
**SURVEY AND PRELIMINARY EVALUATION OF THE
EXISTING WATER USE DATA COLLECTION
SYSTEMS IN THE GREAT LAKES STATES AND
PROVINCES**

OCTOBER 1985



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*FINAL REPORT OF THE
WATER DATA COLLECTION TASK FORCE*

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OF THE
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IN THE
GREAT LAKES STATES AND PROVINCES**

GREAT LAKES COMMISSION STAFF

October 1985

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PREFACE

No report of this length is complete without recognition of the individuals who contributed to its development. Preparation was directed by the full Great Lakes Commission, but individuals and their respective efforts made it happen.

First, recognition should be given to the appointed members of the Commission's Water Data Collection Task Force. Dan Injerd, Chris Shafer, Richard Bartz, John McSparran and Bill Gast gave continuing guidance to the staff and made significant input to the report at major decision points.

Second, without the respondents in each state who completed the survey questionnaires in detail and gave attention to the Commission's follow-up questions, this report would have been impossible to complete in the limited time available.

The Commission's Natural Resources Management Specialist, James Bernard, was primarily responsible for developing the questionnaire with Task Force input. He prepared the first draft of the text, presented the initial results at the Governors' Water Resources Management Committee meeting in July, developed the textured tables in the final report and prepared extended standard versions of the text in accord with the Task Force's instructions.

When the questionnaires were initially returned, Steve Koster, Environmental

Intern Program Associate at the Great Lakes Commission, reviewed all documents received. He entered primary data into the computer and developed the basic matrices for the initial report to the Council of Great Lakes Governors' Water Resources Management Committee on July 11. Steve's compilation of the information and ability to computer process it allowed the first draft to be much more easily written and produced. During this process, Steve also prepared draft questions for Jim Bernard to use in filling gaps in the data initially received. Steve's portion of this project was supported by an award from the Project Assistance Fund of the CEIP Fund, Inc. of Boston, Massachusetts through its division, EIP/ Great Lakes.

The Task Force and report writing process was intense, requiring multiple contacts with state agency personnel completing the forms and, in some cases, with other state agency personnel. Although the Compact which created the Great Lakes Commission requires that the Executive Director be editor of all publications, the major staff work was accomplished by Steve Koster and James Bernard. Without their continuing commitment to the effort and the states' input, preparation of the report would not have been accomplished.

James Fish
Executive Director

INTRODUCTION

On March 22, 1985, the Great Lakes Commission established its Water Data Collection Task Force. The Task Force purpose was to survey existing water use data collection and assessment systems of the Great Lakes states and provinces. The Task Force operates under Great Lakes Commission Compact authority, Article VI, A, Great Lakes Basin Compact, which directs the Commission to "collect, correlate,

interpret and report on data relating to the water resources and use thereof in the Basin...."

The survey and preliminary evaluation of the existing water use data collection systems in the Great Lakes region are intended to assist the future work of the Water Resources Management Committee, established under the Great Lakes Charter signed in February 1985.

THE TASK FORCE PROCESS

The Great Lakes Commission (March 22, 1985) charged the Water Data Collection Task Force to circulate its survey by May 1, 1985 and to report detailed results of the survey by July 15, 1985. Task Force members were designated by the states of Illinois, Pennsylvania, Michigan, and Ohio (members listed in Appendix D).

The Task Force provided advice to the GLC staff in the development of a survey instrument during a conference call April 19, 1985. The conference call established basic agreement on direction and timetable for the survey and identified potential survey recipients in each state and province. A list of water data questions was evaluated and commentary was solicited on content and clarity.

Following the conference call, the survey instrument was developed in matrix format, requesting concise responses to the questions with the intent of eliciting information in a minimum amount of time. The draft survey was circulated to the Task Force for comment April 24, 1985.

The survey questionnaire was distributed May 1, 1985, following Task Force modification. All survey recipients were requested to return completed surveys to GLC no later than May 17, 1985 to permit staff analysis and preparation of a draft report of the survey results. Although the GLC was aware that several agencies in each jurisdiction would collaborate in preparing the

survey response, respondents were asked to collate their responses onto one survey form prior to return of the data.

GLC received responses from all eight Great Lakes states and both Canadian provinces. Dates of receipt by the GLC appear below:

Illinois	5/23
Indiana	5/22
Michigan	5/21
Minnesota	5/21
New York	5/31
Ohio	5/24
Pennsylvania	6/4
Wisconsin	6/7
Ontario	6/11
Quebec	6/24

A listing of contacts who either coordinated the completion of the survey at the state/provincial level or who actually filled out the forms is included in this report as Appendix II. The original survey instrument is attached as Appendix III.

Depth and detail of the response varied greatly in state and provincial responses. The surveys for each state were screened and summarized into an individual matrix for each state (see Appendices IV-XIII).

Needs for further information and clarification of information provided were noted.

Contacts with respondents to request

clarification and greater depth began June 10. An outline for the contents of the report was developed and fleshing out of the text begun. A draft report was completed July 5 and circulated for review by Task Force members.

The GLC staff was asked to present the findings of the survey at the first meeting of the Water Resources Management Committee (WRMC), July 11, 1985 in Chicago. A 30-minute presentation was prepared for the meeting. Water Resources Management Committee members received copies of the draft survey report in conjunction with the first meeting of that body.

Draft copies of the survey report were distributed to Great Lakes Commission commissioners and advisors July 15, coinciding with a public announcement of the completed study.

Following the initial WRMC meeting, the Task Force members directed GLC staff, in a July 12 conference call, to expand the report significantly. The Task Force directed staff to break out portions of the data found in the matrices to support existing text. Additionally, a brief description of

each state and provincial water data collection program was requested. Task Force members requested expanded discussion of the U.S. Geological Survey's State Water Use Data System program and information on how state programs relate to the USGS. The Task Force requested that innovative programming in water data collection be noted, compatibility of computer storage be assessed, Great Lakes Basin data sources be identified, and potential problem areas be addressed.

Additional information and corrections were solicited in July by GLC staff with the last returns of improved data received in late August.

Staff completed an expanded draft final version of the report in September 1985 for distribution at the second WRMC meeting September 25, 1985.

Review of the draft final was completed by the Task Force October 11, 1985. Distribution of the final report was made at the Great Lakes Commission meeting October 16, 1985 in conjunction with a presentation of major findings by Task Force Chairman, Daniel Injerd of Illinois.

SURVEY OBJECTIVES

The survey objectives were:

- to determine what Great Lakes Basin water withdrawal and return flow data is available in the respective states and provinces;
- to determine the relative accessibility of

available Great Lakes water withdrawal and return flow data in the respective states and provinces; and

- to determine the comparability/compatibility of available Great Lakes water withdrawal and return flow data between the respective states and provinces.

SURVEY COVERAGE

The survey sought to gather information on water use data currently being collected by the Great Lakes states and provinces, but did not seek to generate a data base of water use statistics. The questions

emphasized data collection, storage and reported data. The survey also included questions on the accuracy of data collected and processes used to verify and validate the data.

The survey focused on water data, describing withdrawals from groundwater and surface water sources within the Great Lakes Basin and return flows to basin waters. Consumptive use data, determined by total withdrawal minus return flow, was solicited.

Five categories of water use data were surveyed:

- public water supply;
- rural water use;
- irrigated agriculture water use;
- self-supplied industrial water use; and
- water use in thermoelectric and hydroelectric power production.

Definitions of water use and supply terms used in the survey were included in the survey package to ensure that the data recipients provided were consistent within the five categories. A U.S. Geological Survey graphic illustration of water withdrawal, usage and return flow was also attached to guide the respondents.

States and provinces were further asked whether specific data for the Great Lakes Basin was available for each water use category (vs: state-wide/province data only).

The survey instrument and the accompanying glossary and graphic are included in this report as Appendix III.

OVERALL FINDINGS OF THE SURVEY

Overall, the survey responses suggest that Great Lakes states and provinces collect some water use data that can be readily compiled to better manage the resource on a regional basis. However, water data collection in several use categories is uneven and upgrading would appear to be necessary before the data could further serve regional needs. One category of water use data is largely not considered at all or is only estimated.

Public Supply Water Use

The category of water use data most extensively collected by Great Lakes states and provinces is public supply water use. All states and provinces collect or have the capability of collecting public supply water withdrawals reported on at least an annual basis. All jurisdictions can identify water sources for public supply by type. All states have a metering requirement or a mandatory data reporting requirement for public supply

water. Four states and one province also measure return flows.

The historical data base on public supply water use is variable, ranging from zero to forty years. The minimum reporting quantity is also variable based on population, numbers of connections, or specific units of measurement.

Possible problem areas to be resolved include a lack of separate Great Lakes data in some cases. Data on return flows range from not measured to estimated or measured. Data are stored at various governmental levels with the county level as the lowest common denominator.

Public supply water use reporting is mandatory except in Ontario, Quebec, and Illinois areas outside the Great Lakes Basin regulated by Illinois EPA.

Access to data is obtainable in hard copy at the minimum, but is often stored on disk or tape. U.S. Geological Survey has access to much of the existing data from the states.

Table I follows below that partially breaks out the survey data on public supply

water use in the Great Lakes states.

TABLE I — PUBLIC SUPPLY WATER USE

<i>State/ Province</i>	<i>Data Collected</i>			<i>Accuracy of Collection</i>		
	<i>Withdrawal</i>	<i>Return Flow</i>	<i>Consumptive Use</i>	<i>Metering Required</i>	<i>Mandatory Collection</i>	<i>Voluntary</i>
Illinois	Yes	No	Yes	Yes (Lake Michigan only)	Yes	
Indiana	Yes	Estimated percentage				Yes
Michigan	Yes			Yes		
Minnesota	Yes	Yes	Yes	Yes	Yes (1966)	Yes (1947)
New York	Yes					
Ohio	Yes	Yes	No	Yes (Supply)	Yes (Discharge)	
Pennsylvania	Yes	Yes	Estimated (not stored)	Yes (partial)	Yes (Jan. 1986)	
Wisconsin	Yes			Yes	Yes	
Ontario	Major users (over 50,000 liters/day withdrawal) are under permit, but only in cases of potential interference is data collected and verified from required user permits.					
Quebec	Yes	Yes				Yes

Rural Water Use

Rural water use data is virtually not collected by the Great Lakes states and provinces. Rural water use, defined as water for self-supplied domestic use, drinking water for livestock and other uses, is estimated by several states. Indiana requires rural water use data from those users with the *capability* to withdraw more than 100,000 gallons per day.

Estimated water use figures are the norm for rural water use. Pennsylvania, for

example, assumes 50 gallons per capita use for the rural sector and keeps livestock water use data separate in the State's accounting system.

Rural water use represents a significant gap in the water use data collection activities of the states and provinces. However, estimated rural water use figures imply that the category is the least critical in terms of overall water use in the Great Lakes Basin. Table II follows below that partially breaks out the survey data on rural water use in the Great Lakes states.

TABLE II — RURAL WATER USE

State/ Province	Data Collected			Accuracy of Collection		
	Withdrawal	Return Flow	Consumptive Use	Metering Required	Mandatory Collection	Voluntary
Illinois	County level Estimate					Estimate
Indiana	Yes	No	No		Yes	
Michigan						
Minnesota	Yes (USGS Estim)	Yes	Yes (USGS Estim)			
New York						
Ohio	Yes (USGS Estim)		No			Estimate
Pennsylvania	Yes (Estim)	Yes (Estim)	Yes (Estim)			
Wisconsin						
Ontario						
Quebec						

Irrigated Agriculture Water Use

Irrigated agriculture water use data is collected by most of the Great Lakes states, excepting Illinois and Ohio, who estimate the data. The collecting states all measure withdrawals of water for irrigation purposes. Minnesota collects return flow figures from irrigated agriculture and has developed consumptive use figures in the category. Simi-

larly, Pennsylvania estimates return flow figures and has subsequently developed estimated consumptive use figures. Only three states have mandatory collection and/or metered requirements in their data reports.

Neither of the provinces regularly collects irrigated agriculture water use data.

Table III follows below that partially breaks out the survey data on irrigated agriculture water use in the Great Lakes states.

TABLE III — IRRIGATED AGRICULTURE WATER USE

<i>State/Province</i>	<i>Data Collected</i>			<i>Accuracy of Collection</i>		
	<i>Withdrawal</i>	<i>Return Flow</i>	<i>Consumptive Use</i>	<i>Metering Required</i>	<i>Mandatory Collection</i>	<i>Voluntary</i>
Illinois	County level estimate					
Indiana	Yes	No	No		Yes	
Michigan	For survey years					Yes
Minnesota	Yes	Yes	Yes	Yes	Yes (1966)	Yes (1947)
New York	Yes					
Ohio	Yes (Estim)					
Pennsylvania	Yes	Yes (Estim)	Yes (Estim)			Yes
Wisconsin	Yes		Yes	Yes		
Ontario	Major users (over 50,000 liters/day withdrawal) are under permit, but only in cases of potential interference is data collected and verified from required user permits.					
Quebec						

Self-Supplied Industrial Water Use

All the states except Michigan and the province of Ontario collect industrial water use data. Indiana, Minnesota and Wisconsin have mandatory collection and/or metering requirements for industrial water. Ohio requires metering for return flow from larger dischargers of industrial water. All collecting jurisdictions measure withdrawals of water for industrial use. Minnesota, Ohio and Quebec measure withdrawals and return flows for this water use category.

Pennsylvania obtains withdrawal in-

formation from surveys, then estimates return flows and consumptive use for self-supplied industrial water use. Of 16,000 industrial users surveyed most recently, 11,000 forms were returned. Pennsylvania has screened out about 4,000 self-supplied industrial water users to provide their data base. The surveys asked for return flow and consumptive use data from the 1983 water year which was collected in 1984.

Table IV follows below that partially breaks out the survey data on self-supplied industrial water use in the Great Lakes states.

TABLE IV -- SELF-SUPPLIED INDUSTRIAL WATER USE

<i>State/Province</i>	<i>Data Collected</i>			<i>Accuracy of Collection</i>		
	<i>Withdrawal</i>	<i>Return Flow</i>	<i>Consumptive Use</i>	<i>Metering Required</i>	<i>Mandatory Collection</i>	<i>Voluntary</i>
Illinois	Yes				Yes (est. diversion from L. Michigan)	Yes
Indiana	Yes	Estimated percentage	No		Yes	
Michigan						
Minnesota	Yes	Yes	Yes	Yes	Yes (1959)	Yes (1947)
New York	Yes			Yes		
Ohio	Yes	Yes	No	Yes (larger discharges)		Yes
Pennsylvania	Yes	Yes	Yes	No		Yes
Wisconsin	Yes			Yes	Yes	
Ontario	Major users (over 50,000 liters/day withdrawal) are under permit, but only in cases of potential interference is data collected and verified from required user permits.					
Quebec	Yes	Yes				Yes

Thermoelectric/ Hydroelectric Power Production Water Use

All states except Wisconsin and Ohio and the province of Ontario collect power production water use data. Wisconsin and Ohio power production water use figures are prepared by the U.S. Geological Survey. Ontario Hydro has a permit system in place with the capability to collect data, but no permanent data base of power production water use. All jurisdictions that collect power production water use data focus on

withdrawals, with Minnesota, Pennsylvania, and Quebec collecting return flow data as well. Indiana, Minnesota, and Quebec have mandatory collection programs; New York requires metering for this water use category.

Table V follows below that partially breaks out the survey data on thermoelectric/hydroelectric power production water use in the Great Lakes states.

TABLE V — THERMOELECTRIC/HYDROELECTRIC POWER PRODUCTION WATER USE

State/ Province	Data Collected			Accuracy of Collection		
	Withdrawal	Return Flow	Consumptive Use	Metering Required	Mandatory Collection	Voluntary
Illinois	Yes				(Lake Michigan only)	Yes
Indiana	Yes	Est. Percent	No			
	(Hydroelectric not covered)					
Michigan	For survey years					Yes
	(Hydroelectric not covered)					
Minnesota	Yes	Yes	Yes		Yes (1959)	Yes (1947)
New York	Yes			Yes		
Ohio	Yes		No			
Pennsylvania	Yes	Yes	Yes			
	(Thermoelectric only)					
Wisconsin						
Ontario	Major users (over 50,000 liters/day withdrawal) are under permit, but only in cases of potential interference is data collected and verified from required user permits.					
Quebec	Yes	Yes				Yes

Great Lakes Specific Data Collection and Level of Data Availability

In attempting to assess the ability of the states and provinces to readily aggregate or disaggregate data for reporting purposes, the survey asked if the water use data collected was specific to the Great Lakes Basin and at what level the data was available.

All the states and provinces collect water use data specific to the Great Lakes with the exception of New York and Quebec. Quebec does not collect Great Lakes water data due to its location down-

stream from Lake Ontario.

All the states and provinces have water data available for the county level and all but New York have data available for the sub-basin and state levels. The New York State Department of Environmental Conservation is seeking to develop sub-state water resources management strategies for six sub-state regions by March 31, 1986.

Table VI below displays the information discussed above.

TABLE VI — GREAT LAKES SPECIFIC WATER DATA CAPABILITY/LEVEL OF DATA AVAILABLE

<i>State/ Province</i>	<i>Great Lakes Data Available</i>	<i>Level of Data Available</i>		
		<i>County</i>	<i>Sub-basin</i>	<i>State</i>
Illinois	Yes (IDOT-DWR and ISWS have GL data)	Yes (IEPA) (township data also available)	Yes (USGS cat. units)	Yes (IEPA)
Indiana	Yes	Yes	Yes	Yes
Michigan	Yes	Yes	Yes	Yes
Minnesota	Yes	Yes (also township, range, section)	Yes	Yes
New York	No	Yes		
Ohio	Yes	Yes	Yes	Yes
Pennsylvania	Yes	Yes	Yes	Yes
Wisconsin	Yes	Yes	Yes	Yes
Ontario	Yes	Yes	Yes	Yes
Quebec	Yes	Yes	Yes	

Computer Data Base Capabilities and Compatibilities

The survey sought to preliminarily determine the computer data base capabilities of the states and provinces as well as the degree of compatibility available through existing equipment or that expected to be on line in the near future. Overall, the existing and expected hardware can be used to access a central clearinghouse and perform in-house data base management.

All the states store data on disks with five additionally storing data on tape as well. Both provinces store data on tape and not disks.

A wide variety of software is used including USGS derived or applicable systems in Minnesota, Michigan and Ohio. Pennsylvania has developed and designed a Cobol system with funding from USGS. The system includes data elements USGS wanted for the National Water Use program.

Pennsylvania is in the process of de-

veloping an automated interface with the State Water Use Data System (SWUDS) housed in the USGS district office through IBM AT equipment by the end of fiscal year 1986. The IBM AT would be used for networking and maintaining data on the Pennsylvania system, and for downloading or uploading data to Prime. Prime would function as a "switchboard" in this configuration.

Eight of the states and provinces use IBM hardware of several different types. Illinois and Minnesota use the USGS Prime systems. Pennsylvania and Ohio are able to interface with USGS Prime data housed by USGS.

Table VII describing the computer hardware used by the states and provinces, their method of storage, and the software used, is displayed on the following page.

TABLE VII — COMPUTER DATA BASE CAPABILITIES AND COMPATIBILITIES

<i>State/ Province</i>	<i>Hardware</i>	<i>Storage</i>		<i>Software</i>	
		<i>Disk</i>	<i>Tape</i>		
Illinois	IDOT-DWR	Wang Word Processor currently; IBM AT (1986)	Yes		Symphony (1986)
	ISWS	Cyber 175 NOS 1, Vax 11/ 750 Unix, Altos 586-40 Xenix, GSI CAT-8 phototype-setter, Prime 750 ARC/ INFO, Vax 11/ 750 VMS/ Eunice	Yes	Yes	Xenix and Unix utilities, ICE, Fortran, Cyber utilities
	IEPA	New state mainframe in design phase	Yes	Yes	In design phase
Indiana		IBM 3081 Mainframe IBM 3330 Disk Packs-OSVS	Yes		Statistical Analysis System
Michigan		IBM 370 Series	Yes	Yes	USGS System 2000 NWUDS (WATSTORE)
Minnesota		Prime 850 using INFO relational DBMS, IBM PC XT	Yes	Yes	INFO PC (Henco) INFO Prime Computer (Henco)
New York		IBM PC	Yes		Consultant-developed access program for PC
Ohio		USGS Prime 750 PRIMOS system; OEPA-IBM 370	Yes	Yes	OEPA developed systems for public and industrial discharge; USGS SWUDS and NWUDS
Pennsylvania		Burroughs B-7900 Mark 3.4; IBM AT	Yes		Cobol
Wisconsin		Amdahl MVSXA	Yes		3081D, Fortran (VS), Cobol, PL1 supported Panvolet, ASM2, ACS2 security, Synchsort SPF/ TSO
Ontario		IBM 3083		Yes (master file)	JCL-Cobol
Quebec		To be documented		Yes	To be documented

Minimum Levels Required for Reporting Water Use

The survey also sought to determine if the states and provinces were recording data on water withdrawals in excess of 100,000 gallons (380,000 liters) per day average in any 30-day period, the Charter mandated minimum level for data collection. The survey also asked what trigger level requirements (minimum quantity) are in use by the states and provinces.

Public supply water use was the category where the best collection of individual large water users is taking place. All the states except Michigan collect data from large water users. Wisconsin collects data from all users but does not delineate large users. Neither province collects public supply large user data.

All other categories of water use show

uneven large users collection capabilities. Only Indiana and Minnesota have the ability to collect data for all categories. Ohio and Pennsylvania collect large user data for all categories except rural water use.

Trigger levels vary greatly or do not exist. For the best defined category, public supply water use, trigger levels are variously set by numbers of connections, population served, usage greater than 10,000 gals/day, capability of 100,000 gals/day usage, or cover all usage. Illinois, Pennsylvania, and Wisconsin require all public supply water users to report.

Tables VIII and IX below describe the survey results for large water user collection and trigger levels for water use reporting.

TABLE VIII — COLLECTION OF INDIVIDUAL WATER USERS OVER 100,000 GALLONS PER DAY

<i>State/ Province</i>	<i>Public Supply Water Use</i>	<i>Rural Water Use</i>	<i>Irrigation Water Use</i>	<i>Self-Supplied Industrial Water Use</i>	<i>Power Production Water Use</i>
Illinois	Yes			Yes	
Indiana	Yes	Yes	Yes	Yes	Yes
Michigan	No		No		No
Minnesota	>10,000 GPD or >1 million gals/year (e.g., an irrigator under MNDNR permit is required to report even if the user does not appropriate 1 million gals every year)				
New York	Yes		Est. Values	Est. Values	Yes
Ohio	Yes	No	No	Yes	No
Pennsylvania	Yes	No	Yes	Yes	Yes
Wisconsin	No		No		
Ontario	Permits for users of 50,000 liters/day (10,000 Imperial Gallons). Trigger is the potential for interference with other user or public interests in water.				
Quebec					Yes

TABLE IX — TRIGGER LEVELS FOR REPORTING WATER USE

<i>State/ Province</i>	<i>Public Supply Water Use</i>	<i>Rural Water Use</i>	<i>Irrigation Water Use</i>	<i>Self-Supplied Industrial Water Use</i>	<i>Power Production Water Use</i>
Illinois	Zero, all diverters must report (Lake Michigan only)			Zero, all diverters must report (Lake Michigan only)	
Indiana	— Capability of withdrawing 100,000 GPD —				
Michigan	None		None		None
Minnesota	>10,000 GPD or >1 million gals/year (e.g., an irrigator under MNDNR permit is required to report even if the user does not appropriate 1 million gals every year)				
New York	All water districts over 26 connections				
Ohio	Population of 10,000 users				
Pennsylvania	No minimum; All users report		No minimum; All users report	No minimum; All users report	No minimum; All users report
Wisconsin	All use reported		Combines 70 GPM for all wells on one property		
Ontario	Permits for users of 50,000 liters/day (10,000 Imperial Gallons). Trigger is the potential for interference with other user or public interests in water.				
Quebec	— no trigger levels —				

More detailed information from the survey responses is available in matrix form as Appendices IV - XIII.

STATE/PROVINCIAL WATER DATA COLLECTION SYSTEMS OPERATION

Illinois

Water data collection in Illinois involves a three-agency effort by Illinois Department of Transportation, Division of Water Resources (IDOT-DWR), Illinois State Water Survey (ISWS) and Illinois Environmental Protection Agency (IEPA).

IDOT-DWR requires all primary diversers of Lake Michigan waters to report monthly as well as yearly. All other permittees are required to report yearly. Reporting is required as a condition of receiving a permit. DWR also maintains a comprehensive data system for northeast Illinois as part of the division's responsibility to measure and compute Illinois' water diversion as allowed under U.S. Supreme Court decree. In addition to domestic pumpage, information on rainfall, streamflow, direct diversion, and STP flows are recorded and stored. The information is stored on the University of Illinois' (Chicago Circle campus) mainframe computer.

ISWS operates by circulating annual computer-generated questionnaires unique to each public water supply and self-supplied industry. Questionnaires are mailed in January with a follow-up mailing about six weeks later, followed by telephone calls to those with outstanding forms after ten to twelve weeks (mid-March). Each questionnaire is checked in, checked against historic data, coded and the data entered to file systems.

IEPA requires public water suppliers to submit monthly reports, including data on water pumped. Although required, not all public water supplies complete or provide accurate data.

The latest information on water use in Illinois is currently in press. Produced in cooperation with the U.S. Geological Survey, *Water Withdrawals in Illinois, 1984* details water use for public supplies, self-supplied industrial, rural water use, and water use in fish and wildlife management areas, broken down by county, district, and other categories.

According to the ISWS report, water withdrawals in Illinois during 1984 totaled 36,831.7 million gallons per day (mgd), of which groundwater provided 1,098.8 mgd and surface water sources supplied 35,732.8 mgd. The largest water uses category is electric power production, covering 92% of total water use.

Indiana

Every water user in Indiana who has a "significant water withdrawal" facility is required by law to register that facility with the Indiana Department of Natural Resources. A significant water withdrawal facility is defined by statute as the water withdrawal facilities of a user that, in the aggregate from all sources and by all methods, has the capability of withdrawing more than 100,000 gallons daily of groundwater, surface water or ground and surface water combined. The owner of each registered significant water withdrawal facility must report the amount of water withdrawn by the facility within three months of the end of each calendar year.

Guidelines for acceptable methods of measuring the amount of water withdrawn by a significant water withdrawal facility include any of the following methodologies: 1) installation of rate of flow metering devices; 2) time of pump operation; 3) past performance comparison; 4) NPDES data use; 5) direct measurement by a gaging system; 6) installation of quantity metering devices; or 7) other methods showing a definite relationship relating to the amount of water withdrawn.

The Indiana program will begin in full at the end of calendar year 1985. The data obtained will be stored on computer along with prior data based on surveys and estimates.

Under the 1983 Water Resource Management Act, newly constructed facilities must register within three months of completion.

More than 9,000 registration forms were mailed in 1984 by the Division of Water to significant water withdrawal facilities. Of 2,347 registration forms received, by July 1985, approximately 2,013 were reviewed with total withdrawal capabilities of 1,642.53 mgd of groundwater and 12,010.15 mgd of surface water.

Registrants were from all water use categories: irrigation 49.38%; public supply 26.88%; industrial 18.98%; energy production 3.13%; rural .5%; and miscellaneous 1.1%. The largest ten registered users were represented by seven power production water users and three industrial water users.

Michigan

Michigan Department of Natural Resources (MDNR) collects water use data on a five- to ten-year basis through voluntary surveys administered under the U.S. Geological Survey-MDNR National Water Use Information Program. To date, statewide surveys have been completed for irrigated agriculture, public supply, and thermoelectric power water use. Public supply data are compiled from Michigan Department of Public Health records. U.S. census data are used to estimate industrial water use, although a statewide survey may be undertaken in the next several years.

Funding for the cooperative water use program in Michigan is the lowest of the eight Great Lakes states. As a result, the program operates at a minimum level. An example of the program's effort is the recently released report *Ground-Water Data for Michigan 1984* (USGS Open-File Report 85-420) which covers data on the yield of wells, pumpage, quality of water, and trends of groundwater levels for the past five years. Produced with MDNR, the report makes available, through 1984, records of water levels and related data for the principal aquifers of the state.

Through a joint proposal by the

Governor and Attorney General recently accepted by the Michigan legislature, a computerized system to analyze and predict the consequences of Great Lakes' water diversions will be established. The system will be located in MDNR, Division of Land Resource Programs, which administers both the Resource Inventory Program and the Great Lakes Shorelands Program.

The cost of the new computer system, including hardware and trained personnel, was estimated at \$861,500 for its first year. The annual operating budget for the system will be \$494,000.

The Michigan Resource Inventory Program already has computerized land use/land cover information for almost the entire Michigan portion of the Great Lakes shoreline. Point-source effluent discharge data will be entered in the near future. The Great Lakes Shorelands Program has detailed information on high risk erosion areas, coastal wetlands, fish spawning areas and bottomland resources.

The existing information system will be expanded to provide three-dimensional computer graphics of bottom contours from bathymetric data. Detailed near shore/one mile inland digitizing work will be completed, starting with Saginaw Bay, to illustrate how relevant operational models can be used to project the impact of changing water levels on wetlands, fish and wildlife areas, shore contours, and harbor access.

The system will assemble existing information on the Great Lakes from data bases held by the U.S. Army Corps of Engineers, the NOAA Great Lakes Environmental Research Laboratory, and the EPA Large Lakes Laboratory. Existing computer models and corresponding data sets will be acquired and placed on the system to provide an integrated data base as a management tool. LANDSAT and other remote sensing imagery will also be obtained to reflect the dynamic aspect of the Great Lakes. Targeted research efforts will be undertaken to fill data gaps as they are determined.

Minnesota

Minnesota Department of Natural Resources (MNDNR) is charged with managing the appropriation of waters of the state, and requires appropriation permits of all users appropriating more than 10,000 gallons per day or 1 million gallons per year. This permit authority essentially covers all but domestic users. Appropriators are required to report their water use to the MNDNR annually.

Minnesota has developed a State Water Use Data System (SWUDS) based upon the appropriation permit records of the MNDNR. The development of SWUDS was a combined effort of the MNDNR, the State Planning Agency/Land Management Information Center (LMIC), and the U.S. Geological Survey (USGS). Primary funding was provided by USGS as part of the national water use information program.

MNDNR was involved in design, design review, major data checking, and production efforts of establishing the system. LMIC was involved in software and data base development. The MNDNR, Division of Waters will update and manage the data base as part of its water appropriation program management responsibilities.

The SWUDS system is intended to enable MNDNR, Division of Waters staff to more easily review water appropriation activity, summarize stress on a particular resource or area, and access information relevant to specific permit evaluations. In addition, the annual reported use information is being aggregated by major use type, county and watershed, for the USGS's National Water Data System (NWUDS). The resulting summary use information is intended to also be useful in the water planning activities of MNDNR and other state agencies.

The Minnesota Legislative Commission on Minnesota Resources (LCMR) has funded a two-year \$1.285 million project to develop a program for allocation and management of

Minnesota water resources. The effort will be a joint project of MNDNR, Division of Waters (\$515,000), the University of Minnesota Natural Resources Research Institute (NRRI) (\$445,000), and the Water Resources Research Center (WRRC) (\$325,000). MNDNR describes the effort as "not only necessary for state policies and decisions on how to best allocate and use the water, but also for local water planning and for efforts initiated under the Great Lakes International Charter."

The goal of the project is to develop a water allocation and management plan for Minnesota by:

- assessing water availability and uses and identifying areas with water shortages or excesses;
- determining the economic values of water to the industrial sectors and state economy;
- determining the environmental/social values of water;
- evaluating alternative allocation strategies and investment decisions;
- recommending changes in policy directives, legislation and management actions; and
- developing analytical tools for planning, policy development and management evaluation.

Activities of the project will be the subdivision of the state into 39 watersheds, the assessment of each watershed's physical characteristics, the quantification of available water resources, the identification of present and projected water uses, the comparison of water supplies and uses, the valuation of water, and the recommendations of water allocation strategies.

New York

Water use data currently collected in New York is obtained from a variety of secondary sources with varying degrees of accuracy and completeness. Where data have appeared inaccurate or were missing, the New York State Department of Health (NYSDOH) (public supply) and the New York State Department of Environmental Conservation (NYDEC) (irrigated agriculture, self-supplied industrial) provided appropriate analyses to derive or estimate water use rates. In evaluating their water use data collection activities, New York found that "no existing data set was considered totally reliable, as the data reported and collected varies by user throughout the state, thus introducing a degree of subjectivity."

NYDEC is seeking to develop sub-state water resources management strategies for six sub-state regions by March 31, 1986. Each sub-state strategy will analyze the present and future (to the year 2000) demographic, natural resource, economic development, water quality, and conservation requirements of public and private water supply systems and develop regional management strategies to meet the water resource requirements of residential, agricultural, industrial, and commercial users as well as assure the highest possible quality and quantity of these resources.

The strategies are intended to analyze the efficiency and capacity of existing supply sources and facilities and will contain recommendations for appropriate modification, restoration, interconnection, and expansion or development of new sources or facilities. Each strategy will also contain recommendations regarding implementation by the NYDEC, NYSDOH, and other appropriate state agencies, local governments, special districts, and water supply purveyors.

Large public water supply systems serving more than 5,000 people will be analyzed and evaluated, including the efficiency and capacity of existing water supply sources and facilities, deficiencies and recommendations for appropriate modification, and expansion or development of new sources and

facilities as needed to meet present and projected water demands of the system up to the year 2000. A water conservation program will also be considered.

A generic management program will be developed for small public water supply systems serving less than 5,000 people.

An inventory of large self-suppliers for industrial, commercial and institutional uses withdrawing more than 20,000 gallons a day from surface and/or groundwater sources will be prepared, analyzing present water demands and future trends in water uses by categories. The water use data will be summarized by use categories and presented by county and sub-region, identifying conflicts, present or potential, with other uses.

Historical trends in agricultural water use will be reviewed at the sub-state regional level, with future trends and possible conflicts identified.

Regional water resources issues will be identified and discussed in developing regional water resource management strategies. The strategies will assess the need for data collection and regulation as part of the state water resources management program.

Ohio

Since the 1950s, the Ohio Department of Natural Resources, Division of Water (ODNR-DW), and the U.S. Geological Survey (USGS) have undertaken statewide water use surveys. Additional data for public water supplies were provided by Ohio Environmental Protection Agency (OEPA). In addition, a series of water development plans that contain water use information for five areas of Ohio have been published by ODNR-DW (1967, 1972, 1976, 1977, 1978).

The reporting from the water use survey efforts of ODNR-DW and USGS is a county-by-county summary of estimates for major offstream water withdrawals in Ohio during a calendar year period. Data were collected by county for four categories of water use in which large withdrawals are made: thermoelectric power production,

manufacturing, public water supply, and rural domestic and livestock use. The four categories "probably account for 95% or more of Ohio's total offshore water withdrawal."

Estimates for consumptive use in Ohio during the 1980 calendar year were "considered too speculative" to be included in the report of that year.

The data were collected for 1980 in conjunction with the activities of the National Water Use Information Program of the USGS and were entered into the National Water Use Data System (NWUDS) of the USGS.

Data on self-supplied manufacturing water use were compiled by the USGS from a return on survey forms mailed out by ODNR-DW to approximately 7,000 firms in Ohio that had reported using more than 1,000 gallons per day in previous surveys or had started or expanded their facilities since 1970. An initial 70% return and subsequent follow-up yielded an estimated 90% coverage of self-supplied manufacturing water use.

Public water supply system water use data in Ohio were accessed through the records of OEPA and were estimated based on average per capita use. A per capita use figure of 50 gallons per day was used for computing rural domestic usage in combination with the number of rural water users computed by subtracting the population served by public water supplies in each county from the total population for that county.

Pennsylvania

In Pennsylvania, water use data collection is undertaken by Pennsylvania Department of Environmental Resources (PDER), State Water Plan Division, with some NPDES discharge information for public supply, self-supplied industrial and thermoelectric power production also collected by PDER, Bureau of Water Quality Management.

Dating to 1966 originally, the PDER Water Resources Data System comprises three subsystems: 1) the Pennsylvania Stream Network System; 2) the Water Resources

Data System (WARDS); and 3) the Municipal Populations System. In 1978, the State Water Plan Division (SWPD) entered into cooperative agreement with the U.S. Geological Survey (USGS) to develop a state component of a proposed National Water Use Data System. PDER-SWPD took the cooperative program as an opportunity to redesign and upgrade WARDS, which included fairly comprehensive water use information pertaining to public water supply, manufacturing, mining, irrigation, livestock, power generation cooling, fishing and boating, self-supplied domestic, and recreational water uses.

The WARDS data had all been computerized by 1974, with data stored in separate computer files for each type of use, and with only limited consistency and marginal compatibility between the data files. Survey of the various types of water users were conducted essentially as separate projects. Data stored for all use types contained identifiers which located the individual users by State Water Plan sub-basins and by county. No discharge information was available from WARDS, and there was no actual distinction made between withdrawals and uses.

The new system was designed with a single file to maintain withdrawal, use, and discharge information for all water use types. Under the new WARDS, information for an individual user is stored in multiple records within the single file, with each record describing characteristics of individual water withdrawal, use, storage and discharge facilities operated by that user.

Currently, survey forms are mailed at various intervals to all user types. Returned questionnaires are edited and data is coded on data entry forms from which it is keyed to tape and then entered in batch mode into the Water Use Data File. The Water Use File is an expanding computer-based random access file which currently contains approximately 55,000 records, each of which describes either a water withdrawal, use, storage or discharge facility or a stream encroachment or obstruction permit, or a surface water allocation permit or a groundwater withdrawal permit, or fishing and boating resources on a specific stream reach.

Wisconsin

The Wisconsin Department of Natural Resources (WDNR), Division of Environmental Standards, collects water use data for public supply, irrigated agriculture, and self-supplied industrial water use. Irrigated agriculture and industrial water use data are held indefinitely; public supply water utilities are required to submit reports monthly, which are held for three years, then dropped.

Public supply water use data covers water source information, storage facility data, pump capacity facts, distribution piping, chemical addition, and treatment information. The 1985 Public Water Supply Data Book, the first edition since 1970, covers nearly 550 municipal water systems. High capacity water suppliers, 70 gallons per minute or more, are required to have approval from WDNR to operate their systems. At present, about 4,000 high capacity wells are permitted in Wisconsin. Average daily pumpage, recorded to the nearest 1,000 gallons per day, reflects the average volume of water pumped from the source daily. The data also includes the year the water supply system was installed and the year a well was drilled.

According to WDNR, the major problem with the computer system used for storing high capacity well and pumpage-water level information is that, while reports by the operators are received on a continuous basis and added weekly to computer storage, printouts with the information are computer generated only approximately every two months, due to cost-effective practices. However, since the printouts can be as much as two months old, it is often difficult to determine if any operator is up to date with reports. This situation affects permit decisions and approvals.

The situation also precludes the use of a groundwater model by WDNR to calculate possible adverse interference caused by a proposed high capacity well on an existing municipal well.

Ontario

In Ontario, water use permits and certificates are centrally registered on approval and renewal. Through the permit mechanism, a central body of information on water users system design, capacities, and authorized rates (per minute) and amounts (per day) is available. The most detailed water use data and operational information could be collected by the ministry of the Environment regional and district offices which have day-to-day responsibility for inspection and supervision of utilities and industry.

The Permit to Take Water data base provides registration information for over 6,000 permits in force. The collection of actual daily or periodic operational data is generally voluntary on the part of water users.

The main purpose of the permit legislation is to control the taking of water to promote its efficient development and beneficial use. The permit mechanism, with its associated General Terms and Conditions, is utilized to prevent water supply interference problems where possible, and to resolve them when this is not the case.

In any area where there is sufficient water to meet established and new uses, an evaluation of the relative importance of the various uses is necessary before the issuance of permits. The taking of water for domestic, farm purposes and fire protection are considered the most important uses, generally followed by takings for municipal water supply, then the taking of water for industrial, commercial and irrigation purposes. The concepts of water management for pollution control, flood control, recreation and biological preservation are also important considerations when dealing with the review of permit applications and the assignment of Special Conditions where required.

Hydrometric water surveys have been undertaken since 1912 in Ontario. Under a 1975 agreement, water quantity surveys by the federal Water Survey of Canada continue on a shared cost basis and in close cooperation with Ontario Hydro, Ontario Ministry of Natural Resources and the Ontario Ministry of the Environment.

Quebec

Water use data for the 1,600 Municipalities of the Province of Quebec is stored in a data bank within the Ministry of the Environment, Direction des Relevés Aquatiques. The structure of the data collection system can also support the data collection requirements for industrial and irrigated agriculture water uses. Water use by pulp and paper industries in Quebec will be available on mag-

netic tape by September 1985. Hydroelectric power production water use data is retained by Hydro Quebec in Montreal.

Quebec Ministry of the Environment will shortly submit to the provincial government a proposal to set up a program of water use data collection. The proposal will also call for the expansion of the present system for processing the data and allow for dissemination of the data to actual and potential water users.

PRELIMINARY DETERMINATION OF APPLICABILITY OF THE USGS STATE WATER USE DATA SYSTEM TO GREAT LAKES WATER USE DATA COLLECTION ACTIVITIES

As part of the GLC Water Data Collection Task Force effort, a brief review of the documentation for the U.S. Geological Survey's State Water Use Data System (SWUDS) was undertaken. From the review, it is evident that implementation of SWUDS in the Great Lakes region would be an excellent way of facilitating water withdrawal and consumptive use data collection, research and information dissemination.

Advantages to using SWUDS include:

- consistency and compatibility of data collected and disseminated among all Great Lakes states and provinces;
- ease of data access as only one system has to be learned to retrieve data for the entire region;
- ability to aggregate and store the most pertinent water data, including the who, what, where, when, why and how of water withdrawal and return flow;
- existence of established software that minimizes labor and costs required to establish a common water use data storage system;
- adaptability of software to run on any system of sufficient size and having FORTRAN 77 aptitude; and
- capability to be modified for unique applications, including data analysis information and/or published reports.

SWUDS appears implementable in the Great Lakes region. The advantages to using SWUDS are that several of the states are using the system, that most natural resource management agencies already have the computer capability to run the system, and no new agencies need be created or financed.

Implementing SWUDS would entail the establishment of a central regional clearinghouse as mandated by the Great Lakes Charter. The clearinghouse would use SWUDS to collect, store and disseminate water use data for all states and provinces.

The main advantage of the centralized arrangement is that all data could be easily accessed. The clearinghouse could be capable of not only disseminating data, but analyzing and interpreting water use data. This concept would facilitate regional decision-making and use of the data for research.

Disadvantages include developing a funding formula for establishing a clearinghouse with adequate staffing levels and appropriate computer equipment. An obvious solution would be to house the clearinghouse in one state or province under a subsidized operating situation. Some inefficiency is inherent as large amounts of data would be necessarily duplicated and an additional step would be added to the data collection process.

States and provinces would retain their own systems of water data collection for areas outside the Great Lakes Basin. Using SWUDS as the regional data management system would not necessarily constitute an endorsement of SWUDS usage by the states.

Disadvantages could also include the difficulty of individual states and provinces in committing additional funds to water resource programming.

The clear disadvantage to the implementation of SWUDS in the Great Lakes Basin is the difficulty of bringing the provinces into the program. Special arrangements would need to be made to allow SWUDS or any other data base management scheme to cover binational water use data appropriately.

SWUDS may also be seen as a limiting approach to water use data management. Innovative programs hybridizing or going beyond SWUDS may need to be considered as well.

It should be noted that SWUDS' current twelve data categories have been set up for a national USGS program. Several categories are more relevant to the Western United States than to the Great Lakes. States in the region may wish to change data categories to reflect the unique data needs of the region.

The Minnesota Experience with SWUDS

The development of SWUDS in Minnesota was a combined effort of the Minnesota Department of Natural Resources (MNDNR), the State Planning Agency/Land Management Information Center (LMIC), and the United States Geological Survey (USGS). Primary funding was provided by USGS as part of the national water use information program.

The SWUDS system is housed on the Prime 850 minicomputer at LMIC. The system uses the INFO relational data base management system developed by Henco, Inc. of Waltham, Massachusetts. The INFO language is relatively easy to learn, and allows users without extensive programming training to retrieve information using simple commands. Menus and special formats have been developed for the most commonly used data entries and retrievals.

The Minnesota SWUDS is made up of six separate data bases, which correspond to the six MNDNR administrative regions. Each of the regional data bases has the same design, data file description, and operating programs. The data base was divided into six separate systems to reduce data retrieval and update costs and to allow more users to access the system simultaneously.

Existing uses for the data include:

- Use component of the USGS/DNR aquifer modeling study in Swift County;
- Use data added to the Minnesota Pollution Control Agency's hazardous waste site contamination study for St. Louis Park; and
- Use component of State Planning Agency watershed-based supply/demand analysis

Possible future data uses include:

- Water use trend analysis;
- Baseline information for use projections and allocation plans; and
- Base data for local water planning.

Each permit is referenced by the MNDNR appropriation permit number and the installation number. Groundwater appropriators are also referenced by the Minnesota Geological Survey's Unique Well Number, which is the primary well identifier used by all of the state's groundwater data systems.

The data base has five main data files describing location, resource type, use type, and volumes of water appropriated and discharged. Three files contain specific information on the permit, and are completed when the permit is first entered onto the system. Two other data files describe annual and monthly appropriations, and are added to the system each year as users file the required reports with MNDNR. Because of the volumes of data generated, MNDNR intends to store only one year of pumpage data on the system at one time. Previous years' information will be stored on tape, so that it can be reloaded onto the system for analysis and tabulation as needed.

For groundwater appropriations an additional file was created to store information on well depth, type, construction, stratigraphy, aquifer name, etc. Due to extensive staff requirements for interpreting available information for inclusion, this "Groundwater Data Base" portion of the system has been filled for only two of the six MNDNR regions.

An obvious conclusion from the description above is that the SWUDS system could be adapted to serve each of the Great Lakes states and the region as a whole.

RECOMMENDATIONS

Overall

Independent of the need to establish a centralized clearinghouse for water use data in the Great Lakes is the problem of inconsistent data coverage from state-to-state and from state-to-province. At the present time, according to the GLC survey, there exists a wide range in the degree of completeness of water use data coverage across the various categories, ranging from poor to excellent, depending on the category and state or province. A necessary first step in the implementation of any water use data system would be to clearly identify the gaps in state and provincial water use data collection using this report in part, and to cooperate in filling the gaps through administrative or legislative adjustments to current practices.

As noted in the report, Great Lakes specific water use data is available, but is not readily accessible at present. Future efforts can be focused on making much more data available in a uniformly accessible manner. The need for coordination of effort is evident and vital to success of the Charter implementation.

The comparability and compatibility of the current data is an area for further work as well. Much of the data cannot be used in a comparative manner without qualification. Compatible data categories may need to be agreed upon by the states and provinces as units of measurement vary greatly.

Innovative programs that have been successful in the states and provinces should be identified and offered to the region as possible options for enhanced water use data collection opportunities.

Data on return flows was lacking for most of the states and provinces for several of the water use categories surveyed. The possibility of obtaining return flow data

through the National Pollutant Discharge Elimination System (NPDES) permit information could be considered. A systematic review of NPDES permits may yield appropriate and accurate information on return flows.

In the area of data analysis and data reporting, the survey touched briefly on consumptive use data. Details of previous or current data manipulation and analysis undertaken in generating consumptive use figures need to be identified and obtained. A key to the consultation process mandated by the Charter is the 100,000 GPD (380,000 liters) per day average in any 30-day period minimum reporting level. In all water use categories except public supply, the states and provinces need to identify and collect individual large water users more effectively.

Computer compatibility questions are important to assess. Extensive information is and will be stored on computer systems. Determining what types of systems can access this data by reading the tape/disk or by direct modem connection is vital. The variety of systems and software now in use need to be assessed further with successful programs highlighted.

Certainly more data currently exists than we have been able to reach through the survey instrument. For example, water intake data from sites on the Great Lakes for water used by power users are generally available through the various state agencies, the Canadian federal agencies and Canadian hydropower entities. The data could be obtained and added to the clearinghouse data base.

In undertaking the survey of state and provincial water data collection, the Great Lakes Commission began the process of identifying needs for further information on water use in the Great Lakes. This should lead to better access to water resources data for natural resources decisionmaking.

Potential Problem Areas

Key topics for further discussion by the members of the Water Resources Management Committee (WRMC) are the allied issues of how water use data is estimated/calculated by the states and provinces and the relative value of absolutely accurate data versus estimated data.

Water use data estimates/calculations need to be discussed to determine differences and commonalities. A unified estimation process may need to be determined and agreed to by the WRMC members.

Estimation of water use data by the states and the USGS has also raised questions of statistical validity and the consequent ability to use the data effectively. Consideration of statistical validity may need to be undertaken as part of a unified estimation process.

A determination of how vital accuracy is to the water data collection process and to the decisionmaking process should be made. Is metered water use data essential to the protection of the Great Lakes resource or is congruent estimated data sufficient for the demands of the Great Lakes Charter? Should the actual percentage of metered data in each water use category be determined? Is estimated water use data sufficient to support the anti-diversion contentions of the Great Lakes states and provinces in legal proceedings? As a practical matter, which water uses will have to be estimated and which can be metered?

Any consultant to the WRMC should develop a set of relevant questions for prompt discussion and resolution by the WRMC.

APPENDIX I

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APPENDIX II

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APPENDIX III
GREAT LAKES
WATER DATA COLLECTION SURVEY

A. VERIFICATION INFORMATION

1. NAME OF PERSON FILLING OUT THE SURVEY _____
 2. AGENCY COMPLETING THE SURVEY (SAME) _____
 3. ADDRESS _____
 4. TELEPHONE # _____ 5. DATE _____
 6. WHAT ARE THE PRIMARY AGENCIES THAT COLLECT WATER DATA IN YOUR STATE/PROVINCE?
 (PLEASE PROVIDE AGENCY NAME, ADDRESS, TELEPHONE #)
- _____
- _____
- _____
- _____

B. DATA DESCRIPTION QUESTIONS (PLEASE REFER TO ATTACHED DEFINITIONS AND ILLUSTRATION FOR CONSISTENT APPLICATION OF TERMS.)

1. HOW OFTEN ARE WATER USERS REQUIRED TO REPORT DATA? (PLEASE PROVIDE COPIES OF A FEW EXAMPLES OF THE REPORTING SHEETS.)

WATER USE DATA COLLECTION CATEGORIES		DAILY	WEEKLY	MONTHLY	QUARTERLY	ANNUALLY	BI-ANNUALLY
Public Supply Water Use	TOTAL AVG.						
Rural Water Use	TOTAL AVG.						
Irrigated Agriculture	TOTAL AVG.						
Self-Supplied Industrial Use	TOTAL AVG.						
Thermoelectric/ Hydro-electric Power Production	TOTAL AVG.						

2. WHAT UNIT(S) OF MEASUREMENT ARE USED IN REPORTING DATA?

WATER USE DATA
COLLECTION CATEGORIES

NOTE UNIT(S) OF MEASUREMENTS USED TO REPORT DATA: IF
MORE THAN ONE, LIST ALL IN RANK ORDER BY FREQUENCY OF USE

Public Supply
Water Use

Rural Water Use

Irrigated Agriculture

Self-Supplied
Industrial Use

Thermoelectric/
Hydro-electric
Power Production

3. WHAT CYCLE DO YOU USE IN REPORTING YOUR DATA? (Circle One)
(IF FISCAL YEAR, STATE BEGINNING AND END DATES OF YEAR)

FISCAL YEAR

CALENDAR YEAR

USGS YEAR

4. HOW LONG HAS WATER DATA BEEN COLLECTED?

HISTORICAL DATA BASE

WATER USE DATA COLLECTION CATEGORIES	HISTORICAL DATA BASE	
	DATA COLLECTION BEGINNING (YEAR)	DATA REPORTED BEGINNING (YEAR)
Public Supply Water Use		
Rural Water Use		
Irrigated Agriculture		
Self-Supplied Industrial Use		
Thermoelectric/ Hydro-electric Power Production		

WATER USE DATA COLLECTION CATEGORIES	5. ARE AVERAGE USE FIGURES RECORDED:			6a. ARE INDIVIDUAL USERS OVER 100,000 GALLONS PER DAY AVERAGE ANY 30-DAY PERIOD RECORDED?	6b. WHAT IS THE TRIGGER LEVEL REQUIREMENT (MINIMUM QUANTITY) FOR REPORTING WATER USE?
	DAILY	MONTHLY	YEARLY		
Public Supply Water Use					
Rural Water Use					
Irrigated Agriculture					
Self-Supplied Industrial Use					
Thermoelectric/ Hydro-electric Power Production					

7. DOES DATA INCLUDE INFORMATION ON:
(PLEASE NOTE SPECIFIC EXCLUSIONS FROM REPORTING REQUIREMENTS)

WATER USE DATA COLLECTION CATEGORIES	WITHDRAWALS	RETURN FLOW	CONSUMPTIVE USE	SPECIFIC EXCLUSION
Public Supply Water Use				
Rural Water Use				
Irrigated Agriculture				
Self-Supplied Industrial Use				
Thermoelectric/ Hydro-electric Power Production				

9. CAN THE LOCATION OF A PARTICULAR WITHDRAWAL AND ITS RETURN FLOW BE IDENTIFIED?

8. CAN THE TYPE OF WATER (SURFACE OR GROUNDWATER) BE IDENTIFIED?

STREAM OR OTHER SOURCE NAME?

ARE LONGITUDE & LATITUDE USED?

IS A MAP COORDINATE SYSTEM USED?

WATER USE DATA COLLECTION CATEGORIES	8. CAN THE TYPE OF WATER (SURFACE OR GROUNDWATER) BE IDENTIFIED?		STREAM OR OTHER SOURCE NAME?		ARE LONGITUDE & LATITUDE USED?		IS A MAP COORDINATE SYSTEM USED?	
	YES	NO	YES	NO	YES	NO	YES	NO
Public Supply Water Use								
Rural Water Use								
Irrigated Agriculture								
Self-Supplied Industrial Use								
Thermoelectric/ Hydro-electric Power Production								

C. DATA SYSTEM COMPONENTS QUESTIONS

1 a. WHAT AGENCY COLLECTS WHICH DATA COLLECTION CATEGORY?

WATER USE DATA COLLECTION CATEGORIES	AGENCY	DIVISION	ADDRESS	INDIVIDUAL TO CONTACT
Public Supply Water Use				
Rural Water Use				
Irrigated Agriculture				
Self-Supplied Industrial Use				
Thermoelectric/ Hydro-electric Power Production				

1 b. IS THE WATER DATA CENTRALLY STORED WITHIN ONE AGENCY?
 IF SO, STATE NAME AND LOCATION OF AGENCIES.

IF NOT CENTRALLY STORED, WHAT SYSTEM OF DATA STORAGE IS USED?

2 a. WHAT EFFORT IS MADE TO ASSESS ACCURACY IN THE DATA COLLECTION?
 (PLEASE NOTE YEAR REQUIREMENT BEGAN)

WATER USE DATA COLLECTION CATEGORIES	METERING REQUIRED	MANDATORY COLLECTION	VOLUNTARY COLLECTION
Public Supply Water Use			
Rural Water Use			
Irrigated Agriculture			
Self-Supplied Industrial Use			
Thermoelectric/ Hydro-electric Power Production			

b. IF OTHER ACCURACY ASSESSMENT PROCEDURES ARE USED, PLEASE DESCRIBE.

3. IS THE DATA COLLECTED PART OF A(N): (Check One)

WATER USE DATA COLLECTION CATEGORIES	ALLOCATION SYSTEM	PERMIT PROGRAM	REGISTRATION SYSTEM	OTHER (PLEASE NAME)
Public Supply Water Use				
Rural Water Use				
Irrigated Agriculture				
Self-Supplied Industrial Use				
Thermoelectric/ Hydro-electric Power Production				

4 a. WHAT CATEGORIES OF THE DATA COLLECTED ARE REPORTED TO U.S. GEOLOGIC SURVEY?

Public Supply
Water Use

Rural Water Use

Irrigated Agriculture

Self-Supplied
Industrial Use

Thermoelectric/
Hydro-electric
Power Production

b. WHAT AGENCY OR AGENCIES REPORT(S) TO U.S.G.S.?
(WATER USE DATA, NOT STREAMFLOW INFORMATION)

AGENCY, DIVISION, ADDRESS, CONTACT PERSON, TELEPHONE:

c. DOES THE AGENCY PUBLISH A REPORT FOR THE U.S.G.S. ON WATER USE? _____
(IF YES, ATTACH A COPY PLEASE)

d. DOES THE STATE/PROVINCE PUBLISH ITS OWN WATER DATA REPORT(S)? _____

5 a. IN WHAT FORM IS THE DATA ACCESSIBLE? (Circle One)

HARD COPY DATA SYSTEM OTHER (describe)

b. IF DATA SYSTEM, WHAT TYPE(S) OF HARDWARE IS BEING USED?
(MAKE, MODEL, OPERATING SYSTEM)

c. WHAT TYPE(S) OF STORAGE IS USED? (DISK, TAPE) _____

d. WHAT TYPE(S) OF SOFTWARE IS BEING USED? _____

6 a. CAN THE DATA BE AGGREGATED/DISAGGREGATED READILY FOR REPORTING PURPOSES?

b. IS WATER USE DATA SPECIFIC TO THE GREAT LAKES BASIN AVAILABLE? _____

c. AT WHAT LEVEL(S) IS THE DATA AVAILABLE? (Circle all applicable)

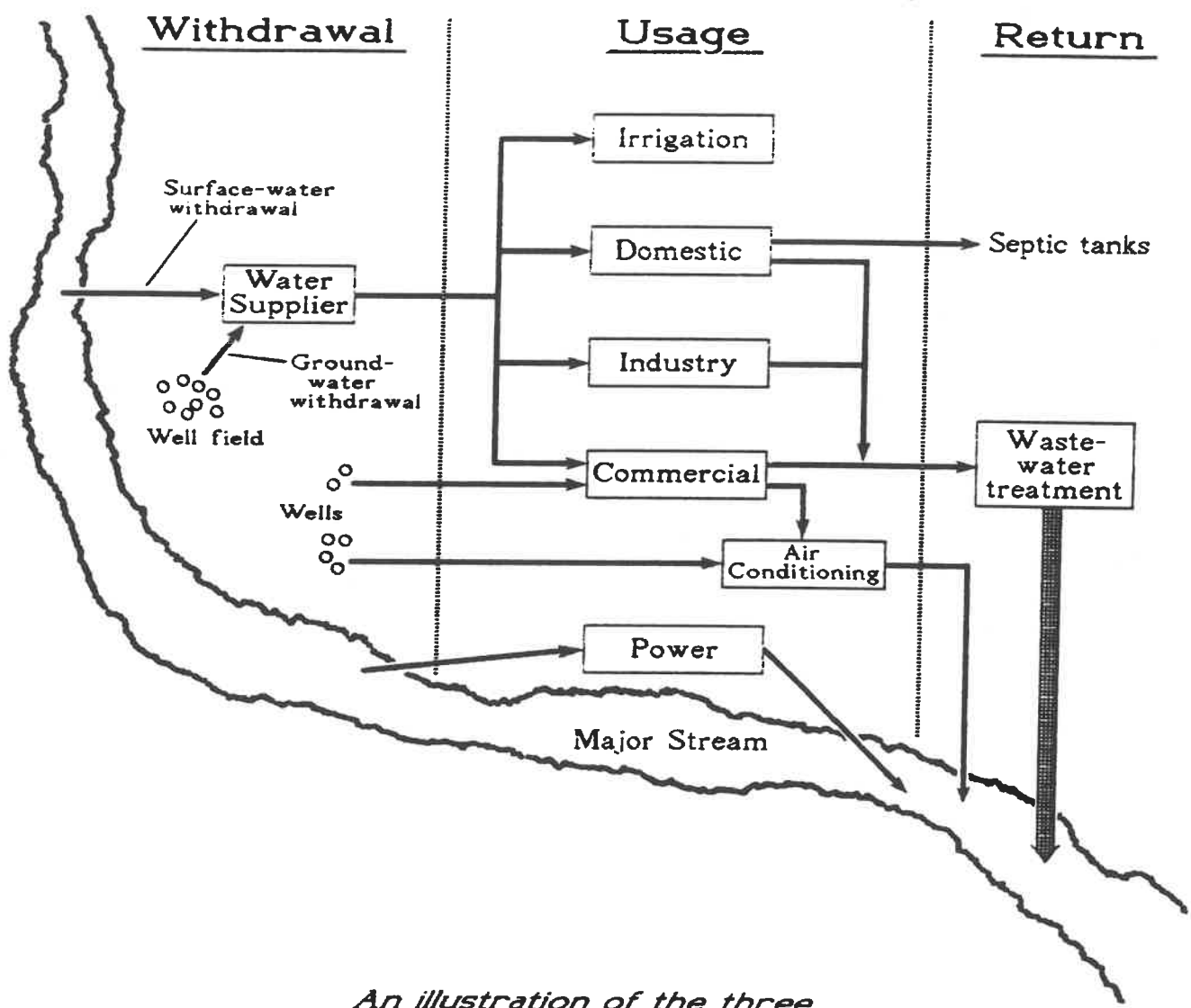
COUNTY SUB-BASIN STATE

D. OPEN-ENDED QUESTIONS

1. EXPLAIN HOW YOUR DATA COLLECTION SYSTEM OPERATES.

2. PLEASE GIVE ANY ADDITIONAL INFORMATION ABOUT YOUR STATE'S DATA SYSTEM(S) WHICH YOU FEEL WOULD BE HELPFUL TO THE GLC IN MEETING ITS SURVEY OBJECTIVES (SEE TRANSMITTAL LETTER)

3. IF AVAILABLE, PLEASE PROVIDE A FLOW CHART SHOWING ARRANGEMENT OF THE PRIMARY WATER DATA COLLECTION AGENCIES IN YOUR STATE/PROVINCE.



An illustration of the three classes of water use data.

- Source: USGS -

DEFINITIONS OF WATER USE & SUPPLY TERMS IN THE SURVEY

WATER SUPPLY TERMS

Public supply is water withdrawn for all uses by public agencies and private water company suppliers, delivered to users that do not supply their own water. Water suppliers provide water for a variety of uses such as domestic, commercial, and industrial.

Self-supplied water is water withdrawn from a surface- or groundwater source by a user and not obtained from a public supply.

WATER USE TERMS

Commercial water use is water used by hotels, motels, restaurants, office buildings, commercial facilities, and institutions, both military and civilian. The water may be obtained from a public supply or be self supplied.

Consumptive use of water is water that is no longer available because it has been evaporated, transpired, incorporated into products or crops, consumed by man or livestock, or otherwise not available to be returned to original flowage.

Domestic water use is the use of water for normal household purposes, such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets and watering lawns and gardens.

Hydroelectric power water use is the use of water to drive turbines and generate electric power.

Industrial water use is restricted for the purposes of the survey to industrial process use such as steel making, chemical production, paper production, mining, and petroleum refining. The water may be obtained from a public supply or be self supplied or a combination of both.

Irrigation water use is the artificial application of self-supplied water on lands to assist in the growing of crops and pastures.

Rural water use is water for self-supplied domestic use, drinking water for livestock and other uses such as dairy sanitation, evaporation from stock ponds and cleaning and waste disposal.

Thermoelectric power is electric power generated using fossil-fuel (coal, oil, or natural gas), geothermal, or nuclear energy.

APPENDIX IV -- ILLINOIS

Data Processing Stage		Water Use				
		Public Supply	Rural	Irrigation	Self-supplied Industrial	Power
Agency		IEPA, IDOT-DNR DENR-SMS	DENR-SMS	DENR-SMS	IDOT-DNR DENR-SMS	DENR-SMS
Collection	1	U,S,F,G	U	U,A	U,Y,F	U,Y
	2	1900	1978	1978	1950	1950
	3	W,D,C	W	W	W	W
	4	M,V	V,E	V,E	M,V,E	V
	5	P,A,S,C,U	C	C	P,A,C	C
Recording (by agency)	1	D,M,Y	Y	Y	D,M,Y	Y
	2	D,M,Y	Y	Y	D,Y	Y
	3	Y	-	-	Y	-
	4	X	-	-	X	-
	5	N,T	X	X	T	N,T
	6	M,L	X	X	M	M
Storage	1	A,M	A	A	A,M	A
	2	Y,O	Y	Y	Y,O	Y
	3	H,D,T,M	H,D,T	H,D,T	H,D,T	H,D,T
	4	E	E	E	E	E
	5	Y	Y	Y	Y	Y
	6	T,C,S,I,U	T,C,S,U	T,C,S,U	T,C,S,I,U	T,C,S,U
Reporting	1	F,C,U	C	C	F,C	C
	2	1905	1978	1951	1960	1950
	3	DENR-SMS	DENR-SMS	DENR-SMS	DENR-SMS	DENR-SMS
	4	S,W,F	S,W	S,W	S,W,F	S,W

CODE KEY:

AGENCY

Agency acronym
(e.g. DENR = Department of Environmental Resources)
X = no significant data collection done

COLLECTION

Category 1: Unit of Measurement
 U = million gallons per day
 M = gallons per minute
 D = gallons per day
 O = gallons per month
 Y = gallons per year
 S = cubic feet per second
 F = cubic feet
 G = gallons
 A = acre inches
 Q = cubic meters per second
 V = various SI units

Category 2: Beginning Collection Date
 V = variable

Category 3: Type of Flow
 W = withdrawal
 D = discharge
 U = consumptive use
 V = variable

Category 4: Degree of Accuracy
 E = estimate
 V = voluntary measurement
 R = required measurement
 M = required metering

Category 5: Collection Program
 P = permit
 A = allocation
 S = survey
 R = registration
 C = cooperative
 U = supervision
 L = legislation
 N = not applicable

RECORDING

Category 1: Reporting Frequency
 D = daily
 M = monthly
 Y = yearly
 I = intermittent
 A = available on request

Category 2: Average Use Recording Frequency
 D = daily
 M = monthly
 Y = yearly
 V = variable

Category 3: Record Users > 100,000 gpd (30-day average)
 Y = yes
 N = no

Category 4: Minimum Reporting Quantity
 A = 10,000 gpd capacity
 B = 100,000 gpd capacity
 C = 1 million gpy
 D = 25 connections
 E = 1,000 gpd withdrawn
 F = 50,000 liters with conflict potential
 P = 10,000 population
 N = not applicable
 X = none

Category 5: Source Description
 N = source name
 T = source type
 X = none

Category 6: User Location
 A = address
 M = map coordinate system
 L = latitude and longitude
 S = survey number
 R = river mile
 X = none

STORAGE

Category 1: Computer Hardware
 A = agency mainframe
 U = USGS mainframe
 M = microcomputer
 X = none

Category 2: Computer Software
 S = SMS/US
 M = RM/US
 A = SAS
 O = other commercial package
 Y = system specific
 X = none

Category 3: Data Access
 H = hard copy
 D = disk
 T = tape
 M = microfiche

Category 4: Data (Dis)aggregation
 E = easy
 D = difficult or not possible

Category 5: Separate Great Lakes Data
 Y = yes
 N = no

Category 6: Division
 T = township/survey section
 C = county
 S = state/province
 B = sub-basin
 I = individual user
 U = USGS hydrologic unit

REPORTING

Category 1: Cycle or Year
 F = fiscal year
 C = calendar year
 U = USGS year
 N = not applicable

Category 2: Beginning Report Date
 N = not applicable

Category 3: Agencies Reporting to USGS
 agency acronym
 X = none

Category 4: Published Report Description
 S = state report
 M = with USGS
 F = for USGS
 X = none

APPENDIX V -- INDIANA

Data Processing Stage		Water Use				
		Public Supply	Rural	Irrigation	Self-supplied Industrial	Power
Agency		SEH, DNR	DNR	DNR	DNR	DNR
Collection	1	N,D	N,D	N,D	M,D	M,D
	2	1980	1980	-	-	-
	3	M,D	W	W	W,D	W,D
	4	R,E	R	R	R,E	R,E
	5	R	R	R	R	R
Recording (by agency)	1	M,Y	-	M,Y	M,Y	M,Y
	2	M,Y	M,Y	M,Y	M,Y	M,Y
	3	Y	Y	Y	Y	Y
	4	B	B	B	B	B
	5	N,T	N,T	N,T	N,T	N,T
	6	N	N	N	N	N
Storage	1	A	A	A	A	A
	2	A	A	A	A	A
	3	D	D	D	D	D
	4	E	E	E	E	E
	5	Y	Y	Y	Y	Y
	6	C,S,B	C,S,B	C,S,B	C,S,B	C,S,B
Reporting	1	C	C	C	C	C
	2	1985	1985	1985	1985	1985
	3	DNR	DNR	DNR	DNR	DNR
	4	S	S	S	S	S

CODE KEY:

AGENCY
 Agency acronym (e.g. DER = Department of Environmental Resources)
 X = no significant data collection done

COLLECTION
 Category 1: Unit of Measurement
 U = million gallons per day
 M = gallons per minute
 D = gallons per day
 O = gallons per month
 Y = gallons per year
 S = cubic feet per second
 F = cubic feet
 G = gallons
 A = acre inches
 Q = cubic meters per second
 V = various SI units
 Category 2: Beginning Collection Date
 V = variable
 Category 3: Type of Flow
 W = withdrawal
 D = discharge
 U = consumptive use
 V = variable
 Category 4: Degree of Accuracy
 E = estimate
 V = voluntary measurement
 R = required measurement
 M = required metering
 Category 5: Collection Program
 P = permit
 A = allocation
 S = survey
 R = registration
 C = cooperative
 U = supervision
 L = legislation
 N = not applicable

RECORDING
 Category 1: Reporting Frequency
 D = daily
 M = monthly
 Y = yearly
 I = intermittent
 A = available on request
 Category 2: Average Use Recording Frequency
 D = daily
 M = monthly
 Y = yearly
 V = variable
 Category 3: Record Users > 100,000 gpd (30-day average)
 Y = yes
 N = no
 Category 4: Minimum Reporting Quantity
 A = 10,000 gpd capacity
 B = 100,000 gpd capacity
 C = 1 million gpy
 D = 26 connections
 E = 1,000 gpd withdrawn
 F = 50,000 liters with conflict potential
 P = 10,000 population
 N = not applicable
 X = none
 Category 5: Source Description
 N = source name
 T = source type
 X = none
 Category 6: User Location
 A = address
 M = map coordinate system
 L = latitude and longitude
 S = survey number
 R = river mile
 X = none

STORAGE
 Category 1: Computer Hardware
 A = agency mainframe
 U = USGS mainframe
 M = microcomputer
 X = none
 Category 2: Computer Software
 S = SNA/DS
 M = MVS/DS
 A = SAS
 O = other commercial package
 Y = system specific
 X = none
 Category 3: Data Access
 M = hard copy
 D = disk
 T = tape
 M = microfiche
 Category 4: Data (Dis)aggregation
 E = easy
 D = difficult or not possible
 Category 5: Separate Great Lakes Data
 Y = yes
 N = no
 Category 6: Division
 T = township/survey section
 C = county
 S = state/province
 B = sub-basin
 I = individual user
 U = USGS hydrologic unit

REPORTING
 Category 1: Cycle or Year
 F = fiscal year
 C = calendar year
 U = USGS year
 N = not applicable
 Category 2: Beginning Report Date
 N = not applicable
 Category 3: Agencies Reporting to USGS
 agency acronym
 X = none
 Category 4: Published Report Description
 S = state report
 M = with USGS
 F = for USGS
 X = none

APPENDIX VI -- MICHIGAN

Data Processing Stage		Water Use				
		Public Supply	Rural	Irrigation	Self-supplied Industrial	Power
Agency		DPH, DNR	USGS	DNR	USGS	DNR
Collection	1	U	-	-	-	-
	2	1940	-	1958	-	1963
	3	W	W	W	W	W
	4	N	E	V	E	V
	5	P	N	S	N	S
Recording (by agency)	1	M	-	I	-	I
	2	D	-	Y	-	Y
	3	N	-	N	-	N
	4	X	N	X	N	X
	5	N,T	-	N,T	-	N,T
	6	A	-	A	-	A
Storage	1	U	-	U	-	-
	2	N	-	N	-	-
	3	H,D,T	-	H,D,T	-	H
	4	D	-	D	-	D
	5	Y	-	Y	-	Y
	6	C,S,B	-	C,S,B	-	C,S,B
Reporting	1	C	-	C	-	C
	2	1979	-	1980	-	1985
	3	DNR	-	DNR	-	DNR
	4	W	S	W	S	W

CODE KEY:

AGENCY

Agency acronyms
 (e.g. DER = Department of Environmental Resources)
 X = no significant data collection done

COLLECTION

Category 1: Unit of Measurement
 U = million gallons per day
 M = gallons per minute
 D = gallons per day
 O = gallons per month
 Y = gallons per year
 S = cubic feet per second
 F = cubic feet
 G = gallons
 A = acre inches
 Q = cubic meters per second
 V = various SI units

Category 2: Beginning Collection Date
 V = variable

Category 3: Type of Flow
 W = withdrawal
 D = discharge
 J = consumptive use
 V = variable

Category 4: Degree of Accuracy
 E = estimate
 V = voluntary measurement
 R = required measurement
 M = required metering

Category 5: Collection Program
 P = permit
 A = allocation
 S = survey
 R = registration
 C = cooperative
 U = supervision
 L = legislation
 N = not applicable

RECORDING

Category 1: Reporting Frequency
 D = daily
 M = monthly
 Y = yearly
 I = intermittent
 A = available on request

Category 2: Average Use Recording Frequency
 D = daily
 M = monthly
 Y = yearly
 V = variable

Category 3: Record Users > 100,000 gpd (30-day average)
 Y = yes
 N = no

Category 4: Minimum Reporting Quantity
 A = 10,000 gpd capacity
 B = 100,000 gpd capacity
 C = 1 million gpy
 D = 26 connections
 E = 1,000 gpd withdrawn
 F = 50,000 liters with conflict potential
 P = 10,000 population
 N = not applicable
 X = none

Category 5: Source Description
 M = source name
 T = source type
 X = none

Category 6: User Location
 A = address
 M = map coordinate system
 L = latitude and longitude
 S = survey number
 R = river mile
 X = none

STORAGE

Category 1: Computer Hardware
 A = agency mainframe
 U = USGS mainframe
 M = microcomputer
 X = none

Category 2: Computer Software
 S = SIMUS
 M = MMUS
 A = SAS
 O = other commercial package
 Y = system specific
 X = none

Category 3: Data Access
 H = hard copy
 D = disk
 T = tape
 M = microfiche

Category 4: Data (Dis)aggregation
 E = easy
 D = difficult or not possible

Category 5: Separate Great Lakes Data
 Y = yes
 N = no

Category 6: Division
 T = township/survey section
 C = county
 S = state/province
 B = sub-basin
 I = individual user
 U = USGS hydrologic unit

REPORTING

Category 1: Cycle or Year
 F = fiscal year
 C = calendar year
 U = USGS year
 N = not applicable

Category 2: Beginning Report Date
 N = not applicable

Category 3: Agencies Reporting to USGS
 agency acronym
 X = none

Category 4: Published Report Description
 S = state report
 M = with USGS
 F = for USGS
 X = none

APPENDIX VII -- MINNESOTA

Data Processing Stage		Water Use				
		Public Supply	Rural	Irrigation	Self-supplied Industrial	Power
Agency		DNR	USGS	DNR	DNR	DNR
Collection	1	O	-	O	O	O
	2	1947	-	1947	1947	1947
	3	W,D,U	W	W,D,U	W,D,U	W,D,U
	4	V,R	E	V,R	V,R	V,R
	5	P	N	P	P	P
Recording (by agency)	1	Y	-	Y	Y	Y
	2	Y	-	Y	Y	Y
	3	Y	-	Y	Y	Y
	4	A,C	N	A,C	A,C	A,C
	5	N,T	-	N,T	N,T	N,T
	6	S	-	S	S	S
Storage	1	A,M	-	A,M	A,M	A,M
	2	S	-	S	S	S
	3	D,T	-	D,T	D,T	D,T
	4	E	-	E	E	E
	5	Y	-	Y	Y	Y
	6	T,C,S,B	-	T,C,S,B	T,C,S,B	T,C,S,B
Reporting	1	C	-	C	C	C
	2	1966	-	1966	1966	1966
	3	DNR	-	DNR	DNR	DNR
	4	S	S	S	S	S

CODE KEY:

AGENCY
 Agency acronym
 (e.g. DER = Department of Environmental Resources)
 X = no significant data collection done

COLLECTION
Category 1: Unit of Measurement
 U = million gallons per day
 M = gallons per minute
 D = gallons per day
 O = gallons per month
 Y = gallons per year
 S = cubic feet per second
 F = cubic feet
 G = gallons
 A = acre inches
 Q = cubic meters per second
 V = various SI units

Category 2: Beginning Collection Date
 V = variable

Category 3: Type of Flow
 W = withdrawal
 D = discharge
 U = consumptive use
 V = variable

Category 4: Degree of Accuracy
 E = estimate
 V = voluntary measurement
 R = required measurement
 M = required metering

Category 5: Collection Program
 P = permit
 A = allocation
 S = survey
 R = registration
 C = cooperative
 U = supervision
 L = legislation
 N = not applicable

RECORDING
Category 1: Reporting Frequency
 D = daily
 M = monthly
 Y = yearly
 I = intermittent
 A = available on request

Category 2: Average Use Recording Frequency
 D = daily
 M = monthly
 Y = yearly
 V = variable

Category 3: Record Users > 100,000 gpd (30-day average)
 Y = yes
 N = no

Category 4: Minimum Reporting Quantity
 A = 10,000 gpd capacity
 B = 100,000 gpd capacity
 C = 1 million gpy
 D = 26 connections
 E = 1,000 gpd withdrawn
 F = 50,000 liters with conflict potential
 P = 10,000 population
 N = not applicable
 X = none

Category 5: Source Description
 N = source name
 T = source type
 X = none

Category 6: User Location
 A = address
 R = map coordinate system
 L = latitude and longitude
 S = survey number
 R = river mile
 X = none

STORAGE
Category 1: Computer Hardware
 A = agency mainframe
 U = USGS mainframe
 M = microcomputer
 X = none

Category 2: Computer Software
 S = SMUDS
 N = MMUDS
 A = SAS
 O = other commercial package
 Y = system specific
 X = none

Category 3: Data Access
 H = hard copy
 D = disk
 T = tape
 M = microfiche

Category 4: Data (Dis)aggregation
 E = easy
 D = difficult or not possible

Category 5: Separate Great Lakes Data
 Y = yes
 N = no

Category 6: Division
 T = township/survey section
 C = county
 S = state/province
 B = sub-basin
 I = individual user
 U = USGS hydrologic unit

REPORTING
Category 1: Cycle or Year
 F = fiscal year
 C = calendar year
 U = USGS year
 N = not applicable

Category 2: Beginning Report Date
 N = not applicable

Category 3: Agencies Reporting to USGS
 agency acronym
 X = none

Category 4: Published Report Description
 S = state report
 M = with USGS
 F = for USGS
 X = none

APPENDIX VIII -- NEW YORK

Data Processing Stage		Water Use				
		Public Supply	Rural	Irrigation	Self-supplied Industrial	Power
Agency		DEH	DEC	DEC	DEC	PERC
Collection	1	D	-	U	U	U
	2	-	-	-	V	-
	3	W	W	W	W	W
	4	N	E	-	E	M
	5	P	N	-	-	P
Recording (by agency)	1	Y	-	Y	Y	M
	2	Y	-	Y	-	M
	3	Y	-	-	-	Y
	4	D	-	-	-	-
	5	T	-	-	-	N,T
	6	A,M	-	-	-	N
Storage	1	M	-	M	M	N
	2	Y	-	Y	Y	Y
	3	D	-	D	D	D
	4	E	-	E	E	E
	5	N	-	N	N	N
	6	C	-	C	C	C
Reporting	1	N	-	N	N	N
	2	-	-	-	-	-
	3	-	-	-	-	-
	4	X	S	X	X	X

CODE KEY:

AGENCY

Agency acronym
(e.g. DER = Department of Environmental Resources)
X = no significant data collection done

COLLECTION

Category 1: Unit of Measurement
U = million gallons per day
M = gallons per minute
D = gallons per day
O = gallons per month
Y = gallons per year
S = cubic feet per second
F = cubic feet
G = gallons
A = acre inches
Q = cubic meters per second
V = various SI units

Category 2: Beginning Collection Date
V = variable

Category 3: Type of Flow
W = withdrawal
D = discharge
U = consumptive use
V = variable

Category 4: Degree of Accuracy
E = estimate
V = voluntary measurement
R = required measurement
M = required metering

Category 5: Collection Program
P = permit
A = allocation
S = survey
R = registration
C = cooperative
J = supervision
L = legislation
N = not applicable

RECORDING

Category 1: Reporting Frequency

D = daily
M = monthly
Y = yearly
I = intermittent
A = available on request

Category 2: Average Use Recording Frequency

D = daily
M = monthly
Y = yearly
V = variable

Category 3: Record Users > 100,000 gpd (30-day average)

Y = yes
N = no

Category 4: Minimum Reporting Quantity

A = 10,000 gpd capacity
B = 100,000 gpd capacity
C = 1 million gpy
D = 26 connections
E = 1,000 gpd withdrawn
F = 50,000 liters with conflict potential
P = 10,000 population
N = not applicable
X = none

Category 5: Source Description

N = source name
T = source type
X = none

Category 6: User Location

A = address
M = map coordinate system
L = latitude and longitude
S = survey number
R = river mile
X = none

STORAGE

Category 1: Computer Hardware

A = agency mainframe
U = USGS mainframe
M = microcomputer
X = none

Category 2: Computer Software

S = SMUDS
M = MMUDS
A = SAS
O = other commercial package
Y = system specific
X = none

Category 3: Data Access

H = hard copy
D = disk
T = tape
M = microfiche

Category 4: Data (Dis)aggregation

E = easy
D = difficult or not possible

Category 5: Separate Great Lakes Data

Y = yes
N = no

Category 6: Division

T = township/survey section
C = county
S = state/province
B = sub-basin
I = individual user
U = USGS hydrologic unit

REPORTING

Category 1: Cycle or Year

F = fiscal year
C = calendar year
U = USGS year
N = not applicable

Category 2: Beginning Report Date

N = not applicable

Category 3: Agencies Reporting to USGS

agency acronym
X = none

Category 4: Published Report Description

S = state report
M = with USGS
F = for USGS
X = none

APPENDIX IX -- OHIO

Data Processing Stage		Water Use				
		Public Supply	Rural	Irrigation	Self-supplied Industrial	Power
Agency		OEPA	DNR	DNR	OEPA, DNR	USGS
Collection	1	U	U	U	U	U
	2	1955	1955	1955	1955	1975
	3	W,D	W	W	W,D	W
	4	R,M	E	E	M	V
	5	P	N	N	P,S	S
Recording (by agency)	1	M	-	-	M	-
	2	D,M	-	-	D,M	-
	3	Y	N	N	Y	N
	4	P	N	N	E	X
	5	N,T	X	X	N,T	N,T
	6	L	X	X	L,R	-
Storage	1	A	-	-	A	U
	2	Y	-	-	Y	S,N
	3	H,D,T	H	H	H,D,T	H,D,T
	4	E	E	E	E	E
	5	Y	Y	Y	Y	Y
	6	C,S,B,U	C,S,B	C,S,B	C,S,B	C,S,B
Reporting	1	C	C	C	C	C
	2	1957	1957	1957	1975	-
	3	DNR	DNR	DNR	DNR	DNR
	4	S	S	S	S	S

CODE KEY:

AGENCY

Agency acronym
(e.g. DER = Department of Environmental Resources)
X = no significant data collection done

COLLECTION

Category 1: Unit of Measurement
U = million gallons per day
M = gallons per minute
D = gallons per day
Q = gallons per month
Y = gallons per year
S = cubic feet per second
F = cubic feet
G = gallons
A = acre inches
Q = cubic meters per second
V = various SI units

Category 2: Beginning Collection Date
V = variable

Category 3: Type of Flow
W = withdrawal
D = discharge
U = consumptive use
V = variable

Category 4: Degree of Accuracy
E = estimate
V = voluntary measurement
R = required measurement
M = required metering

Category 5: Collection Program
P = permit
A = allocation
S = survey
R = registration
C = cooperative
U = supervision
L = legislation
N = not applicable

RECORDING

Category 1: Reporting Frequency
D = daily
M = monthly
Y = yearly
I = intermittent
A = available on request

Category 2: Average Use Recording Frequency
D = daily
M = monthly
Y = yearly
V = variable

Category 3: Record Users > 100,000 gpd (30-day average)
Y = yes
N = no

Category 4: Minimum Reporting Quantity
A = 10,000 gpd capacity
B = 100,000 gpd capacity
C = 1 million gpy
D = 26 connections
E = 1,000 gpd withdrawn
F = 50,000 liters with conflict potential
P = 10,000 population
N = not applicable
X = none

Category 5: Source Description
N = source name
T = source type
X = none

Category 6: User Location
A = address
M = map coordinate system
L = latitude and longitude
S = survey number
R = river mile
X = none

STORAGE

Category 1: Computer Hardware
A = agency mainframe
U = USGS mainframe
M = microcomputer
X = none

Category 2: Computer Software
S = SAUDS
W = MWUDS
A = SAS
O = other commercial package
Y = system specific
X = none

Category 3: Data Access
H = hard copy
D = disk
T = tape
M = microfiche

Category 4: Data (Dis)aggregation
E = easy
D = difficult or not possible

Category 5: Separate Great Lakes Data
Y = yes
N = no

Category 6: Division
T = township/survey section
C = county
S = state/province
B = sub-basin
I = individual user
U = USGS hydrologic unit

REPORTING

Category 1: Cycle or Year
F = fiscal year
C = calendar year
U = USGS year
N = not applicable

Category 2: Beginning Report Date
N = not applicable

Category 3: Agencies Reporting to USGS
agency acronym
X = none

Category 4: Published Report Description
S = state report
M = with USGS
F = for USGS
X = none

APPENDIX X --- PENNSYLVANIA

Data Processing Stage		Water Use				
		Public Supply	Rural	Irrigation	Self-supplied Industrial	Power
Agency		DER	Dag	DER	DER	DER
Collection	1	D	-	Y	Y	U
	2	1985	-	1977	1970	1977
	3	W,D,U	W,D,U	W,D,U	W,D,U	W,D,U
	4	M,R	E	E/V	V	E/V
	5	A,P	-	S	S	C
Recording (by agency)	1	M,Y	-	I	I	I
	2	Y	-	V	V	Y
	3	Y	N	Y	Y	Y
	4	X	N	X	X	X
	5	N,T	-	N,T	N,T	N,T
	6	A,M,L,R	-	A,M,L,R	A,M,L,R	A,M,L,R
Storage	1	A	-	A	A	A
	2	Y	-	Y	Y	Y
	3	H,D,T	-	H,D,T	H,D,T	H,D,T
	4	E	-	E	E	E
	5	Y	-	Y	Y	Y
	6	T,C,S,B,I,U	-	T,C,S,B,I,U	T,C,S,B,I,U	T,C,S,B,I,U
Reporting	1	C	C	C	C	C
	2	1981	-	-	1981	1981
	3	DER	-	DER	DER	DER
	4	S,W	S,W	S,W	S,W	S,W

CODE KEY:

AGENCY -----

Agency acronym
 (e.g. DER = Department of Environmental Resources)
 X = no significant data collection done

COLLECTION -----

Category 1: Unit of Measurement
 U = million gallons per day
 M = gallons per minute
 D = gallons per day
 O = gallons per month
 Y = gallons per year
 S = cubic feet per second
 C = cubic feet
 G = gallons
 A = acre inches
 J = cubic meters per second
 V = various SI units

Category 2: Beginning Collection Date
 V = variable

Category 3: Type of Flow
 W = withdrawal
 D = discharge
 U = consumptive use
 V = variable

Category 4: Degree of Accuracy
 E = estimate
 V = voluntary measurement
 R = required measurement
 M = required metering

Category 5: Collection Program
 > = permit
 A = allocation
 S = survey
 R = registration
 C = cooperative
 J = supervision
 L = legislation
 - = not applicable

RECORDING -----

Category 1: Reporting Frequency
 D = daily
 M = monthly
 Y = yearly
 I = intermittent
 A = available on request

Category 2: Average Use Recording Frequency
 D = daily
 M = monthly
 Y = yearly
 V = variable

Category 3: Record Users > 100,000 gpd (30-day average)
 Y = yes
 N = no

Category 4: Minimum Reporting Quantity
 A = 10,000 gpd capacity
 B = 100,000 gpd capacity
 C = 1 million gpy
 D = 26 connections
 E = 1,000 gpd withdrawn
 F = 50,000 liters with conflict potential
 P = 10,000 population
 N = not applicable
 X = none

Category 5: Source Description
 W = source name
 T = source type
 X = none

Category 6: User Location
 A = address
 M = map coordinate system
 L = latitude and longitude
 S = survey number
 Q = river mile
 X = none

STORAGE -----

Category 1: Computer Hardware
 A = agency mainframe
 U = USGS mainframe
 M = microcomputer
 X = none

Category 2: Computer Software
 S = SRI/US
 M = WRI/US
 A = SAS
 O = other commercial package
 Y = system specific
 X = none

Category 3: Data Access
 H = hard copy
 D = disk
 T = tape
 M = microfiche

Category 4: Data (Dis)aggregation
 E = easy
 D = difficult or not possible

Category 5: Separate Great Lakes Data
 Y = yes
 N = no

Category 6: Division
 T = township/survey section
 C = county
 S = state/province
 B = sub-basin
 I = individual user
 J = USGS hydrologic unit

REPORTING -----

Category 1: Cycle or Year
 F = fiscal year
 C = calendar year
 U = USGS year
 N = not applicable

Category 2: Beginning Report Date
 N = not applicable

Category 3: Agencies Reporting to USGS
 agency acronym
 X = none

Category 4: Published Report Description
 S = state report
 W = with USGS
 F = for USGS
 X = none

APPENDIX XI -- WISCONSIN

Data Processing Stage		Water Use				
		Public Supply	Rural	Irrigation	Self-supplied Industrial	Power
Agency		DNR	USGS	DNR	DNR	USGS
Collection	1	G	-	G	G	-
	2	1945	-	1945	1945	-
	3	W	W	W	W	W
	4	M	E	M	M	E
	5	P	N	P	P	-
Recording (by agency)	1	M	-	M	M	-
	2	M	-	-	-	-
	3	N	-	N	-	-
	4	X	N	B	-	N
	5	N,T	-	N,T	T	-
	6	A	-	L	L	-
Storage	1	X	-	A	A	-
	2	X	-	Y	Y	-
	3	H	-	H,D	H,D	-
	4	D	-	E	E	-
	5	Y	-	Y	Y	-
	6	S	-	C,S,B	C,S,B	-
Reporting	1	N	-	N	N	-
	2	N	-	N	N	-
	3	X	-	DNR	DNR	-
	4	S	S	S	S	S

CODE KEY:

AGENCY

Agency acronym
(e.g. DER = Department of Environmental Resources)
X = no significant data collection done

COLLECTION

Category 1: Unit of Measurement
U = million gallons per day
M = gallons per minute
D = gallons per day
O = gallons per month
Y = gallons per year
S = cubic feet per second
F = cubic feet
G = gallons
A = acre inches
Q = cubic meters per second
V = various SI units

Category 2: Beginning Collection Date
V = variable

Category 3: Type of Flow
W = withdrawal
D = discharge
U = consumptive use
V = variable

Category 4: Degree of Accuracy
E = estimate
V = voluntary measurement
R = required measurement
M = required metering

Category 5: Collection Program
P = permit
A = allocation
S = survey
R = registration
C = cooperative
U = supervision
L = legislation
N = not applicable

RECORDING

Category 1: Reporting Frequency
D = daily
M = monthly
Y = yearly
I = intermittent
A = available on request

Category 2: Average Use Recording Frequency
D = daily
M = monthly
Y = yearly
V = variable

Category 3: Record Users > 100,000 gpd (30-day average)
Y = yes
N = no

Category 4: Minimum Reporting Quantity
A = 10,000 gpd capacity
B = 100,000 gpd capacity
C = 1 million gpy
D = 26 connections
E = 1,000 gpd withdrawal
F = 50,000 liters with conflict potential
P = 10,000 population
N = not applicable
X = none

Category 5: Source Description
N = source name
T = source type
X = none

Category 6: User Location
A = address
M = map coordinate system
L = latitude and longitude
S = survey number
R = river mile
X = none

STORAGE

Category 1: Computer Hardware
A = agency mainframe
U = USGS mainframe
M = microcomputer
X = none

Category 2: Computer Software
S = SMUDS
N = MMUDS
A = SAS
O = other commercial package
Y = system specific
X = none

Category 3: Data Access
H = hard copy
D = disk
T = tape
M = microfiche

Category 4: Data (Dis)aggregation
E = easy
D = difficult or not possible

Category 5: Separate Great Lakes Data
Y = yes
N = no

Category 6: Division
T = township/survey section
C = county
S = state/province
B = sub-basin
I = individual user
U = USGS hydrologic unit

REPORTING

Category 1: Cycle or Year
F = fiscal year
C = calendar year
U = USGS year
N = not applicable

Category 2: Beginning Report Date
N = not applicable

Category 3: Agencies Reporting to USGS
agency acronym
X = none

Category 4: Published Report Description
S = state report
M = with USGS
F = for USGS
X = none

APPENDIX XII -- ONTARIO

Data Processing Stage		Water Use				
		Public Supply	Rural	Irrigation	Self-supplied Industrial	Power
Agency		Min, X	Min, MAP, X	Min, X	Min, X	Min, Only, X
Collection	1	V	V	V	V	V
	2	1961	1966	1961	1961	1961
	3	V	V	V	V	V
	4	V,R	V	V,R	V,R	V,R
	5	P	R	P	P	P
Recording (by agency)	1	I	I	I	I	I
	2	V	V	V	V	V
	3	N	N	N	N	N
	4	F	N	F	F	F
	5	N,T	N,T	N,T	N,T	N,T
	6	M,L	M,L	M,L	M,L	M,L
Storage	1	A	A	A	A	A
	2	Y	Y	Y	Y	Y
	3	H,T	H,T	H,T	H,T	H,T
	4	E	E	E	E	E
	5	Y	Y	Y	Y	Y
	6	C,S,B	C,S,B	C,S,B	C,S,B	C,S,B
Reporting	1	C	C	C	C	C
	2	N	N	N	N	N
	3	X	X	X	X	X
	4	X	X	X	X	X

CODE KEY:

AGENCY _____

Agency acronym
 (e.g. DER = Department of Environmental Resources)
 X = no significant data collection done

COLLECTION _____

Category 1: Unit of Measurement
 U = million gallons per day
 M = gallons per minute
 D = gallons per day
 Q = gallons per month
 Y = gallons per year
 S = cubic feet per second
 F = cubic feet
 G = gallons
 A = acre inches
 Q = cubic meters per second
 V = various SI units

Category 2: Beginning Collection Date
 V = variable

Category 3: Type of Flow
 W = withdrawal
 D = discharge
 U = consumptive use
 V = variable

Category 4: Degree of Accuracy
 E = estimate
 V = voluntary measurement
 R = required measurement
 M = required metering

Category 5: Collection Program
 P = parent
 A = allocation
 S = survey
 R = registration
 C = cooperative
 U = supervision
 L = legislation
 N = not applicable

RECORDING _____

Category 1: Reporting Frequency
 D = daily
 M = monthly
 Y = yearly
 I = intermittent
 A = available on request

Category 2: Average Use Recording Frequency
 D = daily
 M = monthly
 Y = yearly
 V = variable

Category 3: Record Users > 100,000 gpd (30-day average)
 Y = yes
 N = no

Category 4: Minimum Reporting Quantity
 A = 10,000 gpd capacity
 B = 100,000 gpd capacity
 C = 1 million gpy
 D = 26 connections
 E = 1,000 gpd withdrawn
 F = 50,000 liters with conflict potential
 P = 10,000 population
 N = not applicable
 X = none

Category 5: Source Description
 N = source name
 T = source type
 X = none

Category 6: User Location
 A = address
 M = map coordinate system
 L = latitude and longitude
 S = survey number
 R = river mile
 X = none

STORAGE _____

Category 1: Computer Hardware
 A = agency mainframe
 U = USGS mainframe
 M = microcomputer
 X = none

Category 2: Computer Software
 S = SMUDS
 M = MMUDS
 A = SAS
 O = other commercial package
 Y = system specific
 X = none

Category 3: Data Access
 H = hard copy
 D = disk
 T = tape
 M = microfiche

Category 4: Data (Dis)aggregation
 E = easy
 D = difficult or not possible

Category 5: Separate Great Lakes Data
 Y = yes
 N = no

Category 6: Division
 T = township/survey section
 C = county
 S = state/province
 B = sub-basin
 I = individual user
 J = USGS hydrologic unit

REPORTING _____

Category 1: Cycle or Year
 F = fiscal year
 C = calendar year
 U = USGS year
 N = not applicable

Category 2: Beginning Report Date
 N = not applicable

Category 3: Agencies Reporting to USGS
 agency acronym
 X = none

Category 4: Published Report Description
 S = state report
 M = with USGS
 F = for USGS
 X = none

APPENDIX XIII -- QUEBEC

		Water Use				
Data Processing Stage		Public Supply	Rural	Irrigation	Self-supplied Industrial	Power
Agency		MEh	X	X	MEh	HyQ
Collection	1	Q	-	-	Q	Q
	2	1981	-	-	V	V
	3	W,D,U	-	-	W,D,U	W,D
	4	V	-	-	V	R
	5	L	-	-	P	L
Recording (by agency)	1	Y,A	-	-	D	D,A
	2	Y	-	-	D	D
	3	Y	-	-	N	Y
	4	X	-	-	X	X
	5	N,T	-	-	N,T	N,T
	6	M,L	-	-	M,L	M,L
Storage	1	A	-	-	A	A
	2	Y	-	-	Y	Y
	3	T	-	-	T	T
	4	E	-	-	E	E
	5	N	-	-	N	N
	6	C,B	-	-	C,B	C,B
Reporting	1	C	-	-	C	C
	2	-	-	-	-	-
	3	X	-	-	X	X
	4	X	-	-	X	X

CODE KEY:

AGENCY

Agency acronyms
(e.g. DER = Department of Environmental Resources)
X = no significant data collection done

COLLECTION

Category 1: Unit of Measurement
U = million gallons per day
M = gallons per minute
D = gallons per day
O = gallons per month
Y = gallons per year
S = cubic feet per second
F = cubic feet
G = gallons
A = acre inches
Q = cubic meters per second
V = various SI units

Category 2: Beginning Collection Date
V = variable

Category 3: Type of Flow
W = withdrawal
D = discharge
U = consumptive use
V = variable

Category 4: Degree of Accuracy
E = estimate
V = voluntary measurement
R = required measurement
M = required metering

Category 5: Collection Program
P = permit
A = allocation
S = survey
R = registration
C = cooperative
U = supervision
L = legislation
N = not applicable

RECORDING

Category 1: Reporting Frequency

D = daily
M = monthly
Y = yearly
I = intermittent
A = available on request

Category 2: Average Use Recording Frequency

D = daily
M = monthly
Y = yearly
V = variable

Category 3: Record Users > 100,000 gpd (30-day average)

Y = yes
N = no

Category 4: Minimum Reporting Quantity

A = 10,000 gpd capacity
B = 100,000 gpd capacity
C = 1 million gpy
D = 26 connections
E = 1,000 gpd withdrawn
F = 50,000 liters with conflict potential
P = 10,000 population
N = not applicable
X = none

Category 5: Source Description

N = source name
T = source type
X = none

Category 6: User Location

A = address
M = map coordinate system
L = latitude and longitude
S = survey number
R = river mile
X = none

STORAGE

Category 1: Computer Hardware

A = agency mainframe
U = USGS mainframe
M = microcomputer
X = none

Category 2: Computer Software

S = SMUDS
N = NNUDS
A = SAS
O = other commercial package
Y = system specific
X = none

Category 3: Data Access

H = hard copy
D = disk
T = tape
M = microfiche

Category 4: Data (Dis)aggregation

E = easy
D = difficult or not possible

Category 5: Separate Great Lakes Data

Y = yes
N = no

Category 6: Division

T = township/survey section
C = county
S = state/province
B = sub-basin
I = individual user
U = USGS hydrologic unit

REPORTING

Category 1: Cycle or Year

F = fiscal year
C = calendar year
U = USGS year
N = not applicable

Category 2: Beginning Report Date

N = not applicable

Category 3: Agencies Reporting to USGS

agency acronym
X = none

Category 4: Published Report Description

S = state report
M = with USGS
F = for USGS
X = none