



Illinois Department of Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271
<http://dnr.state.il.us>

Pat Quinn, Governor
Marc Miller, Director

December 2, 2009

Mr. David Naftzger
Executive Director
Great Lakes-St. Lawrence River Basin
Water Resources Council
Secretary, Great Lakes-St. Lawrence River
Water Resources Regional Body
c/o Council of Great Lakes Governors
35 E. Wacker Drive, Suite 1850
Chicago, IL 60601

RE: Water Management Program Report and Water Conservation and Efficiency
Program Report Submitted on behalf of Illinois

Dear Mr. Naftzger:

On behalf of the State of Illinois, please find enclosed a Water Management Program Report, and a Water Conservation and Efficiency Program Report being sent pursuant to and in satisfaction of the obligations included in Section 3.4 of the Great Lakes-St. Lawrence River Basin Water Resources Compact.

If you have any questions, please do not hesitate to contact Daniel Injerd at 312/793-3123.

Sincerely,

Gary R. Clark
Director
Office of Water Resources
Alternate of Governor Quinn, Member, Great Lakes-St. Lawrence River Basin Water Resources Council

Daniel Injerd
Chief, Lake Michigan Management Section
Office of Water Resources

GRC:DI:cp
Enclosures

cc: Peter Johnson, Program Director, Council of Great Lakes Governors

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Water Conservation and Efficiency Program Review

Illinois' First Report to the Compact Council and Regional Body

December 8, 2009

Lead agency and contact person: Illinois Department of Natural Resources
Office of Water Resources
Daniel Injerd, Chief, Lake Michigan Management Section

Status of Illinois' water conservation and efficiency program

A U.S. Supreme Court Decree limits Illinois' diversion of Lake Michigan water to an annual average of 3200 cubic feet per second (cfs), approximately 2.1 billion gallons/day. The Decree and Illinois state law specifically require that:

All feasible means reasonably available to the State and its municipalities, political subdivisions, agencies and instrumentalities shall be employed to conserve and manage the water resources of the region and the use of water therein in accordance with the best modern scientific knowledge and engineering practice. (615 ILCS 50)

This is the operative judicial and statutory language that directs the Illinois Department of Natural Resources (Department) to develop and implement a water conservation program covering all diverters of Lake Michigan water.

The Department's water conservation and efficiency program has several primary objectives:

- Promote the efficient use and conservation of Lake Michigan water by the end user (homeowner, business/industry).
- Establish standards for good water system management and leakage control by the owner/operator of a public water supply system.
- Ensure that Lake Michigan water diverted directly into the Chicago Waterway system for various purposes is kept to a minimum.

Illinois' primary tool to implement these objectives is to spell out certain water conservation requirements that all domestic users of Lake Michigan water must comply with as a condition of receiving a Lake Michigan water allocation permit. Section 3730.307 of the Department's Rules and Regulations for the Allocation of Water from Lake Michigan (17 IL Adm. Code Ch I. Sec. 3730) requires the following:

Section 3730.307 Conservation Practices and Other Permit Conditions

- a) The Department shall condition allocations within a user category upon required conservation practices for each user category as specified in subsections (b) and (c). Failure by any permittee to meet the conservation requirements applicable to it within a reasonable period of time will, upon notice, hearing and determination of such failure, constitute a violation of a Department order.

- b) As a condition of receiving an allocation of Lake Michigan water, all permittees will agree to submit to the Department proposals designed to reduce or eliminate wasteful water use and to reduce unaccounted-for flows to 8% or less, based on net annual pumpage, and procedures used to determine efficiency of water metering or accounting in the permittee's system.
- c) The Department shall require evidence of adoptions by the permittee of the following conservation practices as applicable to the particular user:
- 1) Leakage monitoring and correction for storage, transmission and distribution systems.
 - 2) Metering of all new construction.
 - 3) Metering of existing nonmetered services as part of any major remodeling.
 - 4) The adoption of ordinances which require installation of the following water efficient plumbing fixtures based on a pressure at the fixture of 40 to 50 psi in all new construction and in all repair or replacement of fixtures or trim:

Fixtures	Maximum Flow ¹
Water Closets, tank type	1.6 gal per flush
Water Closets, flushometer type	1.6 gal per flush
Urinals, tank type	1.0 gal per flush
Urinals, flushometer type	1.0 gal per flush
Shower Heads	2.5 GPM
Lavatory, sink faucets	2.5 GPM
 - 5) The adoption of ordinances which require the installation of closed system air conditioning in all new construction and in all remodeling.
 - 6) The adoption of ordinances which require that all lavatories for public use in new construction or remodeling be equipped with metering or self closing faucets.
 - 7) The adoption of ordinances which require that all newly constructed or remodeled car wash installations be equipped with a water recycling system.
 - 8) The adoption of ordinances which restrict non-essential outside water uses to prevent excessive, wasteful use. As a minimum, these restrictions shall provide that unrestricted lawn sprinkling will not be allowed from May 15 - September 15 of each year.
 - 9) Development and implementation of public programs to encourage reduced water use.
 - 10) Installation of facilities and implementation of programs to reduce to a reasonable minimum, and to accurately account for, water used for navigational, lockage, and leakage purposes; and pollution treatment, control or abatement purposes.
- d) Within 90 days of receipt of an allocation permit, each permittee which uses any water from deep aquifer pumpage shall submit a phased program designed to end this practice, other than for emergency or standby use, within five years of the receipt of Lake Michigan water.
- e) As a condition of receiving an allocation of Lake Michigan water, all permittees will limit hydrant uses to 1% or less of net annual pumpage in each annual accounting period. The Department may grant an exception to this requirement if it can be shown by the user that this requirement can't be met. In determining the merits of a request for an exception, the Department considers such factors as engineering studies of hydrant uses and unusual circumstances during an annual accounting period.

¹ Proposed revision to IDNR Part 3730 Rules to conform to flow limits specified in Section 123 of the Energy Policy Act of 1993.

- f) The Department recommends that all permittees adopt water rate structures based on metered water use and that water rate structures be developed which will discourage excessive water use.

These conservation requirements have been in effect since 1977. It is very difficult to accurately determine the impact of water conservation requirements on household water use. However, we have noted a general decrease in per capita consumption, especially over the last 10 years. Since the Compact came into force, the Department has completed a comprehensive Lake Michigan water allocation review, and has issued new Lake Michigan water allocation permits that incorporate these lower per capita use rates into the long term (out to the year 2030) allocations. Regionally, a small reduction in water use translates into a large volume of water, given that the Lake Michigan water service population in Illinois is around 7 million people.

Improving the management and accountability of a municipal water system offers the greatest potential for a significant reduction in water consumption. Consequently, the Department has developed standards (see Part b above) relating to leakage and unaccounted-for-flow (UFF), and has made future allocations of Lake Michigan water based on compliance with these requirements.

Historically, UFF has been an overlooked problem, although in recent years it has been getting more attention as the cost of water production and treatment have increased and new water supply sources have become more difficult to locate. In 1995, the average residential water rate in the Lake Michigan water service area was \$2.99/1000 gallons. By 2000, it had increased to \$3.23/1000 gallons, and by 2005 to \$3.65/1000 gallons. Water rates in excess of \$6.00/1000 gallons are becoming more common.

A successful regulatory program should apply to all permittees on a uniform and consistent basis. In the development of the Department's standards on UFF, we had to recognize the unique social, economic and demographic character of each community, such as the City of Chicago with a population of 3 million to small service areas with less than 1,000 people; from industrial to bedroom communities; from highly affluent to poverty level communities; from communities with water systems approaching 100 years old to communities with water systems less than 10 years old; from active growth communities to communities that are losing population; and with communities that have a high per capita water consumption to those with a very low per capita consumption. Given these variables, the Department concluded that the standard definition for UFF, the difference between total water production and billed water, would not be appropriate to use in the development of our regulatory standard.

Recognizing that all water systems, no matter how well constructed or maintained have a certain amount of unavoidable leakage, the Department developed a definition of unavoidable leakage that was based on the number of miles of water main, the type of pipe, the type of joints and the age of the water system. In this way, a community is not penalized because of the age of their water distribution system or for the construction materials that were used. Unavoidable leakage, as originally defined, also relates to that amount of leakage that cannot be reasonably controlled and which may cost more to locate and repair than to permit to exist.

The Department's standards for UFF and unavoidable leakage are based upon the percentage of water that enters the distribution system and does not include water wholesaled to any other water system. This amount is termed Δ net annual pumpage Δ . Based upon studies done by experts in this area and upon standards established by the AWWA for allowable leakage in new

systems, in 1980 the Department set the following standards (Section 3730.102) for unavoidable leakage:

For cast iron pipe with lead joints

<u>Age of water main</u>	<u>Maximum unavoidable leakage</u>
Greater than 60 years	3000 gal/day/mile of main
40 to 60 years	2500 gal/day/mile of main
20 to 40 years	2000 gal/day/mile of main
Less than 20 years	1500 gal/day/mile of main

For all types of pipes and joints

<u>Age of water main</u>	<u>Maximum unavoidable leakage</u>
Greater than 60 years	2500 gal/day/mile of main
40 to 60 years	2000 gal/day/mile of main
20 to 40 years	1500 gal/day/mile of main
Less than 20 years	1000 gal/day/mile of main

For older communities in northeastern Illinois, unavoidable leakage averages about 5-7% of net annual pumpage, while in newer communities it typically averages 3-5%.

UFF water, as defined by the Department (Section 3730.102), is that amount which cannot be accounted for after the amounts used for residential, commercial, industrial, municipal, non-metered hydrant use (this should not exceed 1% of net annual pumpage) and unavoidable leakage are compared to net annual pumpage. UFF should be close to zero. However, to provide some flexibility in water system operation and management, and also recognizing such losses as meter under-registration and water main breaks, the Department allows an UFF of up to 8%.

To ensure consistent reporting of water use data by our Lake Michigan water allocation users, the Department requires the annual submittal of water use data on a form known as the >Annual Water Use Audit Form= (copy attached). This form has been required since the late 1970s, so there is a long term data base that enables the Department to monitor the impact of this conservation requirement. In 1979, the first year for which the Department compiled statistics on UFF for 182 water systems in northeastern Illinois, the average UFF was 10.4%. Over the last five years, the average UFF has been around 4%.

There is a significant regional impact with a reduction of UFF. In 2000, total water consumption by Lake Michigan communities was 1,117 million gallons per day. Assuming that half of the reported UFF is due to underground leakage, the reduction in UFF from 10.4% to 4.0% has saved 36 million gallons per day, enough water to supply an additional 250,000 people.

Although the Department=s standards have served as a strong incentive for communities to begin the necessary leakage control studies and water audits to improve their accountability, they have also yielded very favorable cost returns. Water that is lost from the distribution system because of leakage is revenue lost, even though the cost is there to produce the water. This has the effect of increasing water rates to the consumer. For example, a 3 million gallon per day system with a 20% UFF will cut consumption by 360,000 gallons per day if they reduce

their UFF down to the required 8%. At a purchase price of \$1.75/1000 gallons, this represents an annual savings of \$230,000 per year. This savings alone should be more than adequate to finance a leak detection and repair program.

In 2007, 27 permittees reported UFF exceeding 8%, with some as high as 30%. All of these communities were ordered to present a specific plan of action and a timetable to reduce UFF to below the Department standard of 8%. All of them submitted a compliance program and are currently undertaking measures such as water audits, leak detection surveys, meter change outs and testing and in some cases major water main replacement programs.

During this past year, the Department initiated contact with all of our domestic Lake Michigan water allocation permittees to request a copy of their outside water use ordinance. These ordinances are being reviewed as part of an effort to evaluate where our conservation requirements might be improved.

As part of our ongoing Lake Michigan water allocation program, every year Department staff prepares and distributes a Lake Michigan water allocation newsletter. This newsletter includes a table that reports on our permittees' compliance with our UFF standards, and reminds them of our objective to promote the efficient use and conservation of our limited supply of Lake Michigan water.

An additional activity has been the Department's support of an 11 county Northeastern Illinois Regional water supply planning effort. This study is in its third and final year, and the final report, expected early in 2010, is expected to strongly recommend that water suppliers/users in the 11 county region, which includes the Lake Michigan water service area, consider implementing a number of water conservation initiatives. These measures go beyond the typical list of conservation measures, and include such issues as water reuse, stormwater management, etc.

Conclusion

Illinois has had a Lake Michigan water conservation program for over 30 years. We believe that our program is consistent with and fully supports the Great Lakes-St. Lawrence River Basin Water Conservation and Efficiency Objectives. The unique nature of Illinois' Lake Michigan water use and diversion as allowed under a U.S. Supreme Court Decree has resulted in a water conservation and efficiency program that is implemented primarily as a regulatory program, with additional measures, such as conservation pricing, conservation education and information sharing implemented through a non-regulatory effort.

Attachment – LMO -2 form



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Pat Quinn, Governor
Marc Miller, Director

Office of Water Resources, 36 S. Wabash Ave., Rm. 1415, Chicago, IL 60603
Ofc: 312/793-3123 Fax: 312/793-5968

November 17, 2009

Dear Permittee:

Enclosed are the "Annual Water Use Audit Form, LMO-2" for the 2009 Water Year, covering the period from October 1, 2008 through September 30, 2009, and the Illinois State Water Survey water use report. **Please complete and return the LMO-2 form to the Department by January 4, 2010.** The Illinois State Water Survey water use report should be mailed back directly to the State Water Survey in the enclosed return envelope.

Along with the LMO-2 form, you should include a summary of any water conservation initiatives you have implemented in the last year. This could include water main replacement, meter change outs/calibration, and leak detection surveys.

The data on the LMO-2 forms constitutes a major portion of the data required to measure and account for Illinois' diversion of Lake Michigan water. Therefore, please carefully check the amounts and percentages that you report for accuracy.

Remember, if your unaccounted-for-flow is greater than 8%, your system is in violation of the Department's Rules, and efforts to reduce unaccounted-for-flow to 8% or less should be initiated.

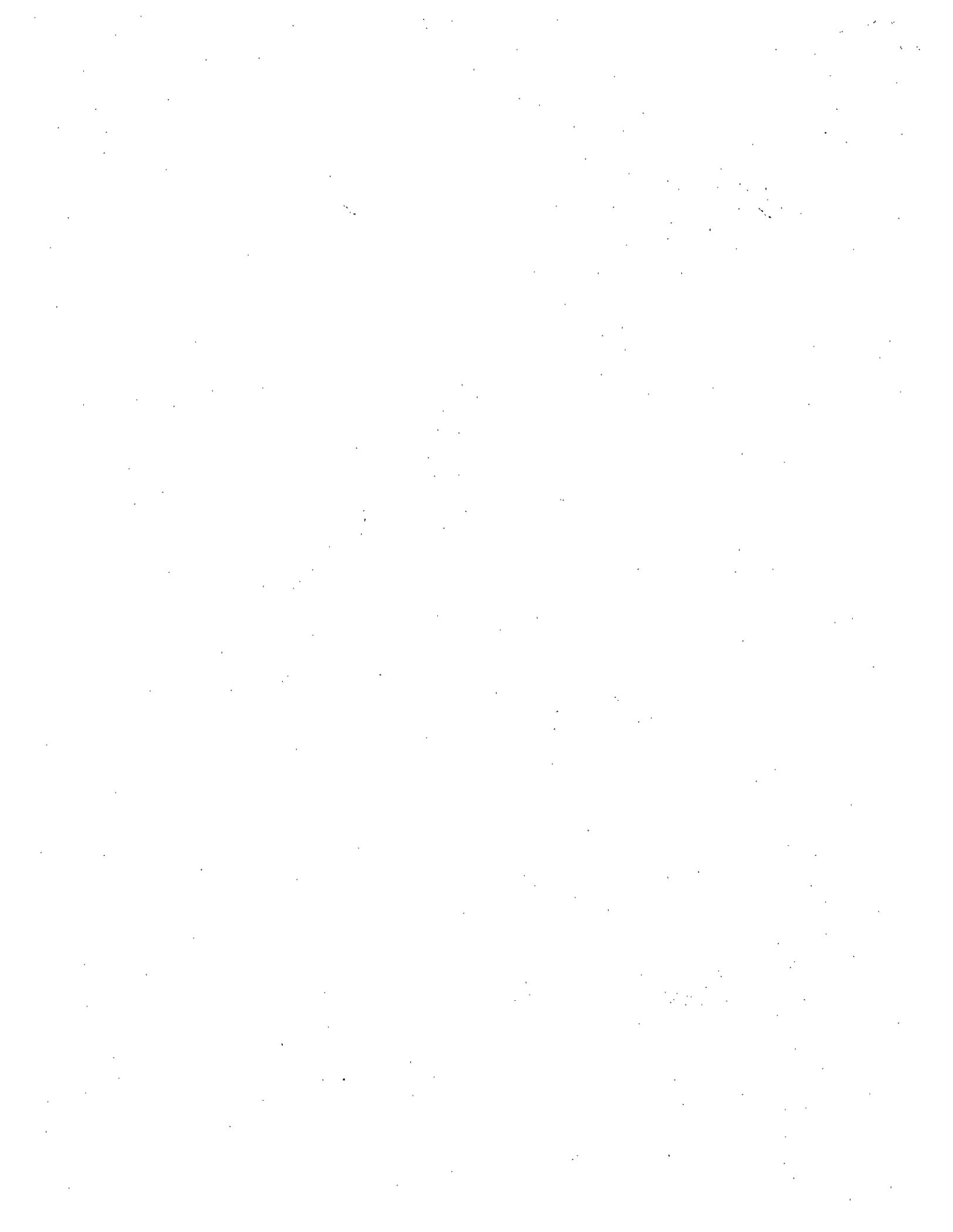
If you have any questions as you complete the Water Year 2009 LMO-2, feel free to contact Jim Casey at (312) 793-5947.

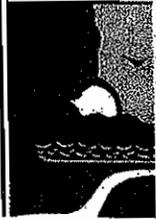
Sincerely,

Daniel Injerd, Chief
Lake Michigan Management Section

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Enclosures

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Office of Water Resources, 36 S. Wabash Ave., Rm. 1415, Chicago, IL 60603
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2009 Annual Water Use Audit Form (LMO-2)

This form must be completed by all Category IA and IIB Permittees for each annual water use accounting year running from October 1st through September 30th. This form must be submitted the Department by January 4, 2010.

Section I - General Information

Name, address and phone number of Permittee:

County _____

Name, address and phone number of the contact person for the Permittee:

e-mail address _____

Authorized Official _____

Title _____

Date _____

Please provide the following leak survey information and population estimates for the last year.

Results and recommendations of leak surveys conducted on the water distribution system including progress made in leak repair. (attach to back of form)

Population _____ **Number of existing households** _____

The Illinois Department of Natural Resources is requesting disclosure of information that is necessary to accomplish the statutory purpose as outlined under Chapter 19, Section 120.2 of the Illinois Revised Statutes. Disclosure of this information is required. Failure to provide any information will result in this form not being processed. This form has been approved by the Forms Management Center, Central Management Services.

Section II - Water Use Audit

Enter the amount of water pumped and utilized for each item shown below. All amounts entered in this section must be in units of million gallons per day (MGD) rounded off to 3 decimal places to the right of the decimal. Conversion calculations are provided for your use in Section IV to convert other commonly used units to MGD.

A. Pumpage Data

Water bought or received from the following distribution systems:

- 1. Lake Michigan Pumpage MGD
- 2. Shallow Aquifer Pumpage MGD
- 3. Deep Aquifer Pumpage MGD
- 4. Total Pumpage (Add lines 1, 2 & 3) MGD
- 5. Water Treatment Use MGD
- 6. Gross Annual Pumpage (subtract line 5 from line 4) MGD

Water sold or provided to any other distribution systems (enter the name of each system and the amount sold or provided to that system on lines 7 through 12). If additional lines are required, attach an additional sheet listing each system and amount.

- 7. _____ MGD
- 8. _____ MGD
- 9. _____ MGD
- 10. _____ MGD
- 11. _____ MGD
- 12. _____ MGD
- 13. Total (add lines 7-12 and any additional amounts) MGD
- 14. Net Annual Pumpage (subtract line 13 from line 6) MGD

B. Uses. Metered Unmetered..... Total

- 15. Residential MGD
- 16. Commercial and Manufacturing MGD
- 17. Municipal MGD
- 18. Construction MGD
- 19. Total Uses (add Total lines 15 through 18) MGD
- 20. Percentage of Total Use to Net Annual Pumpage
(divide line 19 by line 14 and multiply by 100) %

C. Hydrant Uses

- 21. Firefighting and Training MGD
- 22. Water Main Flushing MGD
- 23. Sewer Cleaning MGD
- 24. Street Cleaning MGD
- 25. Construction MGD
- 26. Other (attach explanation) MGD
- 27. Total Hydrant Use (add lines 21 through 26) MGD

Section II - Water Use Audit (continued)

28. Percentage of Hydrant Use to Net Annual Pumpage
(divide line 27 by line 14 and multiply by 100) %
29. Department Requirement for Hydrant Use 1.0 %
30. Excessive hydrant use (subtract line 29 from line 28). If the percentage is
greater than 0.0, attach explanation. [see Rule 730.307(e)] %
- D. Unavoidable Leakage and Unaccounted for Flow**
31. Maximum Unavoidable Leakage (Do worksheet in Section III;
enter amount from line 10 of the worksheet) MGD
32. Percentage of Maximum Unavoidable Leakage to Net Annual Pumpage
(divide line 31 by line 14 and multiply by 100) %
33. Total Accounted for Flow (add lines 19, 27 and 31) MGD
34. Percentage of Total Accounted for Flow to Net Annual Pumpage
(divide line 33 by line 14 and multiply by 100) %
35. Total Unaccounted for Flow (subtract amount on line 33 from line 14) MGD
36. Percentage of Total Unaccounted for Flow to Net Annual Pumpage
(divide line 35 by line 14 and multiply by 100) %

Please Check Your Calculations

The sum of lines 33 and 35 should equal line 14. If they do not equal, recheck your calculations.
The sum of lines 34 and 36 should equal approximately 100%. If not, check your calculations.

Section III - Maximum Unavoidable Leakage Worksheet

Complete the following calculations to determine your maximum unavoidable leakage. Enter the appropriate amounts in the spaces provided.

A. Cast Iron Pipes With Lead Joints

Age of Pipe	Miles of Pipe	Leakage Rate*...Unavoidable Leakage**
1. 60 yrs. or greater	_____	x 3000 g/d/mi = _____ g/d
2. 40-60 yrs.	_____	x 2500 g/d/mi = _____ g/d
3. 20-40 yrs.	_____	x 2000 g/d/mi = _____ g/d
4. 20 yrs. or less	_____	x 1500 g/d/mi = _____ g/d

B. All Other Types of Pipes and Joints

5. 60 yrs. or greater	_____	x 2500 g/d/mi = _____ g/d
6. 40-60 yrs.	_____	x 2000 g/d/mi = _____ g/d
7. 20-40 yrs.	_____	x 1500 g/d/mi = _____ g/d
8. 20 yrs. or less	_____	x 1000 g/d/mi = _____ g/d
9. Total Miles	_____	Total Leakage _____ g/d
10. Total Maximum Unavoidable Leakage, in MGD (divide total leakage on line 9 by 1,000,000)	_____	MGD

(Enter this amount on line 31 of "Section II - Water Use Audit")

* Leakage Rate expressed in gallons per day per mile (g/d/mi)

** Maximum Unavoidable Leakage expressed in gallons per day (g/d)

Section IV - Conversion Table

Below are conversion calculations to convert the most commonly used units to units of million gallons per day (MGD).

To convert cubic feet per year (cf) to (MGD) use:

$$\text{cf} \times 7.48 \div 1,000,000 \div 365 = \text{MGD}$$

To convert gallons per year (g) to (MGD) use:

$$\text{g} \div 1,000,000 \div 365 = \text{MGD}$$

To convert gallons per day (g/d) to (MGD) use:

$$\text{g/d} \div 1,000,000 = \text{MGD}$$

To convert million gallons per year (mg) to (MGD) use:

$$\text{mg} \div 365 = \text{MGD}$$

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