LAKE	421	lake or pond
SEWAGE POND	109	sewage disposal pond or filtration beds
GRAVEL PIT	402	gravel pit or quarry filled with water
WETLAND	111	marsh wetland swamp bog
INUNDATION AREA	105	inundation area

Additional INFO items and corresponding DLG codes for the .AAT file.
No additional items were added.

Contents of the HYDRO-PY.PAT file for the net coverage.

19 ITEMS

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	HYDRO-PY#	4	5	B	-	
13	HYDRO-PY-ID	4	5	B	-	
17	MAJOR1	3	3	I	-	
20	MINOR1	3	3	I	-	
23	MAJOR2	3	3	I	-	
26	MINOR2	3	3	I	-	
29	MAJOR3	3	3	I	-	
32	MINOR3	3	3	I	-	
35	STREAM	1	1	I	-	
36	LAKE	1	1	I	-	
37	SEWAGE POND	1	1	I	-	
38	GRAVEL PIT	1	1	I	-	
39	WETLAND	1	1	I	-	
40	INUNDATION AREA	1	1	I	-	
41	AAA	3	3	I	-	
44	BBB	3	3	I	-	
47	CCC	3	3	I	-	

Contents of the HYDRO-PY.AAT file for the net coverage.

16 ITEMS

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	FNODE#	4	5	B	-	
5	TNODE#	4	5	B	-	
9	LPOLY#	4	5	B	-	
13	RPOLY#	4	5	B	-	
17	LENGTH	4	12	F	3	
21	HYDRO-PY#	4	5	B	-	
25	HYDRO-PY-ID	4	5	B	-	
29	MAJOR1	3	3	I	-	
32	MINOR1	3	3	I	-	
35	MAJOR2	3	3	I	-	
38	MINOR2	3	3	I	-	
41	MAJOR3	3	3	I	-	
44	MINOR3	3	3	I	-	
47	AAA	1	1	I	-	
48	BBB	1	1	I	-	
49	CCC	1	1	I	-	

****

***** Documentation for the POINT coverage HYDRO-PT *****

****

Additional INFO items and corresponding DLG codes for the .PAT file.

INFO item	DLG code	DLG description
SPRING	300	Spring
NON-FLOWING-WELL	301	Non-flowing well
GAGING-STATION	403	Gaging station
MINOR2-DATA	varies	has data in item MINOR2

Contents of the HYDRO-PT.PAT file for the point coverage.

```
   24 9 RECORDS SELECTED

   15 ITEMS
 COL   ITEM NAME          WDTH OPUT TYP N.DEC  ALTERNATE NAME
    1  AREA                4   12  F    3
    5  PERIMETER           4   12  F    3
    9  HYDRO-PT#           4    5  B    -
   13  HYDRO-PT-ID         4    5  B    -
   17  MAJOR1              3    3  I    -
   20  MINOR1              3    3  I    -
   23  MAJOR2              3    3  I    -
   26  MINOR2              3    3  I    -
   29  SPRING              1    1  I    -
   30  NON-FLOWING-WELL    1    1  I    -
   31  GAGING-STATION      1    1  I    -
   32  MINOR2-DATA         1    1  I    -
   33  AAA                 3    3  I    -
   36  BBB                 3    3  I    -
   39  CCC                 3    3  I    -


   ************************************************************
       *****  Documentation for the NODE coverage HYDRO-ND  *****
   ************************************************************
```

Additional INFO items and corresponding DLG codes for the .PAT file.

```
INFO item       DLG code     DLG description

STREAM_UP_ORIGIN   001        Upper origin of stream
SPRING             300        Spring
```

Contents of the .PAT file for the node coverage.

```
   33220 RECORDS SELECTED

   13 ITEMS
 COL   ITEM NAME          WDTH OPUT TYP N.DEC  ALTERNATE NAME
    1  AREA                4   12  F    3
    5  PERIMETER           4   12  F    3
    9  HYDRO-ND#           4    5  B    -
   13  HYDRO-ND-ID         4    5  B    -
   17  MAJOR1              3    3  I    -
   20  MINOR1              3    3  I    -
   23  MAJOR2              3    3  I    -
   26  MINOR2              3    3  I    -
   29  STREAM-UP--ORIGIN   1    1  I    -
   30  SPRING              1    1  I    -
   31  AAA                 3    3  I    -
   34  BBB                 3    3  I    -
   37  CCC                 3    3  I    -
```

****

***** DLG codes available for Hydrology data *****
(not all were used for Illinois data)

****

The customary MAJOR code for hydrography data is 50.

MAJOR CODE	MINOR CODE	DESCRIPTION
Feature identification: Nodes		
050	0001	Upper origin of stream
	0002	Upper origin of stream at water body
	0003	sink, channel no longer evAdent
	0004	Stream entering water body
	0005	Stream exiting water body
Feature identification: Areas		
050	0100	Alkali flat
	0101	Reservoir
	0102	Covered reservoir
	0103	Glacier or permanent snowfield
	0104	Salt evaporator
	0105	Inundation area
	0106	Fish hatchery or farm
	0107	Industrial water impoundment
	0108	Area to be submerged
	0109	Sewage disposal pond or filtration beds
	0110	Tailings pond
	0111	Marsh, wetland, swamp, bog
	0112	Mangrove mren
	0113	Rice field
	0114	Cranberry bog
	0115	Flats (tidal, mud, sand, gravel)
	0116	Bays, estusries, gulfs, oceans, seas
	0117	Shoal
	0118	Soda evaporator
	0119	Duck Pond
	0120	Void area
Feature identification: Lines		
050	0200	Shoreline
	0201	Manmade shoreline
	0202	Closure line
	0203	Indefinite shoreline
	0204	Apparent limit
	0205	Outline of a Carolina bay
	0206	Danger curve
	0207	Apparont shoreline

Feature identification: Points

050	0300	Spring
	0301	Non-flowing well
	0302	Flowing well
	0303	Riser
	0304	Geyser
	0305	Windmill
	0306	Cistern

Feature identificat.ion: Multiple element types
(used for nodes, areas, lines, or points)

050	0400	Rapids
	0401	Falls
	0402	Gravel pit or quarry filled with water
	0403	Gaging station
	0404	Pumping station
	0405	Water intake
	0406	Dam or weir
	0407	Canal lock or sluice gate
	0408	Spillway
	0409	Gate (flood, tidal, head, check)
	0410	Rock
	0411	Crevasse
	0412	Stream
	0413	Braided stream
	0414	Ditch or canal
	0415	Aqueduct
	0416	Flume
	0417	Penstock
	0418	Siphon
	0419	Channel in water area
	0420	Wash or ephemeral drain
	0421	Lake or pond
	0422	Coral reef
	0423	Sand in open water
	0424	Spoil area
	0425	Fish ladders
	0426	Holiday area

Descriptive: Multiple element types

050	0601	Underground
	0602	Overpassing
	0603	Elevated
	0604	Tunnel
	0605	Right bank
	0606	Left bank
	0607	Under construction
	0608	Salt
	0609	Unsurveyed
	0610	Intermittent
	0611	Abandoned or discontinued
	0612	Submerged or sunken
	0613	Wooded
	0614	Dry
	0615	Mineral or hot (sulphur, alkali, etc.)
	0616	Navigable, transportation
	0617	Underpassing
	0618	Earthen construction
	0619	Interpolated elevation

	0621	Decimal fractions of feet or meters
	0629	
	0999	added by Illinois State Water Survey
050	0000	Photorevised feature
		this is coded as -99 in our data

Parameter: Multiple element types (MAJOR code is not 50)

05N	----	Water surface elevation, actual or interpolated, N=1 for feet, 2 for meters, 6 for feet below datum, and 7 for meters below datum. Elevation value in four spaces, right justified.
053	0---	Angle of clockwise rotation (nearest whole degree)
055	-----	River mile, value in four spaces, right justified
058	0000	Best estimate of classification or position

ILLINOIS WATERWAY

Coverage Name: illwaterway

Coverage Contents: water sampling points

Size of Coverage: Illinois waterway from Chillicothe to Lake Michgan at Wilmette, Chicago Harbor and Calumet Harbor

Coverage Type: POINT

Mapscale: 1:100,000

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
In 1991, sampling points were located on U.S. Geological Survey 1:100,000 mapscale topographic maps and digitized.

INFO Item Description:

DATAFILE NAME: ILLWATERWAY.PAT
1314 RECORDS
12 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	ILLWATERWAY#	4	5	B	-	
13	ILLWATERWAY-ID	4	5	B	-	
17	STATION#	8	8	I	-	
25	LOCATION	30	30	C	-	
55	SAMPLING-PERIOD	10	10	C	-	
65	BEGIN-DATE	6	6	I	-	
71	END-DATE	6	6	I	-	
77	P#	5	5	C	-	
82	PNAME	25	25	C	-	
107	UNITS	10	10	C	-	

DATAFILE NAME: ILLWATERWAY.STATIONLIST
73 RECORDS
7 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	STATION#	8	8	I	-	
9	LOCATION	30	30	C	-	
39	X-LAMBERT	4	12	F	3	
43	Y-LAMBERT	4	12	F	3	
47	SAMPLING-PERIOD	10	10	C	-	
57	BEGIN-DATE	6	6	I	-	
63	END-DATE	6	6	I	-	

DATAFILE NAME: ILLWATERWAY.PARAMETERLIST 18 RECORDS
9 ITEMS: STARTING :CN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	STATION#	8	8	C	-	
9	P#	5	5	C	-	
14	PNAME	25	25	C	-	
39	UNITS	10	10	C	-	
49	SAMPLING-PERIOD	10	10	C	-	
59	BEGIN-DATE	6	6	I	-	
65	END-DATE	6	6	I	-	
71	NUMBER-ANALYSES	4	4	I	-	
75	SAMPLING-FREQ	9	9	C	-	

Coding for INFO Items:

DATAFILE NAME: ILLWATERWAY,.PAT

1	AREA	square feet, generated by software
5	PERIMETER	feet, generated by software
9	ILLWATERWAY#	internal ID, generated by software
13	ILLWATERWAY-ID	processing ID, created by ISWS
17	STATION*	assigned by ISWS
25	LOCATION	
55	SAMPLING-PERIOD	
65	BEGIN-DATE	yymmdd
71	END-DATE	yymmdd
77	P#	USGS parameter number
82	PNAME	USGS parameter name
107	UNITS	units of measurement

DATAFILE NAME: ILLWATERWAY.STATIONLIST

1	STATION*	assigned by ISWS
9	LOCATION	
39	X-LAMBERT	x coordinate, lambert conformal
43	Y-LAMBERT	y coordinate, lambert conformal
47	SAMPLING-PERIOD	
57	BEGIN-DATE	yymmdd
63	END-DATE	yymmdd

DATAFILE NAME: ILLWATERWAY.PARAMETERLIST

1	STATION#	assigned by ISWS, ALL == all stations
9	P#	USGS parameter number
14	PNAME	USGS parameter name
39	UNITS	units of meaurement
49	SAMPLING-PERIOD	
59	BEGIN-DATE	yymmdd
65	END-DATE	yymmdd
71	NUMBER-ANALYSES	number of analyses per event
75	SAMPLING-FREQ	

Bibliography:

Butts, Thomas A. and Terstriep, Michael L. , Expansion of the Scope of work of Existing Project, MET SAN DIST CGO BUT, 1-5-35855. Illinois State Water Survey, Champaign, Il, 1990.

100K DLG ROAD INTERCHANGES

Coverage Name: interchanges (10 separate coverages)

Size of Coverage: 100k USGS panels clipped to upper Illinois River watershed boundary, 10 coverages

Coverage Type: LINE

Mapscale: 1:100,000

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
In 1991, the coverage interchanges was created from the 100k DLG roads coverage by reselecting the appropriate codes. Where the original coding was incorrect, it was necessary to delete unwanted lines and to retrieve missing lines from the original coverage. Generally, the codes indicating interchanges had a minor code of 402.

INFO Item Description
DATAFILE NAME: INTERCHANGES.AAT
23 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	FNODE#	4	5	B	-	
5	TNODE#	4	5	B	-	
9	LPOLY#	4	5	B	-	
13	RPOLY#	4	5	B	-	
17	LENGTH	4	12	F	3	
21	INTERCHANGES#	4	5	B	-	
25	INTERCHANGES-ID	4	5	B	-	
29	QUAD	4	4	I	-	
33	MAJOR1	6	6	I	-	
39	MINOR1	6	6	I	-	
45	MAJOR2	6	6	I	-	
51	MINOR2	6	6	I	-	
57	MAJOR3	6	6	I	-	
63	MINOR3	6	6	I	-	
69	MAJOR4	6	6	I	-	
75	MINOR4	6	6	I	-	
81	MAJOR5	6	6	I	-	
87	MINOR5	6	6	I	-	
93	MAJOR6	6	6	I	-	
99	MINOR6	6	6	I	-	
105	MAJOR7	6	6	I	-	
111	MINOR7	6	6	I	-	
117	MAINROADS	1	1	I	-	

Coding for INFO Items

1	FNODE#
5	TNODE#
9	LPOLY#
13	RPOLY#
17	LENGTH
21	INTERCHANGES#
25	INTERCHANGES-ID
29	QUAD
33	MAJOR1
39	MINOR1
45	MAJOR2
51	MINOR2
57	MAJOR3
63	MINOR3
69	MAJOR4
75	MINOR4
81	MAJOR5
87	MINOR5
93	MAJOR6
99	MINOR6
105	MAJOR7
111	MINOR7
117	MAINROADS

Biblxography

James, D.E. and Dulaney, R.A., GIS Technical Memorandum 2, DLG Processing Using ARC/INFO. USEPA, P.O.Box 93478, Las Vegas, Nevada 8 9193-3478.

100K DLG INTERSTATE HIGHWAYS

Coverage Name: interstates (10 separate coverages)

Size of Coverage: 100k USGS panels clipped to upper Illinois River watershed boundary, 10 coverages

Coverage Type: LINE

Mapscale: 1:100,000

Contact Person:
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2204 Griffith Drive
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(217) 333-9544

Coverage History and Mapping Procedures:
In 1991, the coverage interstates was created from the 100k DLG roads coverage by reselecting the appropriate codes. Where the original coding was incorrect, it was necessary to delete unwanted lines and to retrieve missing lines from the original coverage. Generally, the codes indicating interstates had a code of 172 as a major item.

INFO Item Description
DATAFILE NAME: INTERSTATES.AAT
23 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPDT	TYP	N.DEC	ALTERNATE NAME
1	FNODE#	4	5	B	-	
5	TNODE#	4	5	B	-	
9	LPOLY#	4	5	B	-	
13	RPOLY#	4	5	B	-	
17	LENGTH	4	12	F	3	
21	INTERSTATES#	4	5	B	-	
25	INTERSTATES-ID	4	5	B	-	
29	QUAD	4	4	I	-	
33	MAJOR1	6	6	I	-	
39	MINOR1	6	6	I	-	
45	MAJOR2	6	6	I	-	
51	MINOR2	6	6	I	-	
57	MAJOR3	6	6	I	-	
63	MINOR3	6	6	I	-	
69	MAJOR4	6	6	I	-	
75	MINOR4	6	6	I	-	
81	MAJOR5	6	6	I	-	
87	MINOR5	6	6	I	-	
93	MAJOR6	6	6	I	-	
99	MINOR6	6	6	I	-	
105	MAJOR7	6	6	I	-	
111	MINOR7	6	6	I	-	
117	MAINROADS	1	1	I	-	

Coding for INFO Items

1	FNODE#
5	TNODE#
9	LPOLY#
13	RPOLY#
17	LENGTH
21	INTERSTATES#
25	INTERSTATES-ID
29	QUAD
33	MAJOR1
39	MINOR1
45	MAJOR2
51	MINOR2
57	MAJOR3
63	MINOR3
69	MAJOR4
75	MINOR4
81	MAJOR5
87	MINOR5
93	MAJOR6
99	MINOR6
105	MAJOR7
111	MINOR7
117	MAINROADS

Bibliography

James, D.E. and Dulaney, R.A., GIS Technical Memorandum 2, DLG Processing Using ARC/INFO. USEPA, P.O.Box 93478, Las Vegas, Nevada 89193-3478.

USEPA LAKE MICHIGAN SURVEY STATIONS FOR 1988-89 WITHIN ILLINOIS

Coverage Name: lakemich

Coverage Contents: survey stations within Lake Michigan

Size of Coverage: Illinois portion of Lake Michigan

Coverage Type: POINT

Mapscale: generated from coordinates

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
In 1991, the staff of the Illinois State Water Survey used ARC/INFO software to create the lakemich coverage from coordinates in Appendix Table 0-1 of the Illinois Water Quality Report, 1988-1989.

INFO Item Description:

DATAFILE NAME: LAKEMICH,.PAT
247 6 RECORDS
13 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	LAKEMICH#	4	5	B	-	
13	LAKEMICH-ID	4	5	B	-	
17	STATION#	3	3	C	-	
20	LOCATION	40	40	C	-	
60	FREQ-COLLECT	6	6	C	-	
66	SAMPLING-PERIOD	12	12	C	-	
78	BEGIN-DATE	6	6	I	-	
84	END-DATE	6	6	I	-	
90	P#	5	5	C	-	
95	PNAME	35	35	C	-	
130	TABLE-NAME	7	7	C	-	

DATAFILE NAME: LAKEMICH.,STATIONLIST
81 RECORDS
10 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	STATION#	3	3	C	-	
4	LOCATION	40	40	C	-	
44	X-LAMBERT	7	7	I	-	
51	Y-LAMBERT	7	7	I	-	
58	LATITUDE	6	6	I	-	
64	LONGITUDE	7	7	I	-	
71	FREQ-COLLECT	6	6	C	-	
77	SAMPLING-PERIOD	12	12	C	-	
89	BEGIN-DATE	6	6	I	-	
95	END-DATE	6	6	I	-	

DATAFILE NAME: LAKEMICH,.PARAMETERLIST
108 RECORDS
4 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	P#	5	5	C	-	
6	PNAME	35	35	C	-	
41	TABLE-NAME	7	7	C	-	
48	UNITS	15	15	C	-	

Coding for INFO Items:

DATAFILE NAME: LAKEMICH,.PAT

1	AREA	square feet, generated by software
5	PERIMETER	feet, generated by software
9	LAKEMICH#	internal ID, generated by software
13	LAKEMICH-ID	processing ID, supplied by ISWS
17	STATION*	station number
20	LOCATION	
60	FREQ-COLLECT	GIJK = TABLE-NAME in the file LAKEMICH.PARAMETERS 3,4,7 = yearly frequency of samples
66	SAMPLING-PERIOD	
78	BEGIN-DATE	yy,mm,dd
84	END-DATE	yy,mm,dd
90	P#	parameter number
95	PNAME	parameter name
130	TABLE-NAME	G = Lake Michigan I = total IEPA parameter spectrum J = macroinvertebrate diversity K = fish filet toxic monitoring (annually)

DATAFILE NAME: LAKEMICH,.STATIONLIST

1	STATION#	station number
4	LOCATION	
44	X-LAMBERT	x coordinate, lambert conformal projection
51	Y-LAMBERT	y coordinate, lambert conformal projection
58	LATITUDE	degrees, minutes, seconds
64	LONGITUDE	degrees, minutes, seconds
71	FREQ-COLLECT	GIJK = TABLE-NAME in the file LAKEMICH.PARAMETERS 3,4,7 = yearly frequency of samples
77	SAMPLING-PERIOD	collection period (begin - end)
89	BEGIN-DATE	yymmdd
95	END-DATE	yymmdd

DATAFILE NAME: LAKEMICH..PARAMETERLIST

1	P#	USEPA parameter number
6	PNAME	USEPA prarameter name
41	TABLE-NAME	G = Lake Michigan I = total IEPA parameter spectrum J = macroinvertebrate diversity K = fish filet toxic monitoring (annually)
48	UNITS	units of measurement

Bibliography:

Illinois Water Quality Report 1988-1989, April 1990. Illinois Environmental Protection Agency, Division of Water Pollution Control, 2200 Churchill Road, P.O. Box 19276, Springfield, IL, 62794-9276. IEPA/WPC/90-160.

100K DLG MAIN ROADS

Coverage Name: mainroads (10 separate coverages)

Size of Coverage: 100k USGS panels clipped to upper Illinois River watershed boundary, 10 coverages

Coverage Type: LINE

Mapscale: 1:100,000

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
In 1991, the coverage mainroads was created from the 100k DLG roads coverage by reselecting the appropriate codes. Where the original coding was incorrect, it was necessary to delete unwanted lines and to retrieve missing lines from the original coverage. Generally, the codes indicating mainroads had a code of 172, 173, 174 or 201 as a major item.

INFO Item Description
DATAFILE NAME: MAINROADS.AAT
23 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	FNODE#	4	5	B	-	
5	TNODE#	4	5	B	-	
9	LPOLY#	4	5	B	-	
13	RPOLY#	4	5	B	-	
17	LENGTH	4	12	F	3	
21	MAINROADS#	4	5	B	-	
25	MAINROADS-ID	4	5	B	-	
29	QUAD	4	4	I	-	
33	MAJOR1	6	6	I	-	
39	MIN0R1	6	6	I	-	
45	MAJ0R2	6	6	I	-	
51	MIN0R2	6	6	I	-	
57	MAJ0R3	6	6	I	-	
63	MIN0R3	6	6	I	-	
69	MAJ0R4	6	6	I	-	
75	MIN0R4	6	6	I	-	
81	MAJ0R5	6	6	I	-	
87	MIN0R5	6	6	I	-	
93	MAJ0R6	6	6	I	-	
99	MIN0R6	6	6	I	-	
105	MAJ0R7	6	6	I	-	
111	MIN0R7	6	6	I	-	
117	MAINROADS	1	1	I	-	

Coding for INFO Items

1	FNODE#
5	TNODE#
9	LPOLY#
13	RPOLY#
17	LENGTH
21	MAINROADS#
25	MAINROADS-ID
29	QUAD
33	MAJOR1
39	MINOR1
45	MAJOR2
51	MINOR2
57	MAJOR3
63	MINOR3
69	MAJOR4
75	MINOR4
81	MAJOR5
87	MINOR5
93	MAJOR6
99	MINOR6
105	MAJOR7
111	MINOR7
117	MAINROADS

Bibliography

James, D.E. and Dulaney, R.A., GIS Technical Memorandum 2, DLG Processing Using ARC/INFO. USEPA, P.O.Box 93478, Las Vegas, Nevada 89193-3478.

NORTHEASTERN ILLINOIS PLANNING COMMISSION (NIPC)

Coverage Name: nipc

Coverage Contents: nipc water quality sampling locations

Size of Coverage: northeastern Illinois comprising the counties of Cook, DuPage, Kane, Lake, McHenry and Will

Coverage Type: POINT

Mapscale: approximately 1:500,000

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
In 1991, points were digitized from a paper map of approximately 1:500,000 mapscale. These points were then overlaid with the dlg streams of 1:100,000 mapscale and moved closer to the appropriate stream. The distance being moved was approximately 500 feet.

INFO Item Description:

DATAFILE NAME: NIPC..PAT
864 RECORDS
12 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	8	18	F	5	
9	PERIMETER	8	18	F	5	
17	NIPC#	4	5	B	-	
21	NIPC-ID	4	5	B	-	
25	STATION#	2	2	I	-	
27	LOCATION	80	80	C	-	
107	SAMPLING-PERIOD	25	25	C	-	
132	BEGIN-DATE	6	6	I	-	
138	END-DATE	6	6	I	-	
144	P#	5	5	C	-	
149	PNAME	28	28	C	-	
177	UNITS	15	15	C	-	

DATAFILE NAME: NIPC..STATIONLIST
48 RECORDS
9 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	STATION#	2	2	I	-	
3	LOCATION	80	80	C	-	
83	X-LAMBERT	8	18	F	5	
91	Y-LAMBERT	8	18	F	5	
99	LONGITUDE	12	12	C	-	
111	LATITUDE	12	12	C	-	

123	SAMPLING-PERIOD	25	25	C	-
148	BEGIN-DATE	6	6	I	-
154	END-DATE	6	6	I	-

DATAFILE NAME: NIPC.PARAMETERLIST
18 RECORDS
6 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	STATION#	3	3	C	-	
4	P#	5	5	C	-	
9	PNAME	28	28	C	-	
37	UNITS	15	15	C	-	
52	ANALYSIS-FREQ	15	15	C	-	
67	NUM-ANALYZED	4	4	I	-	

Coding for INFO Items:

DATAFILE NAME: NIPC,.PAT

1	AREA	square feet, generated by software
9	PERIMETER	feet, generated by software
17	NIPC#	internal ID, generated by software
21	NIPC-ID	used in processing, assigned by ISWS
25	STATION#	supplied by NIPC
27	LOCATION	description of location of sampling point
107	SAMPLING-PERIOD	1 = January, 2 = February, etc. year is 1976 or 1977
132	BEGIN-DATE	yymmdd
138	END-DATE	yymmdd
144	P#	USGS parameter code, supplied by ISWS
149	PNAME	USGS parameter name, supplied by NIPC
177	UNITS	units of measurement

DATAFILE NAME: NIPC..STATIONLIST

1	STATION*	supplied by NIPC
3	LOCATION	description of location of sampling point
83	X-LAMBERT	x coordinate, lambert conformal projection
91	Y-LAMBERT	y-coordinate, lambert conformal projection
99	LONGITUDE	degrees, minutes, seconds
111	LATITUDE	degrees, minutes, seconds
123	SAMPLING-DATES	1 = January, 2 = February, etc. year is 1976 or 1977
148	BEGIN-DATE	yymmdd
154	END-DATE	yymmdd

DATAFILE NAME: NIPC.PARAMETERLIST

1	STATION*	supplied by NIPC
4	P#	USGS parameter code, supplied by ISWS
9	PNAME	USGS parameter name, supplied by NIPC
37	UNITS	units of measurement
52	ANALYSIS--FREQ	proportion of samples analyzed
67	NUM-ANALYZED	total number of samples analyzed

Bibliography:

Elmore, G. Roy, Staff Paper No. 14, Water Quality Sampling and Analysis in the 208 Program. Northeastern Illinois Planning Commission, January 1977.

NPDES LOCATIONS

Coverage Name: npdes

Coverage Contents: npdes sampling locations

Size of Coverage: watershed boundary of the upper Illinois River

Coverage Type: POINT

Mapscale: generated from coordinates

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
In 1991, the npdes location coverage was generated from coordinates supplied in machine readable form by Illinois EPA. The work was done by the Illinois State Water Survey staff.

INFO Item Description:

571 RECORDS

DATAFILE NAME: NPDES.PAT

21 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	NPDES#	4	5	B	-	
13	NPDES-ID	4	5	B	-	
17	PERMIT#	9	9	C	-	
26	NAME	30	30	C	-	
56	PHONE#	10	10	I	-	
66	MAILING-NAME	30	30	C	-	
96	MAILING-STREET	30	30	C	-	
126	MAILING-CITY	23	23	C	-	
149	MAILING-STATE	2	2	C	-	
151	MAILING-ZIP-CODE	9	9	I	-	
160	SIC-CODE	4	4	I	-	
164	RIVER-REACH	12	12	I	-	
176	COUNTY-FIPS#	3	3	I	-	
179	BASIN	6	6	C	-	
185	REC-WATERS-CODE	6	6	C	-	
191	LATITUDE	6	6	I	-	
197	LONGITUDE	7	7	I	-	
204	X-LAMBERT	4	12	F	3	
208	Y-LAMBERT	4	12	F	3	

DATAFILE NAME: NPDES.OPERATORSLIST

1329 RECORDS

17 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	PERMIT*	9	9	C	-	
10	CONTACT1	35	35	C	-	

45	CONTACT2	35	35	C	-
80	CONTACT3	35	35	C	-
115	CONTACT4	35	35	C	-
150	CONTACT5	35	35	C	-
185	CONTACT6	35	35	C	-
220	CONTACT7	35	35	C	-
255	CONTACT8	35	35	C	-
290	CONTACT9	35	35	C	-
325	CONTACT10	35	35	C	-
360	CONTACT11	35	35	C	-
395	CONTACT12	35	35	C	-
430	CONTACT13	35	35	C	-
465	CONTACT14	35	35	C	-
500	CONTACT15	35	35	C	-
535	CONTACT16	35	35	C	-

Coding for INFO Items:

1	AREA	generated by software
5	PERIMETER	generated by software
9	NPDES#	generated by software
13	NPDES-ID	generated by ISWS staff
17	PERMIT#	NPDES permit number
26	NAME	
56	PHONE#	
66	MAILING-NAME	
96	MAILING-STREET	
126	MAILING-CITY	
149	MAILING-STATE	
151	MAILING-ZIP-CODE	
160	SIC-CODE	Standard Industrial Code
164	RIVER-REACH	
176	COUNTY-FIPS#	
179	BASIN	basin name
185	REC-WATERS-CODE	
191	LATITUDE	degrees, minutes, seconds
197	LONGITUDE	degrees, minutes, seconds
204	X-LAMBERT	x-coordinate, lambert conformal projection
208	Y-LAMBERT	y-coordinate, lambert conformal projection

DATAFILE NAME: NPDES..OPERATORSLIST

1	PERMIT*	NPDES permit number
10	CONTACT1	name of person
45	CONTACT2	name of person
80	CONTACT3	
115	CONTACT4	
150	CONTACT5	
185	CONTACT6	
220	CONTACT7	
255	CONTACT8	
290	CONTACT9	
325	CONTACT10	
360	CONTACT11	
395	CONTACT12	
430	CONTACT13	
465	CONTACT14	
500	CONTACT15	
535	CONTACTl6	

Bibliography: none

100K MAPSCALE QUADRANGLES

Coverage Name: quad100

Coverage Contents: U.S. Geological Survey 100k quadrangle boundaries clipped to the upper Illinois River basin

Size of Coverage: watershed boundary of the upper Illinois River

Coverage Type: POLYGON

Mapscale: generated from coordinates

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
The state wide 100k quadrangle boundary coverage was generated from the coordinates of the four corners of the 100k quadrangles the U.S. Geological Survey topographic maps.

INFO Item Description:
11 RECORDS SELECTED
DATAFILE NAME: QUAD100.PAT
6 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	QUAD100#	4	5	B	-	
13	QUAD100-ID	4	5	B	-	
17	USGS-100	30	30	C	-	
47	USGS-250	25	25	C	-	

Coding for INFO Items:

1	AREA
5	PERIMETER
9	QUAD100#
13	QUAD100-ID
17	USGS-100
47	USGS-250

Bibliography:
U.S. Geological Survey 1:100,000 mapscale quadrangle maps

Coverage Name: quad75

Coverage Contents: 7.5 minute quadrangle boundaries

Size of Coverage: watershed boundary of the upper Illinois River

Coverage Type: POLYGON

Mapscale: 1:24,000

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
The state wide 7.5 minute quadrangle boundary coverage was generated from the coordinates of the four corners of the 7.5 minute quadrangle U.S. Geological Survey maps.

INFO Item Description:
179 RECORDS
DATAFILE NAME: QUAD75.PAT
15 ITEMS: STARTING IN POSITION L

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	QUAD75#	4	5	B	-	
13	QUAD75-ID	4	5	B	-	
17	POLYID	4	5	B	-	
21	INDEX#	4	4	C	-	
25	MAPNAME	24	24	C	-	
49	XT1	4	12	F	-	
53	YT1	4	12	F	-	
57	XT2	4	12	F	-	
61	YT2	4	12	F	-	
65	XT3	4	12	F	-	
69	YT3	4	12	F	-	
73	XT4	4	12	F	-	
77	YT4	4	12	F	-	

Coding for INFO Items:

1	AREA
5	PERIMETER
9	QUAD75#
13	QUAD75-ID
17	POLYID
21	INDEX#
25	MAPNAME
49	XT1
53	YT1
57	XT2
61	YT2
65	XT3
69	YT3
73	XT4
77	YT4

Bibliography:

U.S. Geological Survey 1:24,000 7.5 minute quadrangle maps

100K DLG ROADS

Coverage Name: roads (10 separate coverages)

Size of Coverage: 100k DSGS panels clipped to upper Illinois River watershed boundary, 10 coverages

Coverage Type: LINE

Mapscale: 1:100,000

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
Purchased U.S. Geological Survey 100k DLG files were converted to ARC/INFO coverages and edge matched by the Illinois State Water Survey modifying the techniques described by USEPA-Las Vegas. As we systematically edge-matched every 7.5 or 15 minute coverage for the streams, we realized that the ARC/INFO software was making very few mistakes that we had to undo. Therefore, for the roads the process was automated even more. Rather than using the checkerboard pattern to distribute the edgematching, every north and west border was edge-matched for the roads. Initially, the limit adjust poly was created interactively within ARCEDIT for every quad and saved. Next, the edge-matching steps suggested by James and Dulaney was run as a batch process. The quads were appended and a check plot was made showing the 7.5 min quads as a "backcover", the roads and all dangles. All dangles occuring along quad lines were checked against 1:100,000 topo maps. Very, very few of the dangles had to be corrected.
The major-minor codes in the attribute database were maintained and additional INFO items were added for user friendliness.

INFO Item Description

DATAFILE NAME: ROADS.AAT

23 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	FNODE#	4	5	B	-	
5	TNODE#	4	5	B	-	
9	LPOLY#	4	5	B	-	
13	RPOLY#	4	5	B	-	
17	LENGTH	4	12	F	3	
21	ROADS#	4	5	B	-	
25	ROADS-ID	4	5	B	-	
29	QUAD	4	4	I	-	
33	MAJOR1	6	6	I	-	
39	MINOR1	6	6	I	-	
45	MAJOR2	6	6	I	-	
51	MINOR2	6	6	I	-	
57	MAJOR3	6	6	I	-	
63	MINOR3	6	6	I	-	
69	MAJOR4	6	6	I	-	
75	MINOR4	6	6	I	-	
81	MAJOR5	6	6	I	-	
87	MINOR5	6	6	I	-	
93	MAJOR6	6	6	I	-	
99	MINOR6	6	6	I	-	
105	MAJOR7	6	6	I	-	
111	MINOR7	6	6	I	-	
117	MAINROADS	1	1	I	-	

Coding for INFO Items

1	FNODE#
5	TNODE#
9	LPOLY#
13	RPOLY#
17	LENGTH
21	ROADS#
25	ROADS-ID
29	QUAD
33	MAJOR1
39	MINOR1
45	MAJOR2
51	MINOR2
57	MAJOR3
63	MINOR3
69	MAJOR4
75	MINOR4
81	MAJOR5
87	MINOR5
93	MAJOR6
99	MINOR6
105	MAJOR7
111	MINOR7
117	MAINROADS

Bibliography

James, D.E. and Dulaney, R.A., GIS Technical Memorandum 2, DLG Processing Using ARC/INFO. USEPA, P.O.Box 93478, Las Vegas, Nevada 89193-3478.

STORET LOCATIONS

Coverage Name: storet

Coverage Contents: USEPA STORET sampling locations

Size of Coverage: watershed boundary of the upper Illinois River

Coverage Type: POINT

Mapscale: generated from coordinates

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
In 1991, coordinates for the locations of STORET sampling points were received from the USEPA STORET system in machine readable form and converted to an ARC/INFO point coverage by the Illinois State' Water Survey staff.

INFO Item Description:

DATAFILE NAME: STORET..PAT
29850 RECORDS
12 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	STORET#	4	5	B	-	
13	STORET-ID	4	5	B	-	
17	STATION#	9	9	C	-	
26	STATION#2	11	11	C	-	
37	P#	5	5	C	-	
42	PNAME	17	17	C	-	
59	UNITS	8	8	C	-	
67	ANAL-METHOD	8	8	C	-	
75	BEGIN-DATE	6	6	I	-	
81	END-DATE	6	6	I	-	

DATAFILE NAME: STORET,.STATIONLIST
353 RECORDS
15 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	STATION#	9	9	C	-	
10	STATION#2	11	11	C	-	
21	LOCATION	30	30	C	-	
51	LOCATION2	30	30	C	-	
81	X-LAMBERT	7	7	I	-	
88	Y-LAMBERT	7	7	I	-	

95	LATITUDE	10	10	C	-
105	LONGITUDE	11	11	C	-
116	COUNTY-FIPS#	3	3	I	-
119	COUNTY-NAME	12	12	C	-
131	LEGAL-LOCATION	14	14	C	-
145	LOCATE-METHOD	2	2	I	-
147	GRAB/COMPOSITE	1	1	I	-
148	SAMPLE-FREQ	1	1	C	-
149	SAMPLE-REASON	2	2	I	-

DATAFILE NAME: STORET..PARAMETERLIST
333 RECORDS
3 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	P#	5	5	C	-	
6	PNAME	17	17	C	-	
23	UNITS	8	8	C	-	

Coding for INFO Items:

DATAFILE NAME: STORET,.PAT

1	AREA	square feet, generated by software
5	PERIMETER	feet, generated by software
9	STORET#	internal ID, generated by software
13	STORET-ID	ID supplied by ARC/INFO user
17	STATION#	
26	STATION#2	
37	P#	USEPA parameter number
42	PNAME	USEPA parameter name
59	UNITS	units of measurement
67	ANAL-METHOD	
75	BEGIN-DATE	yymmdd
81	END-DATE	yymmdd

DATAFILE NAME: STORET.STATIONLIST

1	STATION*	
10	STATION#2	
21	LOCATION	
51	LOCATION2	
81	X-LAMBERT	x coordinate, lambert conformal projection
88	Y-LAMBERT	x coordinate, lambert conformal projection
95	LATITUDE	degrees, minutes, seconds
105	LONGITUDE	degrees, minutes, seconds
116	COUNTY-FIPS#	county FIPS number
119	COUNTY-NAME	
131	LEGAL-LOCATION	township, range, section
145	LOCATE-METHOD	
147	GRAB/COMPOSITE	
148	SAMPLE-FREQ	
149	SAMPLE-REASON	

DATAFILE NAME: STORET.PARAMETERLIST

1	P#	USEPA parameter number
6	PNAME	USEPA parameter name
23	UNITS	units of measurement

Bibliography:

Storet User Handbook, USEPA, Washington, D.C. 20460, January, 1989.

ILLINOIS STATE WATER SURVEY WATER QUALITY MONITORING STATIONS

Coverage Name: swswq

Coverage Contents: Illinois State Water Survey water quality monitoring stations

Size of Coverage: watershed boundary of the upper Illinois River

Coverage Type: POINT

Mapscale: 1:500,000

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
Created in 1984 by ESRI as part of SHPTMA and SHPTMB; RESELECTED from SHPTMA and SHPTMB on INFO item SWS-WTR-QUAL-STN.

INFO Item Description:

DATAFILE NAME: SWSWQ.PAT
584 RECORDS
12 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	SWSWQ#	4	5	B	-	
13	SWSWQ-ID	4	5	B	-	
17	STATION#	8	8	I	-	
25	LOCATION	46	46	C	-	
71	SAMPLING-PERIOD	12	12	C	-	
83	BEGIN-DATE	6	6	I	-	
89	END-DATE	6	6	I	-	
95	P#	5	5	C	-	
100	PNAME	40	40	C	-	
140	UNITS	15	15	C	-	

DATAFILE NAME: SWSWQ.STATIONLIST
8 RECORDS
7 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	STATION#	8	8	I	-	
9	LOCATION	46	46	C	-	
55	X-LAMBERT	4	12	F	3	
59	Y-LAMBERT	4	12	F	3	
63	SAMPLING-PERIOD	12	12	C	-	
75	BEGIN-DATE	6	6	I	-	
81	END-DATE	6	6	I	-	

```
 DATAFILE NAME: SWSWQ.PARAMETERLIST
 74 RECORDS
    7 ITEMS: STARTING IN POSITION    1
 COL   ITEM NAME          WDTH OPUT TYP N.DEC  ALTERNATE NAME
    1  STATION#              5    5  C    -
    6  P#                    5    5  C    -
   11  PNAME                40   40  C    -
   51  UNITS                15   15  C    -
   66  SAMPLING--PERIOD      9    9  C    -
   75  BEGIN-DATE            6    6  I    -
   81  END-DATE              6    6  I    -
```

Coding for INFO Items:

```
DATAFILE NAME: SWSWQ,.PAT
    1  AREA                  square feet, generated by software
    5  PERIMETER             feet, generated by software
    9  SWSWQ#                internal ID, generated by software
   13  SWSWQ-ID              processing ID, assigned by ISWS
   17  STATION#              ISWS assigned number
   25  LOCATION
   71  SAMPLING-PERIOD       time period of measurement (begin - ending)
   83  BEGIN-DATE            yymmdd
   89  END-DATE              yymmdd
   95  P#                    USEPA parameter number
  100  PNAME                 USEPA parameter name
  140  UNITS                 units of measurement

 DATAFILE NAME: SWSWQ.STATIONLIST
    1  STATION#              ISWS assigned number
    9  LOCATION
   55  X-LAMBERT             x coordinate, lambert conformal
   59  Y-LAMBERT             y coordinate, lambert conformal
   63  SAMPLING-PERIOD       time period of measurement (begin -- ending)
   75  BEGIN-DATE            yymmdd
   81  END-DATE              yymmdd

 DATAFILE NAME: SWSWQ.PARAMETERLIST
    1  STATION#              ISWS assigned number
    6  P#                    USEPA parameter number
   11  PNAME                 USEPA parameter name
   51  UNITS                 units of measurement
   66  SAMPLING--PERIOD      time period of measurement (begin -- ending)
   75  BEGIN-DATE            yymmdd
   81  END-DATE              yymmdd
```

Bibliography:

SWS Water Quality Monitoring Stations
Illinois State Water Survey, 1983, Tape and listing of SWS surface water quality data stations in Illinois

Coverage Name: towns

Coverage Contents: towns having a population greater than zero and/or a listing in the zip code book

Size of Coverage: watershed boundary of the upper Illinois River

Coverage Type: POINT

Mapscale: varies according to USGS map used for GNIS

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
The Geographic Names Information System (GNIS) populated places coverage was clipped to the upper Illinois River basin. Those towns with a zero population and no listing in the zip code book were removed so as to eliminate excess clutter in regards to annotation.

INFO Item Description:
370 RECORDS
DATAFILE NAME: TOWNS.PAT
33 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	TOWNS#	4	5	B	-	
13	TOWNS-ID	4	5	B	-	
17	NAME	48	48	C	-	
65	FEATURE-CLASS	9	15	C	-	
74	FEATURE-CLASS#	2	6	I	-	
76	FIPS-STATE	2	2	I	-	
78	FIPS-COUNTY	3	3	I	-	
81	FIPS-STATE2	2	2	I	-	
83	FIPS-COUNTY2	3	3	I	-	
86	LATITUDE	7	7	C	-	
93	LONGITUDE	8	8	C	-	
101	LAMBERT-COORD-X	12	12	N	4	
113	LAMBERT-COORD-Y	12	12	N	4	
125	BOARD-GEOG-NAMES	14	14	C	-	
139	ELEVATION-FEET	5	5	I	-	
144	SOURCE	15	15	C	-	
159	USGS-MAPS-USED1	5	5	I	-	
164	TOPO-MAP-NAME1	25	25	C	-	

189	SGS-TOPO-MAP#-l	4	4	C	-
193	USGS-MAPS-USED2	5	5	I	-
198	TOPO-MAP-NAME2	25	25	C	-
223	SGS-TOPO-MAP#-2	4	4	C	-
227	USGS-MAPS-USED3	5	5	I	-
232	TOPO-MAP-NAME3	25	25	C	-
257	SGS-TOPO-MAP#-3	4	4	C	-
261	USGS-MAPS-USED4	5	5	I	-
266	TOPO-MAP-NAME4	25	25	C	-
291	SGS-TOPO-MAP#-4	4	4	C	-
295	PLACE-CODE	4	4	I	-
299	FIPS-CITY	5	5	I	-
304	POPULATION	9	9	I	-
	** REDEFINED ITEMS **				
65	FC	9	15	C	-

Coding for INFO Items:

COL	ITEM NAME	
1	AREA	
5	PERIMETER	
9	TOWNS#	
13	TOWNS-ID	
17	NAME	town name
65	FEATURE-CLASS	GNIS feature class, all ppl
74	FEATURE-CLASS#	
76	FIPS-STATE	state FIPS#
78	FIPS-COUNTY	county FIPS#
81	FIPS-STATE2	second state FIPS#
83	FIPS-COUNTY2	second county FIPS#
86	LATITUDE	degrees, minutes, seconds
93	LONGITUDE	degrees, minutes, seconds
101	LAMBERT-COORD-X	x coordinate, lambert conformal
113	LAMBERT-COORD-Y	y coordinate, lambert conformal
125	BOARD-GEOG-NAMES	board of geographic names
139	ELEVATION-FEET	elevation in feet
144	SOURCE	
159	USGS-MAPS-USED1	
164	TOPO-MAP-NAME1	
189	SGS-TOPO-MAP#-l	
193	USGS-MAPS-USED2	
198	TOPO-MAP-NAME2	
223	SGS-TOPO-MAP#-2	
227	USGS-MAPS-USED3	
232	TOPO-MAP-NAME3	
257	SGS-TOPO-MAP#-3	
261	USGS-MAPS-USED4	
266	TOPO-MAP-NAME4	
291	SGS-TOPO-MAP#-4	
295	PLACE-CODE	
299	FIPS-CITY	city FIPS#
304	POPULATION	population

Bibliography:

zip code book, source of populations, and GNIS reference

U.S. PUBLIC LAND SURVEY (USPLS) TOWNSHIPS

Coverage Name: townships

Coverage Contents: U.S. Public Land Survey townships

Size of Coverage: watershed boundary of the upper Illinois River

Coverage Type: POLYGON

Mapscale: 1:24,000

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
The original state wide U.S. Public Land Survey townships coverage was created as a township-range-section coverage and digitized from available 7.5 minute and 15 minute U.S. Geological Survey topographic maps in the 1970s and periodically updated. The state wide townships coverage was derived from this coverage.

INFO Item Description:

287 RECORDS

DATAFILE NAME: TOWNSHIP.PAT

12 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	TOWNSHIP#	4	5	B	-	
13	TOWNSHIP-ID	4	5	B	-	TOWN.INT-ID
17	TOWN.INT#	4	5	B	-	
21	TOWN.NEW-CN#	4	5	B	-	
25	TOWN.NEW-CN-:ID	4	5	B	-	
29	TOWN.OLD#	4	5	B	-	
33	TOWN.OLD-ID	4	5	B	-	
37	MERIDIAN	1	1	I	-	
38	TOWNSHIP	3	3	C	-	
41	RANGE	3	3	C	-	
	** REDEFINED ITEMS **					
37	TWP	7	7	C	-	
38	TR	6	6	C	-	

Coding for INFO Items:

1	AREA
5	PERIMETER
9	TOWNSHIP#
13	TOWNSHIP-ID
17	TOWN.INT#
21	TOWN.NEW-CN#
25	TOWN.NEW-CN-ID
29	TOWN.OLD#
33	TOWN.OLD-ID
37	MERIDIAN
38	TOWNSHIP
41	RANGE

Bibliography:

U.S. Geological Survey 1:24,000 7.5 minute quadrangle maps

SURFACE WATER TREATMENT FACILITIES

Coverage Name: treatment

Coverage Contents: water treatment plants

Size of Coverage: watershed boundary of the upper Illinois River

Coverage Type: POINT

Mapscale: generated from coordinates

Contact Person:
Robert A. Sinclair
Office of Spatial Data Analysis and Information
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
In 1991 the state wide water treatment facility coverage was generated from coordinates supplied by the IEPA Public Water Supply Monitoring Program.

INFO Item Description:
4 RECORDS
DATAFILE NAME: TREATMENT.PAT
9 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	TREATMENT#	4	5	B	-	
13	TREATMENT-ID	4	8	B	-	
17	NAME	35	35	C	-	
52	CODE	1	1	C	-	
53	FACILITY	45	45	C	-	
98	LONG	12	12	N	0	
110	LAT	12	12	N	0	

Coding for INFO Items:

1	AREA	generated by software
5	PERIMETER	generated by software
9	TREATMENT#	generated by ISWS
13	TREATMENT-ID	
17	NAME	company name
52	CODE	s = surface
53	FACILITY	name of treatment plant
98	LONG	longitude
110	LAT	latitude

Bibliography:

ISWS SURVEY OF WATER QUALITY SAMPLING POINTS

Coverage Name: wqsurvey

Coverage Contents: locations of water quality sampling points located as a result of a survey done by the Illinois State Water Survey in 1990-91

Size of Coverage: watershed boundary of the upper Illinois River

Coverage Type: POINT

Mapscale: generated from coordinates and digitized at mapscale 1:100,000

Contact Person:
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2204 Griffith Drive
Champaign, IL 61820
(217) 333-9544

Coverage History and Mapping Procedures:
In 1991, the Illinois State Water Survey created the coverage wqsurvey from information supplied by the returned ISWS questionaires. Locations of approximately one third of the points were supplied as latitude, longitude; another third were supplied as township, range, section and the remaining third were provided by locational descriptions. Points were initially positioned using the supplied information. The 1:100,00 scale stream coverage was then used as a backcover and adjustments were made as needed so that sampling points would be located on streams.

INFO Item Description:

DATAFILE NAME: WQSURVEY.PAT
3777 RECORDS
12 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	WQSURVEY#	4	5	B	-	
13	WQSURVEY-ID	4	5	B	-	
17	STATION#	7	7	I	-	
24	SAMPLING-PERIOD	15	15	C	-	
39	BEGIN-DATE	6	6	I	-	
45	END-DATE	6	6	I	-	
51	P#	5	5	C	-	
56	PNAME	40	40	C	-	
96	METHOD	1	1	I	-	
97	UNITS	15	15	C	-	

DATAFILE NAME: WQSURVEY,.STATIONLIST 149 RECORDS
18 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	STATION#	7	7	I	-	
8	LOCATION	50	50	C	-	
58	LOCATION#2	50	50	C	-	
108	LATITUDE	9	9	C	-	
117	LONGITUDE	9	9	C	-	
126	X-LAMBERT	4	12	F	3	
130	Y-LAMBERT	4	12	F	3	
134	TOWNSHIP	3	3	C	-	
137	RANGE	3	3	C	-	
140	SECTION	14	14	C	-	
154	QSECTION	2	2	C	-	
156	LOCATION-METHOD	70	70	C	-	
226	SAMPLING-TYPE	3	3	C	-	
229	SAMPLING-PERIOD	15	15	C	-	
244	BEGIN-DATE	6	6	I	-	
250	END-DATE	6	6	I	-	
256	SAMPLING-FREQ	5	5	C	-	
261	SAMPLING-REASON	122	122	C	-	

257 RECORDS
DATAFILE NAME: WQSURVEY.PARAMETERLIST
2 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME
1	P#	5	5	C	-	
6	PNAME	40	40	C	_	

Coding for INFO Items:

DATAFILE NAME: WQSURVEY,.PAT

1	AREA	generated by software
5	PERIMETER	generated by software
9	WQSURVEY#	generated by software
13	WQSURVEY-ID	assigned by ISWS during processing
17	STATION#	assigned by ISWS
24	SAMPLING-PERIOD	begin date - end date
39	BEGIN-DATE	yymmdd
45	END-DATE	yymmdd
51	P#	USGS water quality parameter number
56	PNAME	USGS water quality parameter name
96	METHOD	numbers 1- 9 1 = standard methods 2 = ASTM 3 = EPA 4 = other 5 = standard + EPA 6 = EPA + other 7 = ASTM + EPA 8 = standard + ASTM 9 = standard + EPA + other
97	UNITS	measurement units

DATAFILE NAME: WQSURVEY..STATIONLIST

1	STATION#	assigned by ISWS
8	LOCATION	stream name
58	LOCATION#2	site name
108	LATITUDE	degrees, minutes, seconds
117	LONGITUDE	degrees, minutes, seconds
126	X-LAMBERT	x coordinate, lambert conformal
130	Y-LAMBERT	y coordinate, lambert conformal
134	TOWNSHIP	
137	RANGE	
140	SECTION	
154	QSECTION	
156	LOCATION-METHOD	
226	SAMPLING-TYPE	g = grab; c = composite
229	SAMPLING-PERIOD	collection date (begin - end)
244	BEGIN-DATE	yymmdd
250	END-DATE	yymmdd
256	SAMPLING-FREQ	frequency of collection
261	SAMPLING-REASON	reason for sampling

DATAFILE NAME: WQSURVEY.PARAMETERLIST

1	P#	USGS water quality parameter number
6	PNAME	USGS water quality parameter name

Bibliography:

Surface Water Quality Data Collection Questionnaire, 1991, Illinois State Water Survey, Champaign, IL.

Appendix D

dBASE IV Database Specifications

Structure for database: C:\DBASE\NPDES.DBF
Number of data records: 1138

Field	Field Name	Type	Width	Index
1	NPDES ID#	Character	9	Y
2	ORG NAME	Character	30	Y
3	MAILNAME	Character	30	N
4	PHONE	Character	10	N
5	ADDRESS	Character	30	N
6	CITY	Character	23	N
7	STATE	Character	2	N
8	ZIP	Character	5	N
9	ZIPN	Character	5	N
10	SICCODE	Character	4	N
11	LAT	Character	8	N
12	LONG	Character	9	N
13	RVRBRANCH	Character	11	N
14	COUNTY	Character	3	N
15	BASIN	Character	6	N
16	RECWTRCODE	Character	6	N
** Total **			192	

Structure for database: C:\DBASE\CONTACT.DBF
Number of data records: 571

Field	Field Name	Type	Width	Index
1	NPDES_ID#	Character	9	N
2	CONTACT	Character	30	N
** Total **			39	

Structure for database: C:\DBASE\WDSD_ADD.DBF
Number of data records: 42

Field	Field Name	Type	Width	Index
1	ORG NAME	Character	34	Y
2	DEPT	Character	34	Y
3	CONTACT	Character	30	N
4	ADDRESS	Character	31	N
5	CITY	Character	15	Y
6	STATE	Character	2	N
7	ZIP	Character	5	Y
8	PHONE	Character	10	N
** Total **			161	

```
Structure for database: C:\DBASE\ISWS.DBF
Number of data records:      50
Field  Field Name  Type       Width      Index
    1  ORG NAME    Character     25          Y
    2  ADDRESS      Character    30          N
    3  CITY        Character     15          N
    4  STATE       Character      2          N
    5  COUNTY      Character     15          N
    6  ZIP         Character      5          N
    7  PHONE       Character     10          N
    8  CONTACT     Character     25          N
** Total **                     131


Structure for database: C:\DBASE\INHS.DBF
Number of data records:      21
Field  Field Name  Type       Width      Index
    1  ORG NAME    Character     34          Y
    2  DEPT        Character     34          N
    3  ADDRESS      Character    30          N
    4  ADDRESS2     Character    23          N
    5  CITY        Character     15          N
    6  STATE       Character      2          N
    7  ZIP         Character      5          N
    8  PHONE       Character     10          N
    9  CONTACT     Character     30          N
   ** Total **                  183


Structure for database: C:\DBASE\H20_USE.DBF
Number of data records:     396
Field  Field Name  Type       Width      Index
    1  ID          Character      8          Y
    2  ORG NAME    Character     34          Y
    3  ADDRESS      Character    30          N
    4  CITY        Character     15          N
    5  STATE       Character      2          N
    6  ZIP         Character      5          N
    7  CONTACT     Character     30          N
    8  PHONE       Character     10          N
    9  DEPT        Character     32          N
** Total **                    166


Structure for database: C:\DBASE\HWRIC.DBF
Number of data records:      33
Field  Field Name  Type       Width      Index
    1  ORG NAME    Character     34          Y
    2  ADDRESS      Character    31          N
    3  ADDRESS2     Character    30          N
    4  CITY        Character     15          N
    5  STATE       Character      2          N
    6  COUNTY      Character     15          N
    7  ZIP         Character      5          Y
    8  PHONE       Character     10          N
    9  CONTACT     Character     30          Y
   ** Total **                  172
```

Database Design for Location and ID

Info Database Design	SITE_LOC	
Field Name	Width	Type
MAIL ID	8	Character
ID#2	11	Character
County#	2	Character
County Name	12	Character
Legal Location	15	Character
Latitude	10	Numeric
Longitude	11	Numeric
Name of Site	40	Character
Method of determining Location	2	Character
Collection Period		
From	6	Date
To	6	Date
Frequency of Sampling	1	Character
Reason for Sampling	2	Character

Database Design for Raw Data

Info Database Design	RAW DATA	
Field Name	Width	Type
MAIL ID	8	Character
ID#2	11	Character
PNUM	5	Character
PNAME	10	Character
Collection Period		
Beginning Date	6	Date
Ending Date	6	Date
Units of Measurement	8	Character
Analytical Technique	8	Character

Appendix E

Chemical and Biological Water Quality Parameters (alphabetic)

% CLOUD COVER	00032
1,1 DICHLOROPROPANONE-2	72531
1,1, 2-TRICHLORO-l,1,2-TRIFLUOROETHANE	34511
1,1,2-TRICHLORO-1,2,2,-TRIFLUOROETHANE	34511
1,3-DICHLOROPROPENE	34561
1-NAPHTHOL	81697
1-NAPHTHOL	81697
2,4,5-T	39740
2,4,5-T	39740
2,4,5-T (TRICHLOROPHENOXY ACETIC ACID)	88036
2,4-D (DICHLOROPHENOXYACETIC ACID	39730
2,4-DB	38745
3-HYDROXYCARBOFORAN	82584
3-HYDROXYCARBOFURAN	81405
ACENAPHTHENE	34206
ACENAPHTHYLENE	34201
ACIDITY	00437
ALACHLOR	77825
ALACHLOR	77825
ALACHLOR	77825
ALDICARB	39053
ALDICARB	82619
ALDICARB	82619
ALDICARB SULFOLE	82582
ALDICARB SULFONE	82587
ALDICARB SULFONE	82587
ALDICARB SULFOXIDE	82586
ALDICARB SULFOXIDE	82586
ALDICARB SULOXIDE	82586
ALDRIN	39330
AMMONIA NITROGEN	00604
AMPHIBIA AND REPTILES	91000
ANTHRACENE	34221
AQUATIC HUMIC SUBSTANCES	84151
AQUATIC INSECTS	84151
AROCHLOR	88048
AROCHLOR	88048
ATRAZINE	39033
ATRAZINE	39033
ATRAZINE ALRAZINE	39033
B BORON	01022
BAYGON	88054
BAYGON	88054
BENEFIN	39002
BENEFIN	39002
BENTHIC MACROINVERTEBRATES	70900
BENZENE	34030
BENZIDINE	39120
BENZO(A)ANTHRACENE	78342
BENZO(A)PYRENE	78343
BENZO(B)FLUORANTHENE	34230
BENZO(GHI)PERYLENE	34521
BENZO(K)FLUORANTHENE	34711
BHC(S)	39075
BIOCHEMICAL OXYGEN DEMAND (BOD)	00310

BIOCHEMICAL OXYGEN DEMAND 5-DAY BOD TEST	00310
BIRDS	90000
BIS (2-ETHYL-HEXYL) ADIPATE	77903
BIS (2-ETHYL-HEXYL)ADIPATE	77903
BIS (2-ETHYL-HEXYL)PHTHALATE	39100
BIS (2-ETHYLHEXYL) PHTHALATE	39100
BIS (CHLOROMETHYL) ETHER	34268
BIS (CHLOROMETHYL) ETHER	34268
BR- BROMIDE	82298
BROMOBENZENE	81555
BROMOCHLOROACETONITILE	88042
BROMOCHLOROACETONITRILE	88042
BROMOCHLOROMETHANE	77803
BROMODICHLOROMETHANE	32101
BROMOFORM	32104
BROMOMETHANE	46358
BROMOPHENOXYBENZENE	88000
BROMOPHENYL PHENYL ETHER	73284
BUTACHLOR	77860
BUTACHLOR	77860
BUTACHLOR	77860
BUTYL BENZYL PHTHALATE	77940
BUTYLBENZENE(S)	78483
BUTYLBENZYL PHTHALATE	79038
BUTYLBENZYL PHTHALATE	79038
CALCIUM CARBONATE SATURATION	29809
CALCIUM HARDNESS	45634
CAPTAN	39640
CARBARYL	77700
CARBARYL	77700
CARBARYL	77700
CARBOFURAN	81405
CARBOFURAN	81504
CARBOFURAN/BAYGON	81405
CARBOFURAN/BAYGON	81405
CARBON TETRACHLORIDE	32102
CHEMICAL OXYGEN DEMAND (COD)	00146
CHEMICAL OXYGEN DEMAND (COD)	00146
CHLORDANE	39810
CHLORIDE	00940
CHLOROBENZENE	34301
CHLOROETHANE	34311
CHLOROETHOXY METHANE	45619
CHLOROETHYL ETHER	88002
CHLOROETHYLVINYL ETHER	73311
CHLOROFORM	32106
CHLOROISOPROPYL ETHER	88004
CHLOROMETHANE	30201
CHLOROMETHYL BENZENE	77963
CHLOROMETHYLPHENOL	88006
CHLORONAPHTHALENE(S)	38687
CHLOROPHENOL(S)	74015
CHLOROPHENOXY BENZENE	88008
CHLOROPHENYL PHENYL ETHER	73421

CHLOROPHYLL	70953
CHLOROPHYLL-A	70950
CHLOROPHYLL-A	70953
CHLOROPICRIN	77548
CHLOROPICRIN	77584
CHLOROTOLUENE	77970
CHRYSENE	34320
CL CHLORINE (RESIDUAL)	00183
CL- CHLORIDE	00940
CL02 CHLORINE DIOXIDE	50070
CN CYANIDE	00720
C02 CARBON DIOXIDE	00405
COLOR	00079
COLOR	00079
CONDUCTIVITY	00095
CONDUCTIVITY FIELDS	00095
CYANAZINE	81757
CYANAZINE	81757
DALAPON	38432
DALAPON	38432
DDD	81897
DDE	81896
DDT	39358
DI-N-BUTYL PHTHALATE	39110
DI-N-BUTYL PHTHALATE	39110
DI-N-OCTYL PHTHALATE	34596
DI-N-OCTYL PHTHALATE	34596
DIAZINON	39570
DIAZINON	39570
DIBENZO (A,H) ANTHRACENE	77639
DIBROMOACETONITRILE	88040
DIBROMOACETONITRILE	88040
DIBROMOCHLOROMETHANE	32105
DIBROMOCHLOROPROPANE	82625
DIBROMOETHANE	81522
DIBROMOMETHANE	46361
DIBUTYL PHTHALATE	39111
DICAMBA	38443
DICAMBA	38443
DICHLORAN	38446
DICHLOROACETONITRILE	88044
DICHLOROACETONITRILE	88044
DICHLOROBENZENE(S)	81524
DICHLOROBENZIDINE	73250
DICHLOROBRAMOMETHANE	34329
DICHLOROBROMOETHANE	34329
DICHLORODIFLUOROMETHANE	34668
DICHLOROETHANE	81328
DICHLOROETHENE(S)	88010
DICHLOROIODOMETHANE	81575
DICHLOROIODOMETHANE	81575
DICHLOROPHENOL(S)	77981
DICHLOROPRAPANE(S)	81327
DICHLOROPROPANONE	72531

DICHLOROPROPENE	46365
DIELDRIN	39380
DIETHYL PHTHALATE	34336
DIMETHYL PHTHALATE	34341
DIMETHYLPTHNOL(S)	88012
DIMITROPHENOL(S)	73162
DIMITROTOLUENE(S)	81533
DINOSEB	30191
DINOSEB	38191
DIOXIN	46461
DIOXIN	46461
DIPHENYL HYDRAZINE	88014
DIQUAT	78885
DIQUAT	78885
DISS. CHLORIDE	82295
DISS. SILICA	00955
DISS.GAS SUPERSATURATION	01310
DISSOLVED ALUMINUM	01106
DISSOLVED ANTIMONY	01095
DISSOLVED ARSENIC	01000
DISSOLVED BARIUM	01005
DISSOLVED BERYLLIUM	01010
DISSOLVED BISMUTH	01015
DISSOLVED CADMIUM	01025
DISSOLVED CALCIUM	00915
DISSOLVED CESIUM	01115
DISSOLVED CHROMIUM	01030
DISSOLVED COBALT	01035
DISSOLVED COPPER	01040
DISSOLVED GOLD	82344
DISSOLVED IRIDIUM	
DISSOLVED IRON	01046
DISSOLVED LEAD	01049
DISSOLVED LITHIUM	01130
DISSOLVED MAGNESIUM	00925
DISSOLVED MANGANESE	01056
DISSOLVED MERCURY	71890
DISSOLVED MOLYBDENUM	01060
DISSOLVED NICKEL	01065
DISSOLVED ORGANIC HALOGEN	78115
DISSOLVED OSMIUM	
DISSOLVED PALLADIUM	
DISSOLVED PLANTINUM	01172
DISSOLVED POTASSIUM	00935
DISSOLVED RHENIUM	
DISSOLVED RHODIUM	
DISSOLVED RUTHENIUM	82327
DISSOLVED SELENIUM	01145
DISSOLVED SILVER	01075
DISSOLVED SODIUM	00930
DISSOLVED STRONTIUM	01080
DISSOLVED THALLIUM	01057
DISSOLVED THORIUM	82365
DISSOLVED TIN	01100

DISSOLVED TITANIUM	01150
DISSOLVED VANADIUM	01085
DISSOLVED ZINC	01091
DISULFOTON	81888
DISULFOTON	81888
ENDOSULFAN	39388
ENDOSULFAN SULFATE	34351
ENDRIN	61468
ENDRIN ALDEHYDE	34366
EPTC	81894
EPTC	81894
ETHENYL BENZENE (STYRENE)	78009
ETHYLBENZENE	34371
ETHYLHEXYL PHTHALATE	88016
EXACHLOROBUTADIENE	34391
F- FLUORIDE	00951
FISH	34774
FLOATABLES	45613
FLOURIDE	00951
FLOW	00060
FLOW OR DISCHARGE	00060
FLUORANTHENE	34376
FLUORENE	34381
GEOSMIN	88018
GIYPHOSPHATE	79743
GLYPHOSPHATE	79743
GROSS RADIOACTIVITY	82066
H+ PH VALUE	00400
HEPTACHLOR	61471
HEPTACHLOR EPOXIDE	39420
HEXACHLOROBENZENE	39700
HEXACHLOROCYCLOPENTADIENE	34386
HEXACHLOROETHANE	34396
HEXAVALENT CHROMIUM	78247
I IODINE	00108
I- IODIDE	71865
INDENO(l,2,3-CD) PYRENE	34403
ISOBUTYLMETHOXY PYRAZINE	88020
ISOPHORONE	34408
ISOPROPYL METHOXY PYRAZINE	88022
ISOPROP YLBENZENE	77223
ISOPROPYLTOLUENCE	88024
LANGELIER INDEX	71814
LANGELIER INDEX	71814
LINDANE (G-BHC)	39782
LINDANE (G-BHC)	81720
MACROINVERTEBRATE S	84086
MACROPHYTES	70944
MAGNEMIUM HARDNESS	45635
MALATHION	39530
MALATHION	39530
MAMMALS	84169
METHANE	76994
METHANE	76994
METHIOCARB	30282

METHIOCARB	30282
METHIOCARB	30282
METHOMYL	39051
METHOMYL	39051
METHOMYL	39051
METHOXYCHLOR	61486
METHOXYCHLOR	61486
METHYL PARATHION	39600
METHYL PARATHION	39600
METHYLDINITROPHENOL(S)	88026
METHYLENE CHLORIDE	77596
METHYLENE CHLORIDE	77596
METHYLISOBORNEOL	88028
METOLACHLOR	39356
METOLACHLOR	39356
METRIBUZAN	81408
METRIBUZAN	81408
MIREX	39755
MITRALIN	88052
MUSSELS	92000
N NITROGEN	00600
N NITROGEN	00600
NAPHTHALENE	34696
NAPHTHALENE	34696
NH3 NITROGEN (AMMONIA)	00610
NH3 NITROGEN (AMMONIA)	00610
NITRALIN	88052
NITROBENZENE	34447
NITROGEN (NITRATE-NITRITE)	82458
NITROGEN (NITRATE-NITRITE)	82458
NITROPHENOL(S)	73243
NITROSODI-N-PROPYLAMINE	88030
NITROSODIMETHYLAMINE	88032
NITROSODIPHENYLAMINE	78656
N02 NITROGEN (NITRITE)	00618
N02- NITROGEN (NITRITE)	00618
N03 NITROGEN (NITRATE)	00620
N03- NITROGEN (NITRATE)	00620
NORG NITROGEN (ORGANIC)	82446
NORG NITROGEN (ORGANIC)	82446
NORG NITROGEN, KJELDAHL, TOTAL	82539
NORG NITROGEN, KJELDAHL,TOTAL	82539
0 OXYGEN (DISSOLVED)	00300
0 OXYGEN (DISSOLVED)	00300
03 OZONE (RESIDUAL)	00386
03 OZONE (RESIDUAL)	00386
ODOR	00086
OIL AND GREASE	00153
ORGANIC AND VOLATILE ACIDS	78732
OXAMYL	38865
OXAMYL	38865
OXAMYL	38865
P PHOSPHATE, DISS. ORTHO	00671
P PHOSPHATE, TOTAL	00665
P PHOSPHATE, TOTAL DISS.	00666

P PHOSPHATE, TOTAL ORTHO	70512
P PHOSPHORUS, SUSP. ORGANIC	00676
P PHOSPHORUS, TOTAL ORGANIC	00670
P PHOSPHATE, TOTAL	00665
P PHOSPHATE, TOTAL DISS.	00666
P PHOSPHATE, TOTAL DRTHO.	70512
P PHOSPHORUS, SUSP. ORGANIC	00676
P PHOSPHORUS, TOTAL ORGANIC	00670
PARAQUAT	82416
PARAQUAT	82416
PARATHION	39540
PCB	34671
PCP-1016,1221,1232,:1242,1248,1254,1260	34671
PENTACHLORONITROBENZENE	81316
PENTACHLOROPHENOL	79407
PERIPHYTON	70945
PETACHLOROETHANE	88056
PETACHLOROETHANE	88056
PH	00400
PHENANTHRENE	34461
PHENANTHRENE	34461
PHENOL	32730
PHENOLS	34694
PHENYLBENZAMINE	88034
PHEOPHYTIN-A	32213
PHEOPHYTIN-A	32213
PHORATE	39038
PHORATE	39038
PHYTOPLANKTON	82093
PICLORAM	39720
PICLORAM	39720
PROPACHLOR	30295
PROPACHLOR	30295
PROPACHLOR	30295
PROPANIL	77012
PROPANIL	77012
PROPAZINE	39024
PROPAZINE	39024
PROPYLBENZENE	78764
PROTOZOA	60820
PYRENE	34469
PYRENE	34469
RAINFALL	82553
RESIDUE, FILTERABLE	70300
RESIDUE, NON-FILTERABLE	00530
RESIDUE, TOTAL	00500
RESIDUE, VOLATILE	00505
RYZNER INDEX	88050
RYZNER INDEX	88050
S2 SULFIDE, TOTAL	00745
S2- SULFIDE	00745
SALINITY	00096
SALINITY	00096
SCHESSI DISK	00077
SEDIMENT OXYGEN DEMAND	00390

SEDIMENT OXYGEN DEMAND (SOD)	00390
SETTLEABLE MATTER	50086
SI SILICA	00956
SI SILICA, TOTAL	00956
SILVEX (TRICHLOROPHENOXY PROPIONIC ACID)	39760
SILVEX (TRICHLOROPHENOXY PROPIONIC ACID)	39760
SLUDGE DIGESTER GAS	81007
S032 SULFITE	00740
S032-SULFITE	00740
S04 SULFATE, DISS.	00946
S042 SULFATE, DISS.	00946
S042-SULFATE, TOTAL	00947
SODIUM CHLORIDE	32107
SOLIDS	70304
SOLIDS	70304
STROBANE	38552
STYRENE (ETHENYL BENZENE)	77128
STYRENE (ETHENYL BENZENE)	77128
SURFACTANTS	34790
TANNIN AND LIGNIN	32240
TASTE	01331
TEMPERATURE (AIR)	00021
TEMPERATURE (AIR)	00021
TEMPERATURE (WATER)	00011
TEMPERATURE (WATER)	00011
TEST ON SLUDGES	00165
TETRACHLOROETHANE(S)	81549
TETRACHLOROETHANE(S)	81549
TETRACHLOROETHENE	34475
TETRACHLOROETHENE	34475
TIME OF DAY	02400
TOLUENE	34010
TOLUENE	34010
TOTAL ALKALINITY	00410
TOTAL ALPHA & BATA	80002
TOTAL ALUMINUM	01105
TOTAL ANTIMONY	01097
TOTAL ARSENIC	01002
TOTAL BARIUM	01007
TOTAL BERYLLIUM	01012
TOTAL BISMUTH	01017
TOTAL CADMIUM	01027
TOTAL CALCIUM	00916
TOTAL CESIUM	01117
TOTAL CHROMIUM	01034
TOTAL COBALT	01037
TOTAL COPPER	01042
TOTAL DISSOLVED SOLIDS	70304
TOTAL GAMMA	05513
TOTAL GOLD	71910
TOTAL HARDNESS	00900
TOTAL HARDNESS	00900
TOTAL IRIDIUM	01240

TOTAL IRON	01045
TOTAL LEAD	01051
TOTAL LITHIUM	01132
TOTAL MAGNESIUM	00927
TOTAL MANGANESE	01055
TOTAL MERCURY	71900
TOTAL MOLYBDENUM	01062
TOTAL NICKEL	01067
TOTAL ORGANIC CARBON (TOC)	00680
TOTAL ORGANIC CARBON (TOC)	00680
TOTAL OSMIUM	01241
TOTAL PALLADIUM	01210
TOTAL PLANTINUM	01171
TOTAL POTASSIUM	00937
TOTAL RHENIUM	01242
TOTAL RHODIUM	82067
TOTAL RUTHENIUM	82326
TOTAL SELENIUM	01147
TOTAL SILVER	01077
TOTAL SODIUM	00929
TOTAL SOLU PHOSPHATE	70506
TOTAL STRONTIUM	01082
TOTAL THALLIUM	01059
TOTAL THORIUM	82364
TOTAL TIN	01102
TOTAL TITANIUM	01152
TOTAL VANADIUM	01087
TOTAL ZINC	01092
TOXAPHENE	39400
TOXAPHENE	39400
TRICHLOANISOLE	81872
TRICHLOROACETONITRILE	88046
TRICHLOROACETONITRILE	88046
TRICHLOROBENZENE	82516
TRICHLOROBENZENE(S)	82516
TRICHLOROETHANE(S)	81853
TRICHLOROETHENE	39180
TRICHLOROFLUOROMETHANE	34480
TRICHLOROFLUOROMETHANE	34488
TRICHLOROPHENOL	81848
TRICHLOROPROPANE	81610
TRIFLURALIN	81284
TRIFLURALIN	81284
TRIHALOMETHANE FORMATION	82080
TRIMETHYLBENZENE(S)	78136
TRIVALENT CHROMIUM	80357
TURBIDITY	00070
TURBIDITY	00070
VINYL CHLORIDE	39175
VINYL CHLORIDE	39175
WATERSHED AREA	81024
WEATHER CONDITIONS	47501
WIND DIRECTION	00036
WIND VELOCITY	00036
XYLENE(S)	81551
XYLENE(S)	81551
ZOOPLANKTON	70946