A River is Reborn—Use Attainability Analysis for the Lower Des Plaines River, Illinois

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ABSTRACT: The goal of the Use Attainability Analysis (UAA) of the Lower Des Plaines River was to upgrade the designated "Secondary Contact Recreation and Indigenous Aquatic Life Use" to a higher use that would be commensurate with the goals of the Clean Water Act (CWA). In Illinois, the water body use in compliance with the goals of the CWA is named "General Use". The river has been extensively modified and receives most point-source and urban runoff discharges from the Chicago metropolitan area (9.5 million inhabitants). The study included an extensive assessment of the physical, chemical, biological, and bacteriological integrity status of the water body and sediments. The UAA found that the water quality situation of the river has improved significantly since the 1970s, when the Illinois Pollution Control Board defined and assigned the Secondary Contact Recreation and Indigenous Aquatic Life Use designation to the Lower Des Plaines River. The study defined and suggested a "Modified Impounded Use" for one highly modified reach, with adjusted standards for dissolved oxygen and recreation. The study also recommended adoption of the General Use standards, some of them in a modified form, for other water quality parameters. Standards for limited recreation were also developed. The UAA also outlines a suggested action plan that will bring UAA segments of the Lower Des Plaines River in compliance with UAA goals. *Water Environ. Res.*, **79**, 68 (2007).

KEYWORDS: use attainability analysis, water body assessment, water quality, water quality standards, habitat assessment, Index of Biotic Integrity, water quality planning, total maximum daily load, Chicago waterways, Lower Des Plaines River.

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Introduction

Water Body Uses. The Lower Des Plaines River is the largest effluent-dominated stream in the United States. The river and accompanying upstream Chicago waterways receive almost all point-source and urban runoff discharges from the Chicago metropolitan area (9.5 million inhabitants). In addition to propagating aquatic life and providing recreation for people, the Lower Des Plaines River provides flood conveyance and control as well as disposal of residual waste loads, combined sewer overflows (CSOs), and urban runoff. As one of the nation's busiest inland navigation arteries, the river also serves as the source for cooling water for thermal power generation, industrial water supplies, and landscape irrigation.

The aforementioned economic uses of the Lower Des Plaines River were achieved through physical alteration of the water body, such as

- Impounding and channelizing the river to provide navigation depth and head for other water works (for example, hydropower generation);
- Periodic dredging of sediments in the impounded reaches to maintain navigation;
- Dikes and embankments to control floods and prevent extensive flood damage, especially in congested urban areas; and
- Extensive channelization that relocated the former river body or resulted in completely artificial water bodies being built.

The requirement for the Use Attainability Analysis (UAA) stems from Section 101(a) of the Clean Water Act (CWA), which states, "... it is the national goal that wherever attainable ... water quality provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water ..." In this article, uses that agree with Section 101(a) will be called "statutory uses". In practice, the UAA investigates whether the chemical standards and physical and biotic criteria assigned for the statutory balanced aquatic life and primary recreation are attainable and, if they are not, the UAA develops alternatives.

In contrast, the total maximum daily load (TMDL) process implementing state water quality standards is a planning process that leads to achievement of the water quality standards in water quality-limited receiving water bodies. Total maximum daily load *de facto* presumes that the statutory designated use and corresponding standards are attainable. In instances where attainability of the designated use and corresponding standards are in question, a UAA should precede or even substitute the TMDL process. The U.S. Environmental Protection Agency (U.S. EPA) (1994) defined water quality-limited segments as "those that do not or are not expected to meet applicable water quality standards even after the application of technology-based effluent limitations required by Sections 301 and 306 of the Clean Water Act."

Table 1 specifies the conditions that would allow a change of the statutory uses and standards. To carry out the socio-economic impact analysis outlined in no. 6 in Table 1, the load capacity of the water body needs to be determined along with the waste load allocation (Novotny et al., 1997), which is a standard procedure of

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Table 1—Six reasons allowing a change of designated use in a UAA (U.S. EPA, 1994).

(1) Naturally occurring pollutant concentrations prevent attainment of the use; or
(2) Natural, ephemeral, intermittent or low flow or water levels prevent the attainment of the use unless these conditions may be compensated for by the discharge of a sufficient volume of effluent discharge without violating state conservation requirements to enable uses to be met; or
(3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or
(4) Dams, diversions, or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modifications in a way that would result in the attainment of the use; or
(5) Physical conditions related to the natural features of the water body, such as the lack of proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or
(6) Controls more stringent than those required by Sections 301(b)(1)(A) and (B) and 306 of the Act would result in substantial and wide-spread adverse social and economic impact.

the TMDL process. Thus, the TMDL and UAA processes are intertwined (Committee, 2001).

The state of Illinois recognizes two water use classifications: (1) General Use, which meets the goals of CWA, and (2) Secondary Contact Recreation and Indigenous Aquatic Life Use (Secondary Contact Use), which was used for highly modified and degraded river systems at the time the use was designated in the 1970s. While most UAAs have been developed to downgrade a use or to adjust the standards downwards (Novotny et al., 1997), the Illinois Environmental Protection Agency (IEPA), in the case of the Lower Des Plaines River and, currently, for the entire Chicago Waterways System, was looking for a way to upgrade the Secondary Contact Use assigned to the river. This Secondary Contact Use classification has an objective of protecting the existing aquatic organisms, allowing limited noncontact recreational opportunities, and avoiding nuisance and aesthetically impaired conditions. Protecting existing aquatic organisms indirectly inferred protection of organisms that could survive in these impaired water bodies. The IEPA and U.S. EPA wanted to achieve the highest attainable water use that was as consistent as possible with the goals of Section 101(a) of CWA.

Table 2 compares the Secondary Contact Use and Indigenous Aquatic Life Use standards with those for the Illinois General Use. However, based on current knowledge, some of the Secondary Contact Use standards defined in the 1970s are lethal to many organisms residing in northern Illinois streams and could potentially inhabit the Lower Des Plaines River. The UAA is a legitimate means to strive for a higher use when that designated is a lesser use than that specified by Section 101(a)(2) of CWA. If the efforts needed to upgrade the river quality and habitat do not cause "a widespread and substantial adverse socio-economic impact (U.S. EPA, 1994)," the higher use is considered attainable (Table 1).

Chicago Sanitary and Ship Canal and the Lower Des Plaines River. Until the beginning of the 20th century, wastewater from Chicago, including CSOs, was discharged into the Chicago and Calumet Rivers and was conveyed into Lake Michigan or directly into the lake. The polluted discharges into the lake, which is the main source of drinking water for the metropolis, had severe public health consequences. In the 1870s and 1880s, Chicago had the highest per capita municipal typhoid rate in the United States (Macaitis et al, 1977). In 1889, the Illinois State Legislature created the Chicago Sanitary District to solve this acute health problem. The District is the predecessor of the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC). As a solution to problems the unhealthy water quality of the Chicago and Calumet Rivers, ground was broken in 1892 by the District (MWRDGC) for CSSC. The 45-km (28-mile) -long canal, which is wider and as deep as the Suez Canal, was completed at the beginning of the 20th century. The canal reversed the flow direction of the Chicago River into CSSC and, subsequently, into the Lower Des Plaines River. The Calumet–Sag Channel, also reversing the flow of the Calumet River into CSSC, opened in 1922. The result of these massive projects was the diversion of all wastewater effluent flows, stormwater, and CSOs into CSSC as well as a virtual elimination of any overflows into the lake. By 1917, typhoid deaths (per capita) dropped to the lowest level for major cities in the nation (Chicago Public Library, 2005). Subsequent legal agreements between the Great Lakes states and Canadian provincial governments authorized a total diversion of 90 m^3/s (3200 cfs) of Lake Michigan flow into CSSC and the Lower Des Plaines River. This diversion allowance also included all wastewater and runoff discharges, which otherwise would be flowing into the lake.

The Des Plaines River originates just above the Illinois–Wisconsin border in southeast Wisconsin and flows in a southerly direction through Lake and Cook counties in Illinois. In the Chicago metropolitan area, the river makes a southwesterly turn and parallels the Chicago Sanitary and Ship Canal (CSSC) until the confluence with CSSC near Joliet, Illinois. The reach between the confluence of the river with CSSC downstream of the Lockport Dam is the Lower Des Plaines River. The river then continues to the Kankakee River; the confluence of the two rivers is the beginning of the Illinois River (Figure 1). The total watershed area of the Des Plaines River, excluding CSSC, is 4059 km^2 and the CSSC drainage is 1899 km^2 (673 square miles).

According to the U.S. Geological Survey, the long-term mean discharge of the Des Plaines River above the confluence with CSSC at Riverside, Illinois, is 10.9 m^3/s (387 cfs). The mean flow contribution from CSSC measured at Romeoville, Illinois, is approximately 104 m^3/s (3668 cfs); after the confluence with CSSC, the mean flow is approximately 115 m^3/s. This can be compared to the capacity of the Stickney, Illinois, wastewater treatment plant, which, operating at a capacity of 28.5 m^3/s, is the largest treatment plant operated by MWRDGC. The entire point-source contribution from all municipal and industrial treatment plants in the Chicago metropolitan area draining into the Lower Des Plaines River is approximately 53 m^3/s. Additional wastewater contributions still originate from CSOs. Clearly, the Lower Des Plaines River is effluent-dominated. During low-flow conditions, more than 90% of the entire flow consists of point-source effluent discharges.

The UAA of the Lower Des Plaines River extended from the confluence of the river with the CSSC downstream to the Interstate 55 (I-55) Bridge. Almost the entire UAA reach is impounded and has two morphologically different segments, the Brandon Road

Table 2—Example of Numeric Illinois State Standards and Federal Aquatic Life Protection and Water Contact Criteria.

Parameter	Illinois General Use Standards Title 35:Env. Protection0, C:Wat. Pollution, CH. 1	Federal Aquatic Life Protection Criteria 40 CFR 131	Illinois Secondary Contact and Indigenous Aquatic Use Standards*
Dissolved Oxygen (mg/L)	5.0 (minimum), 6.0 (for 16 hours on any day) (Permissible excursion at flows less than Q7–10)	Early life stages: 7 day mean - 6.0 1 day minimum - 5.0 Other life 7 day minimum - 4.0 1 day minimum - 3.0	4.0 3.0 (Calumet Canal) (Permissible excursion at flows less than Q_{7-10})†
Coliforms (No/100ml)	200 (May–October) (geometric mean) 400 (max 10% of samples in any 30 day period) Fecal coliforms	126 (geometric mean of 5 samples over a 30 day period) E. coli - Risk based geometric mean and maximum single value	Repealed
Temperature	32°C (Apr.–Nov.) 16°C (Dec.–March)	Geographically variable	>34°C ≤5% of time ≤37.8 at all times†

Toxic compounds	Acute	Chronic	Acute	Chronic	
Arsenic (µg/L) trivalent-dissolved	360	190	360	190	1000‡ (total)
Cadmium** (µg/L) (dissolv.)	25.3–33.7	2.2–2.7	Similar to General Use	Similar to General Use	150‡ (total)
Copper** (µg/L) (dissolved)	39.3–50	24.2–30.3	Similar to General Use	Similar to General Use	1000‡ (total)
Cyanide (µg/L)	22	5.2	22 (Total)	5.2 (Total)	100† (total)
Lead** (µg/L) (dissolved.)	231–300.8	58.3–81.6	Similar to General Use	Similar to General Use	1000† (total)
Nickel** (µg/L) (dissolved)	167.6–209.6	10.2–12.4	Similar to General Use	Similar to General Use	1000‡ (total)
Zinc** (µg/L) (dissolved)	244.4–305.7	220.6–286.5	Similar to General Use	Similar to General Use	1000‡ (total)

† Potentially lethal to some aquatic organisms indigenous to Northern Illinois,
‡ Lethal.
* Title 35:Env. Protection, C:Wat. Pollution, CH1, ** site specific standard calculated from hardness for General Use and federal criteria.

Pool above the Brandon Road Lock and Dam and the portion of the Dresden Island Pool above the I-55 Bridge.

The Brandon Road Pool is 6.4 km in length, approximately 91-m wide, and has a depth varying between 3.6 and 4.6 m. It is almost entirely within the city of Joliet (population 106 200 in the 2000 census). The pool is an artificial channel with side masonry, concrete or sheet pile embankments that protect the city from flooding and other effects. The downtown city elevation is below the water level in the waterway. The average velocity in the pool is 0.23 m/s. CSSC is the main tributary of the Lower Des Plaines River segment under consideration and contributes approximately 90% of flow to the river downstream from the confluence with the Des Plaines River.

The water quality status of the Des Plaines River, upstream from the confluence with CSSC, has been classified as "fair" in the State Water Quality Reports mandated by Section 305[b] of CWA. The Des Plaines River collects runoff and point-source discharges from many suburban communities. Runoff from the largest commercial *diffuse source in the upstream watershed*, Chicago's O'Hare International Airport, is collected and conveyed to the MWRDGC system for treatment.

The Dresden Island Pool is 22.5-km long, approximately 245-m wide, and has a depth varying between 0.6 and 4.5 m. The average stream velocity is 0.2 m/s. The 13-km reach of the impoundment that is part of the UAA study is more "natural" than the Brandon Road Pool in that it meanders and has a fair amount of natural shoreline and side channels. In the Dresden Island Pool, the U.S. Army Corps of Engineers maintains a 2.7-m-deep navigational channel. The UAA reach subjected to the Secondary Contact standards ends at the I-55 Bridge. Downstream of the bridge, the Lower Des Plaines River joins the Kankakee River and becomes the Illinois River. Figure 2 shows the UAA reaches (Brandon Road and Dresden Island Pools) as well as the location of monitoring stations operated by MWRDGC and IEPA.

Water Quality Assessment

The pollution population equivalent of effluent discharge carried by CSSC to the Lower Des Plaines River is approximately 9.5 million. The massive Tunnel and Reservoir Project (TARP), designed and operated by MWRDGC to provide storage and treatment of CSOs and to prevent basement flooding in the Chicago area, has significantly reduced the number (i.e., frequency) of overflows per year. With the full implementation of the reservoir portion of TARP, the frequency of overflows will be further reduced. Combined sewer overflows reaching the river via CSSC contain a mixture of untreated wastewater and urban runoff from the city of Chicago as well as the rest of Cook County.

Several large power plants use water from CSSC and the Lower Des Plaines River for cooling. These plants are operated by Midwest Generation (and previously by Commonwealth Edison,

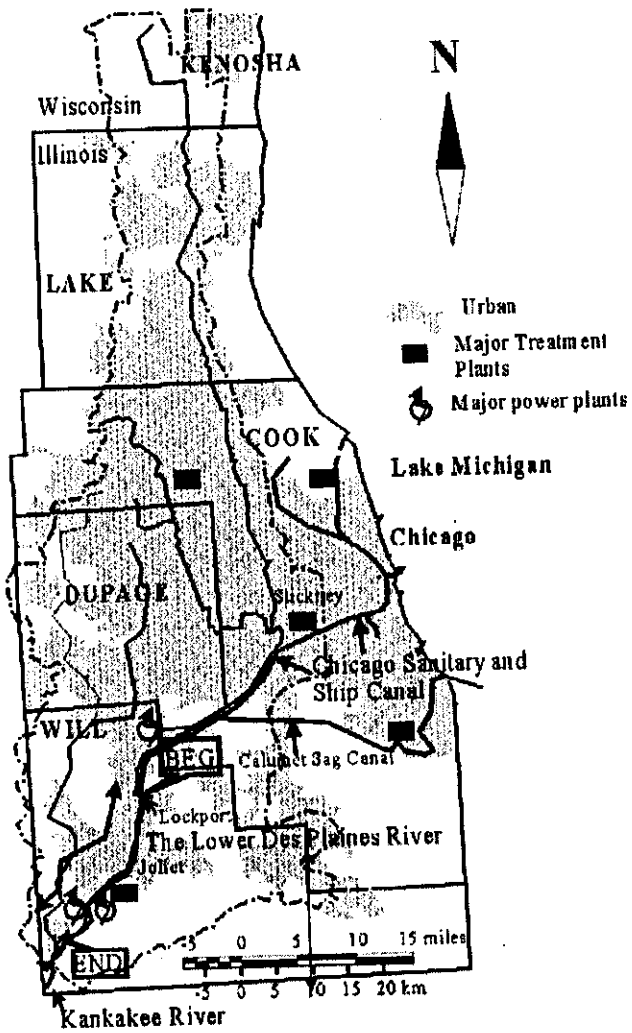

Figure 1—Map of the Des Plaines River and part of CSSC from the Illinois state line to the confluence with the Kankakee River (beginning of the Illinois River).

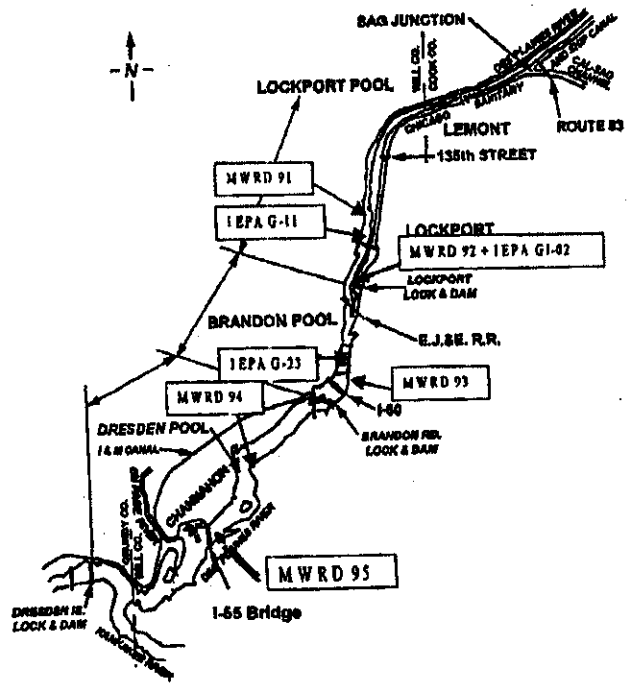

Figure 2—The Lower Des Plaines River and locations of MWRDGC and IEPA water quality monitoring points.

which sold its power production to Midwest Generation in 1999). The Will County power plant takes cooling water from CSSC (outside the UAA reach). The city of Joliet's power generating units are located at the beginning of the Dresden Pool. The plants use once-through cooling. During the summer of 1999, 24 supplemental cooling towers were installed on the cooling water outlet channel at Station #29 in Joliet. The towers are used as needed to keep the temperature of the river at the I-55 Bridge at or below the adjusted temperature standard requested by Commonwealth Edison and approved by the State of Illinois Pollution Control Board. Although the once-through (i.e., run of the river) cooling water capacities of these plants exceed all of the low flows of CSSC (Will County power plant) or the Lower Des Plaines River (two power plant units in Joliet), the plants cannot use all of the river flow for cooling due to the temperature limit at the I-55 Bridge location.

The IEPA has identified the following parameters of concern for the sections between the confluence of CSSC and the Kankakee River: priority organics, metals, ammonia, low dissolved oxygen (DO)/organic enrichment nutrients, pathogens, siltation, habitat alterations, and flow alteration.

Significant progress has been made in improving water quality at the Stickney, Calumet, North Shore, Joliet, and other water reclamation (wastewater treatment) plants discharging into the Lower Des Plaines River system. Approximately 85% of the CSO discharges from the Chicago metropolitan area are now conveyed into the TARP system and receive treatment in the Stickney plant.

Chemical Parameters. Use evaluation and analysis are accomplished by comparing existing or predicted future water quality to a set of water quality standards or criteria. If the standards are not met, a scientific assessment will determine whether they are attainable. Generally, a standard (criterion) for a pollutant has three components (U.S. EPA, 1994):

- *Magnitude*—How much of a pollutant (or a pollutant parameter such as toxicity), expressed as concentration, is allowable.
- *Duration*—The period during which the instream concentration is averaged for comparison with the magnitude of the standard. The specification limits the duration of concentration above the criteria.
- *Frequency*—How often the standards can be exceeded.

Many states simplified the frequency/duration component by substituting the rule that a numeric standard must be maintained (i.e., not to be exceeded) at all times. Such a limitation is statistically impossible because there is a small chance that a water parameter may reach a high, but statistically possible, value exceeding an established standard (Committee, 2001). The federal criteria defined the permissible frequency of excursions for federal toxicity (priority pollutants) criteria. The Water Quality Standard Regulation (U.S. EPA, 1992, 1994) specifies the following:

- *Acute toxicity criteria*—1-hour average concentration (essentially a grab sample) not to be exceeded more than once in 3 years on average (1B3 allowable excursions) and

- *Chronic toxicity criteria*—4-day average concentration not to be exceeded more than once in 3 years on average (4B3 allowable excursions) and used for most toxic pollutants, or 30-day average concentration (30B3 allowable excursions) that is used for ammonium toxicity.

A frequency of once in 3 years of allowable excursions corresponds to a probability of $1/(365 \times 3) = 0.001$, or 0.1%, of being exceeded or 0.2% of being equaled or exceeded. As such, $100 - 0.2 = 99.8\%$ should be the probability of compliance. The concept of probabilistic fitting is shown in Figure 3 and has been described in detail by Novotny (2003, 2004). In this methodology, the water quality data are fitted to the log-normal probability distribution and the line of the best fit is extended to the critical probability of being less or equal. The critical decision point is placed at a 99.8% probability of being less for the acute (criterion maximum concentration) standard. For dissolved oxygen, the concentrations can be arranged and plotted in descending order of magnitude. Figure 3 also shows that evaluation of compliance with water quality standards without statistics may be arbitrary. For example, if only nine water quality data points were available (shaded circles), all data could have complied with the pertinent magnitude of the water quality standard, but the frequency and duration of statistical exceedance would be violated.

For nonpriority pollutants, scientific judgment was used to determine the frequency and duration components if such information was not specified in the standard or criteria documents. Usually, the duration component is specified (e.g., the magnitude of the DO standard or temperature can be exceeded for a specified number of hours), but the frequency component may be missing. In such cases, compliance with a standard will occur if all measured data are below the standard and/or 95 to 99% of the data are below the standard.

This frequency criterion is more stringent than that suggested in the 305(b) reporting guidelines. These guidelines (U.S. EPA, 1997) specify that, for a particular chemical water quality constituent, a water body would be fully supporting the aquatic life use if the number of samples that do not meet the standard is 10% or less (i.e., only 90% compliance is required). This is in conflict with the frequency component of the water quality standards and, for some parameters (e.g., dissolved oxygen), it would lead to dubious water quality conclusions. For example, this guideline evaluation, in an extreme situation, allows dissolved oxygen to stay below the standard for 1 month, yet the water body would still be classified as good/fully supporting.

For chronic toxicity, U.S. EPA's water quality guidelines (U.S. EPA, 1992, 1994) require 4-day averaging (30 days for ammonium) periods. This infers that samples must be taken daily or composited during 4- or 30-day periods, respectively. Such sampling programs are rarely available. For such "incomplete" monitoring series' that do not allow 4-day averaging, the 99.4 percentile was used in the first cut (Tier I) analysis to define the chronic standard as suggested by the statistical analysis of a U.S. EPA expert (Delos, 1990). Substituting data points generated by Monte Carlo simulation has also been used in the Tier II analysis (AquaNova International/Hey and Associates, 2003; Novotny, 2004).

Figure 2 shows the location of sampling points. The key sampling points used in the UAA are those located in the segments of the Des Plaines River between the Lockport Dam and the I-55 Bridge. The reference site on the Kankakee River defines the reference conditions for this preliminary analysis. Analysis of data

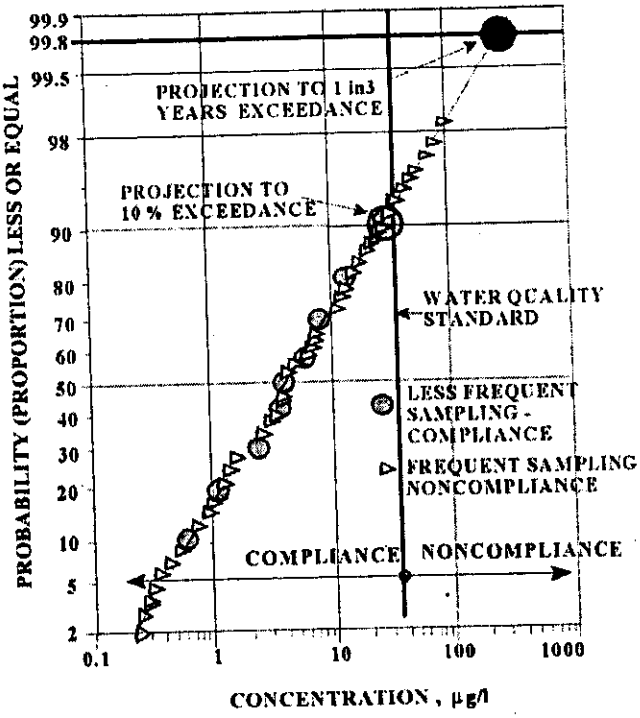

Figure 3—Statistical plotting using log-normal probability plots and the decision on compliance with water quality standards. The decision point is set at the intercept of the probability line and the 99.8 percentile of being less or equal. For compliance, the decision point should not be above the water quality standard.

in the river upstream of the Lockport Dam and in the CSSC is for comparative purposes. The Kankakee River is the nearest minimally polluted stream that has flows of the same order of magnitude as the Lower Des Plaines River. The watershed of the Kankakee River borders that of the Lower Des Plaines River to the south. Unlike the Lower Des Plaines River, the Kankakee River is not impounded and its chemical characteristics were used as a benchmark for assessment of chemistry. As stated previously, the confluence of the Kankakee and Lower Des Plains Rivers forms the Illinois River.

Statistical probability plots of both IEPA and MWRDGC data from 1995 to 2000 were produced for each parameter. In the case of the reference Kankakee River site, all existing data were used in the statistical analysis because changes in most reference watersheds are not rapid (they should be least impacted by human actions) and the data base would have been insufficient if restricted only to a period of analysis of the 5 years preceding the study. An example of the plot is shown in Figure 4. Toxic compounds included in the analysis were compared with both the acute and chronic Illinois General Use standards. Standards for metals were calculated from hardness (U.S. EPA, 1994) and the standards calculated from the average hardness for the sites are included in Table 2. The total ammonium standard was developed by formulae taken from the updated federal criteria documents (U.S. EPA, 1999). The acute and chronic criteria for ammonium are also site-specific because they are calculated from pH (acute) and pH and temperature (chronic).

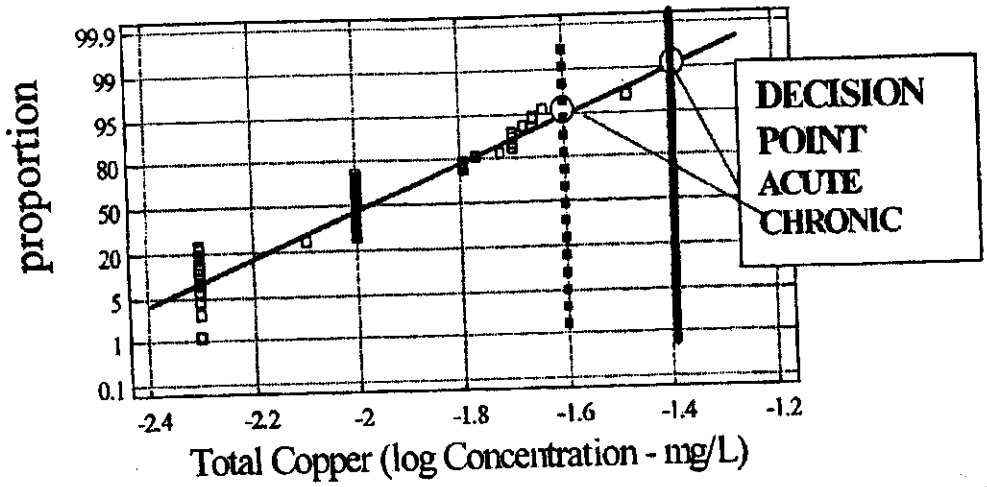

Figure 4—Example of a statistical plot of copper used for establishing probabilities of excursions of the standard.

Tier I—Screening Analysis. Parameters listed in Table 3 meet the Illinois General Use standards and the federal aquatic life protection and propagation criteria. By default, they also meet the current Secondary Contact Recreation and Indigenous Aquatic Life Use because these standards are less stringent. The water quality parameters have also passed the 99.8 percentile probability test for nonexceedance in spite of the fact that some are not priority pollutants. Chloride is not a priority pollutant, and organisms can tolerate extended periods of higher salinity; therefore, the 97% compliance was deemed to be satisfactory (note that the guidelines for the 305[b] reporting characterize 90% compliance for non-priority pollutants as "good"). For the parameters listed in Table 3, the General Use of the water body (aquatic life protection) has been met. Table 4 includes parameters that did not pass the Tier I test and required further analysis.

In the final Tier II analysis, dissolved oxygen, temperature, and coliform bacteria required formulation of new standards and adjustment of uses. Monte Carlo modeling was used to generate missing data for chronic toxicity evaluations for ammonium and copper, along with implementing the concept of the water effect ratio. The QUAL 2E Model developed by the Institute for Environmental Risk Management of Marquette University,

Table 3—Parameters meeting Illinois General Use Standards and Federal Criteria.

Parameter	Representative sites meeting General Use Standards	Approximate probability of compliance with General Use Standard
Arsenic	All in the Lower Des Plaines R.	>99.8%
Barium	All	>99.8%
Boron	All	>99.8%
Cadmium	All	>99.8% (CCC)[1]
Chloride	All	97% (MWRDGC 94, 95)
Chromium (trivalent)	All	>99.8%
Cyanide (WAD CN)	MWRDGC 93, 94, 95	>99.8%
Fluoride	All	>99.8%
Iron	All	>99.8%
Lead	All	>99.8%
Manganese	All	>99.8%
Nickel	All	>99.8%
Phenols	MWRDGC, IEPA sites	>99.8%
Selenium	All	>99.8%
Silver	All	>99.8%
Sulfate	All	>99.8%
Tot. Ammonium as N (CMC)	All	[2]
Tot. Ammonium as N (CCC)	All	
Zinc	All	MWRDGC and IEPA sites >99.8% for total and dissolved zinc acute (CMC) standard only

[1] Chronic standard for cadmium is 10 to 25% below the detection limit. All measured dissolved cadmium concentrations in the last five years were at or below the detection limit, consequently it is not possible to calculate WER. Compliance with the chronic standard is impossible to ascertain but is assumed.

[2] An exact estimation of compliance involves statistical fitting and joint probability consideration of 3 parameters, Total NH_4^+, temperature, and pH, calculated as 30 day (4 day) averages. Furthermore, all three parameters are not pure random variables but exhibit a cyclic pattern. A scientific judgement was used in the Tier 1 analysis.

Table 4—Parameters not meeting Illinois General Use Standards or are threatened.

Parameter	Representative Lower Des Plaines River Sites Not Meeting General Use Standards	Comment on meeting the Secondary Contact and Indigenous Aquatic Life Standards
Copper	MWRDGC sites (chronic & acute)[1)]	All sites meeting Illinois Secondary Contact Use standard
Mercury	MWRDGC sites (chronic & acute)[1)]	MWRDGC sites 92-95 also not meeting the Secondary Contact Use standard
Fecal coliform	All stations	No Illinois Secondary Contact Use standard in force
pH	MWRDGC sites 94 & 95	Also not meeting Illinois Secondary Contact Use standard
Dissolved oxygen	All stations with exception of MWRDGC 95 (Interstate 55)	Only Stations G23 and MWRDGC 93 do not meet the Secondary Contact Use standard
Temperature	Section in the Dresden Island pool between the thermal power plant outlets and I-55 Bridge	Temperature meets the current Secondary Contact Use standards
Zinc	All MWRDGC sites[1)] (IEPA measurements not available)	Only acute Illinois General Use standard is met at all sites. Illinois chronic standard is not met at all sites. Federal chronic criterion is met at all sites.

[1)] MWRDGC sites measured total metals only.

Milwaukee, Wisconsin, simulated DO conditions and the impact of dam aeration (AquaNova International/Hey and Associates, 2003). Accurate analysis of mercury was not possible because of the detection-limit problem of the analytical method. For the remaining three parameters, the General Use standards were found to be attainable.

The problem with some current Secondary Contact Use standards (Table 2) is that they exceed chronic or even acute lethality levels. This is documented for temperature in Figure 5. For dissolved oxygen, even the Kankakee River (reference stream) had difficulty meeting the absolute minimum 5 mg DO/L standard at "all times". In the Brandon Pool, dissolved oxygen, on occasion, drops below the current 4 mg/L standard. The lowest DO concentrations generally occur at medium flows, indicating the effect of the remaining CSOs on the oxygen level of the stream, poor aeration over the Lockport Dam and in the pool itself, and possible effects of algal growths. There was a 25% probability that the DO concentrations in the Brandon Pool would be below the General Use standard of 5 mg/L and a 5% probability they could drop below the current secondary standard of 4 mg/L. In the Dresden Pool, daily variations of DO levels due to nutrient enrichment can also cause a drop in DO concentrations below the General Use standard; however, the current Secondary Contact Use standard of 4 mg/L is generally met. This situation represents a significant improvement compared to DO concentrations measured in the Lower Des Plaines River 25 to 30 years ago (Butts et al., 1975). In 1972, DO concentrations in the Brandon Pool for long time periods could not meet the interim standard of 2 mg/L (Butts et al., 1975) that was applied then. In 2000, maintaining an average daily DO level of 5 mg/L in the pool was common.

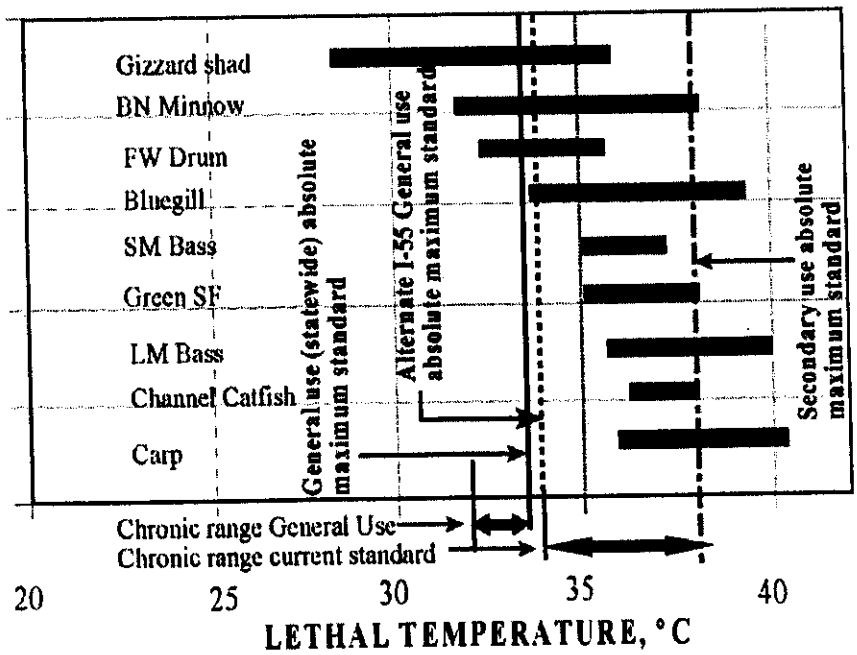

Figure 5—The Secondary Contact and Indigenous Aquatic Life Use standards for temperature allowed temperature in parts of the Lower Dresden Pool to reach levels that could have been lethal to fish. The alternate absolute maximum standard was applicable only to the end of the UAA study at the I-55 bridge.

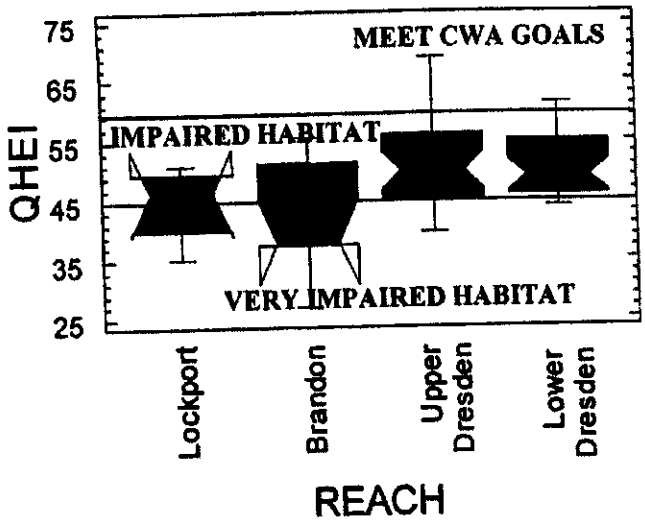

Figure 6—Habitat scores based on Ohio's QHEI Index (Rankin, 1995) for the Lower Des Plaines River and CSSC. Note that habitat scores for the Upper Dresden Pool (Secondary Contact Use) and Lower Dresden Pool (General Use) are statistically identical. The Brandon Pool and Lockport Pool (CSSC) have similar habitats corresponding to artificial navigation canals.

Sediments. U.S. EPA (Region V, Chicago, Illinois) measured sediment contamination extensively and the (public domain) data are included, in numeric and graphic form, in the appendix of the final report of the UAA (AquaNova International/Hey and Associates, 2003). The analysis found the contamination to be mostly legacy pollution that was highest in the depositional zone above the Brandon Road Dam ("river km 460" ["mile 286"] site). By calculating the pore water concentrations of the sediment and comparing them with the chronic water quality standards, polychlorinated biphenyls (PCBs), dieldrin, chlordane, and heptachlor epoxide were identified as pollutants of concern. The ammonium effect is related to temperature; however, in general, ammonium in sediments was deemed to not be toxic to aquatic biota residing in water (with the exception of the river km 460 site). Toxic metals are not a problem, with the exception of cadmium at the river km 460 site.

A more definitive evaluation was not possible without a detailed study of sediment contamination and a possible remediation TMDL. This proposal for a study should not delay implementation of water quality standards. The abatement should focus on depositional zones at the river km 460 and 453 sites.

Biological Investigations. At the time of the study, Illinois had no standards for biotic assessment, only guideline criteria. However, using biotic observations and criteria (not binding) is an indispensable tool of water quality management, UAAs, and TMDLs (Committee, 2001).

Biotic evaluations were conducted by IEPA as well as consultants for Midwest Generation and Commonwealth Edison. The data from these observations were used by UAA preparers. The biotic evaluations focused on the quality of the habitat and benthic macroinvertebrate and fish compositions expressed by indices of biotic integrity (IBIs) (Barbour et al., 1999).

Ohio's Qualitative Habitat Evaluation Index (QHEI) (Rankin, 1995) was used for habitat assessment. Poor habitat scores throughout the investigated river reaches were caused by a lack of riffle and run habitat; a lack of hard substrate; channelization and frequent bottom scouring by barge traffic; a poor riparian habitat, especially in the Brandon Pool; a lack of instream cover; and, above all, impounded conditions. The Brandon Pool is essentially a man-made channel with vertical sheet pile or masonry embankment walls. The Dresden Island Pool has a more diverse habitat. The QHEI scores for the pools are shown in Figure 6. The Lockport Pool is located on the CSSC, just above the confluence with the Lower Des Plaines River, and the Lower Dresden Island Pool is located downstream of the I-55 Bridge. These two segments are not part of the UAA investigation. The highest quality habitat scores are in the range of 55 to 66. Habitat scores below 45 are associated with

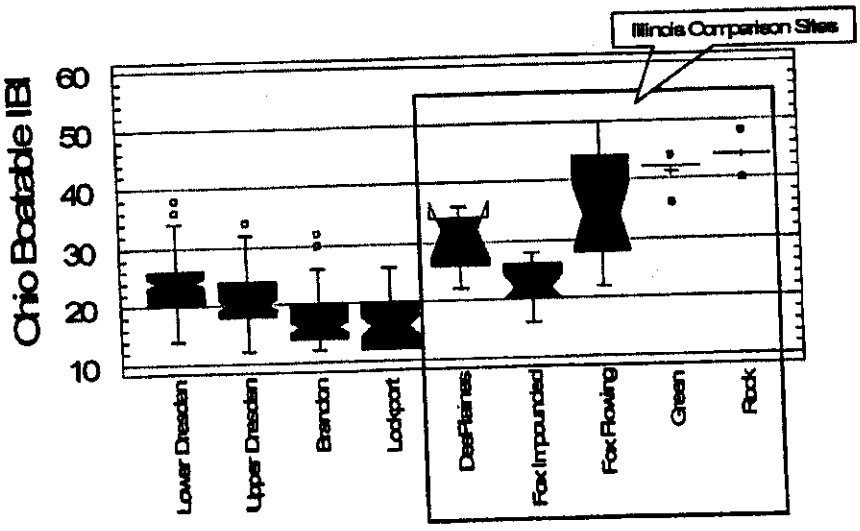

Figure 7—Ohio fish IBI scores for selected impounded Illinois streams. The Upper Dresden Pool and Brandon Pool are parts of the Lower Des Plaines River UAA. Reference water bodies are the Lower Dresden Pool, Upper Des Plaines River (free flowing), impounded and free flowing reaches of the Fox River, and impounded reaches of the Green River and Rock River. The designated use for the Upper Dresden Pool, Brandon Pool, and Lockport Pool was Secondary Contact and Indigenous Aquatic Life. All other rivers are designated as Illinois General Use.

streams that do not attain warm water habitat biocriteria and have modifications that are generally severe and widespread.

The goal of the fish IBI investigation was to evaluate the existing status and characterize the potential of the fish community in the Lower Des Plaines River. Electrofishing data, collected from 1999 to 2001 by a consultant for Midwest Generation, were analyzed using an IBI. The IBIs for the fish community of the Lower Des Plaines River were then compared to other impacted rivers in the region.

The UAA found that the Brandon Pool had consistently poorer biotic integrity than downstream reaches. The probable cause for this is the modified channel and lack of habitat. A general decline in biotic integrity was observed moving upstream from the Lower Dresden Pool into the Upper Dresden Pool (Figure 7) and continuing to the Brandon and Lockport Pools. The IBIs for other impounded Illinois streams (Fox, Rock, and Green Rivers) and the Des Plaines River upstream from the confluence with CSSC that have been designated as General Use water bodies are also shown in Figure 7. It can be seen that the Lower Dresden Pool IBIs are similar to the impounded, but not navigable, Fox River, which is a General Use stream. Comparing the impounded and free-flowing Fox River segments revealed that the impounding status results in IBIs that are 12 to 15 scoring points less than those for the free-flowing segments. For this reason, the state of Ohio developed a Modified Impounded Stream Designated Use (classification) that recognizes that impounded streams cannot reach the ecological quality of free-flowing, wadeable streams from which the IBI classification ranking was originally developed.

Bacteria. At the time of the study (1998 to 2003), secondary contact recreation in Illinois was not protected by a standard. The standard for secondary recreation was repealed more than 25 years ago. Subsequent to the repeal, treatment plants on Chicago waterways and in Joliet ceased chlorination. The bacterial status of Chicago waterways is the subject of another UAA. The Illinois General Use standard during the time of preparation of the UAA was 200 fecal coliform/100 mL as a geometric mean, and 10% of samples during any 30-day period not to exceed 400 fecal coliforms/100 mL. Through surveys, the study found that primary (contact) recreation did not exist in the Brandon Road Pool and was infrequent (incidental) in the Dresden Island Pool. Passage of recreational boats is common during summer months in both pools; the surveys also found that recreation would increase if the perception of water quality improved.

The U.S. EPA (1986) Water Quality Criteria document required states to change to *Escherichia Coli* and *Enterococci* indicator microorganisms for recreation. *E. Coli* are part of the fecal coliform group; therefore, *E. Coli* concentrations theoretically cannot be greater than fecal coliform concentrations. U.S. EPA (2002) insists on adopting the risk related to the *E. Coli* standard. Acceptable risks for water bodies with beaches that are heavily used for primary recreation range from 8 to more than 10 illnesses per 1000 swimmers, and the corresponding standards range from 126 *E. Coli*/100 mL for frequented beaches to larger values for waters that are not heavily frequented. A state can determine the level of risk.

In spite of discontinuation of effluent chlorination, Figure 8 shows that the bacterial quality of the Lower Des Plaines River has improved dramatically since the 1970s, when chlorination was practiced. This reflects the improvements in treatment technology and the impact of TARP.

Because of physical constraints imposed by the physical features of the channel and frequent navigation, the study found that the

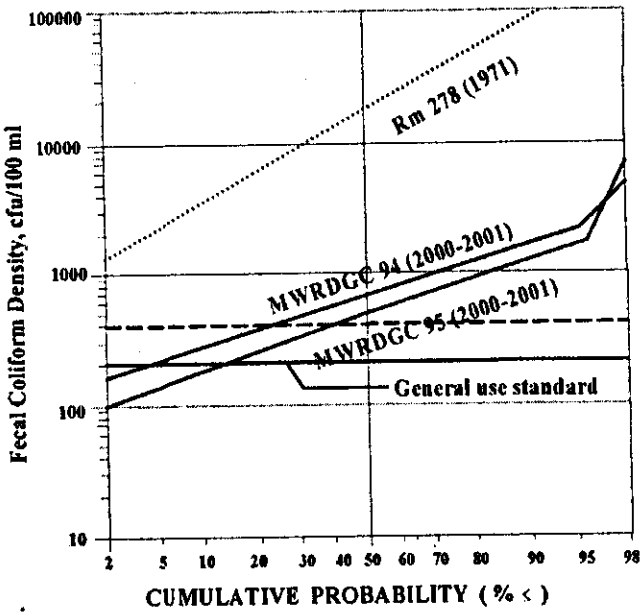

Figure 8—Probabilistic log-normal distributions of fecal coliform bacteria in the Brandon Pool. The probability lines represent the lines of the best fit of the log-normal probability distribution. The river mile 278 and MWRDGC 95 locations are at the I-55 bridge. The MWRDGC 94 location is in the middle of the Dresden Pool. Note the difference between the fecal coliform densities in 1971 (Butts et al., 1975), when the upstream effluents were disinfected, and during the 2000 to 2001 period, when upstream effluent disinfection of MWRDGC and city of Joliet treatment plants was not practiced.

Brandon Pool was not suitable for primary recreation and gave the state options that were less than primary recreation. Although physical features of the Dresden Pool are more suitable for primary recreation, primary contact recreation may not be desired nor recommended for the pool due to effluent domination of the river. However, in a situation where primary contact is possible and likely, protection of primary recreation must be implemented.

Proposed Use Change and Modified Standards

Using statistics and log-normal probability plotting (Figures 3 and 4) for each individual chemical component, the study documented that a majority of the chemical General Use standards are already attained. Furthermore, the Secondary Contract Use standards that are in the lethal zone must be repealed. Most navigable water bodies could provide conditions for balanced aquatic life and should be classified with a use commensurate with Section 101(a) of CWA (i.e., the General Use in Illinois). The purpose of the use designation is not to downgrade the use, rather, to reflect the reality that the biological composition of such water bodies may not be comparable to pristine, unimpacted reference streams that form the foundation of IBIs. Because navigation is irreversible in the long run and is specifically mentioned in CWA as a protected use, the integrity of these streams should be compared with least impacted water bodies that have the same morphological character (i.e., impounded and navigable). What makes the Lower Illinois River somewhat unusual is its effluent domination. However, as reason no. 2 of the UAA regulations (Table 1) indirectly states, effluent

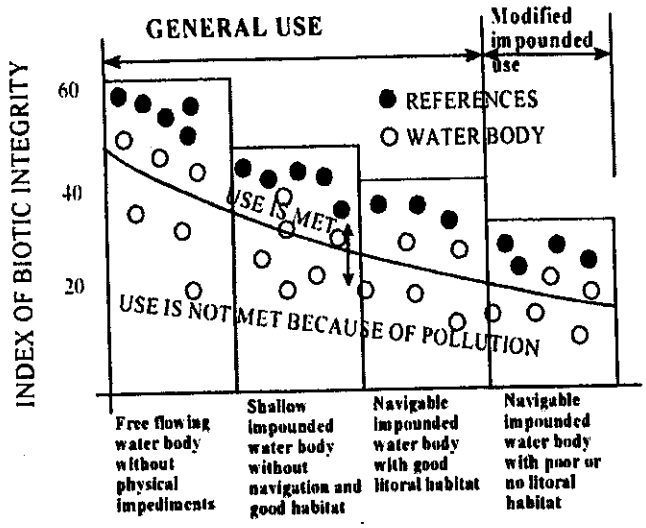

Figure 9—Proposed free-flowing and impounded river classifications.

domination cannot be used as a reason to downgrade the use nor to keep a lesser use that does not comply with Section 101(a) of CWA unless the remedy for the noncompliance would cause a widespread, adverse, socio-economic impact. In the case of the Lower Des Plaines River, meeting the General Use standards for dissolved oxygen, bacteria (pathogens), and temperature would require common technologies (e.g., cooling, stream aeration, and effluent disinfection). Implementation of these remediation technologies would not cause a widespread, adverse, socio-economic impact.

Conversely, water bodies that are heavily used for economic purposes, such as the Lower Des Plaines River, need help to achieve optimum water quality goals. Without management, these water bodies would not achieve their ecological potential. As such, management means should be provided that would compensate for the effects of physical modification and uses and lead to optimum water uses in agreement with the overall goals of CWA. Such measures may include instream or side-stream aeration, fish stocking, periodic sediment dredging, nutrient inactivation, and so on. A plan for water body management should be developed after the UAA has been completed.

The physical, man-made features of the impounded, navigable water body that make it different from an unimpacted, free-flowing stream are as follows:

- Substrate deficiency in the navigable channel that prevents or limits fish spawning and propagation;
- Legacy pollution in sediments that, based on a UAA study and/or TMDL, cannot be remedied;
- Poor aeration that, based on a UAA, cannot be remedied;
- Poor or nonexistent contact recreation due to barge traffic, embayments, stream lining, and so on;
- Lack of fish refuge;
- Impoundments that prevent fish passage and migration that cannot be remedied (e.g., by installing fish ladders);
- Flow irregularities caused by operation of locks for navigation; and
- Flow and temperature irregularities caused by increased imperviousness of the watershed, for example, that cannot be remedied.

The UAA for the Lower Des Plaines River developed a suggested modified use designation for the two pools. The objectives of the modified use designations are

- To define an optimum ecological water use for the water body,
- To delineate possible limitations on the uses of the water body, and
- To suggest possible management to maintain the optimum ecological use.

Proposing the modified use is in accordance with reason no. 4 of the UAA regulations (Table 1). The most important preamble of any such modified use designation should be that it is not a permanent designation. When irreversibility of the physical impediments ceases to exist, the water body designation should be changed to General Use.

The second preamble is if the water body can presently or potentially attain General Use designation, the General Use designation cannot be downgraded. This also applies to standards; that is, if the appropriate standards are attainable, they cannot be downgraded.

The third preamble is if the water quality problems are caused by correctable point and nonpoint discharges of pollutants, the lesser use cannot be assigned to the water body. The categorization will impact only those water quality parameters that are affected by irreversible physical impediments of the water body (e.g., lack of spawning habitat) and will not lead to a blanket relaxation of other water quality standards (e.g., toxic compounds).

The concept of the modified use is based on Ohio water body designations linked to the fish and macroinvertebrate IBIs (Figure 9). Under the proposed classification, impounded water bodies that have good to fair habitat conditions, such as shallow litoral and backwater refuge areas, could be classified as General Use (impounded). This category is appropriate for the Dresden Island Pool. The study found that the habitat quality of the Lower Dresden (General Use) and Upper Dresden (Secondary Contact Use) Pools is similar and, because the Lower Dresden Island Pool has a General Use classification, considerations should be given to extending the (modified) General Use to the entire Dresden Island Pool. Only water bodies that a UAA finds to have physical features and navigational activities that prevent early life spawning, propagation, and development would be classified as "Modified Impounded Use". The main reason for this categorization is the separation of early life present or absent categories in U.S. EPA (1986) standing criteria (and Illinois water quality standards for ammonium) that allow relaxing dissolved oxygen, ammonia, and some other standards in early life absent situations. The Brandon Road Pool has the characteristic of the modified impounded water body with early life absent and could receive this site-specific use designation. Fish studies have documented that early life forms in the Brandon Pool are present in much smaller densities than in the Dresden Pool as well as downstream reaches of the river. From this discussion it follows that, using the best impounded and channelized water bodies as a reference (for example the Rock and Green Rivers) and not wadeable, small headwater streams (e.g., the Mackinaw River), this specific form of General Use can be extended to water bodies that have smaller IBI values.

Water Quality Standard for the Modified Impounded Use. *Dissolved Oxygen.* The key decision variables in the formulation of the DO standard in the U.S. EPA (1986) document is the division of water bodies into cold and warm waters and their categorization based on the potential of early life forms to be

present or absent. The Illinois General Use criteria are similar in magnitude to the U.S. EPA warm water fish species category of the DO limit. This category is logical for the Des Plaines River and other northeastern Illinois water bodies because salmonid cold water fish species are not indigenous to these rivers and could not sustain a viable reproducing cold water population.

Consideration was given to the following wording of the U.S. EPA (1986) criteria document:

> ... Where natural conditions alone create dissolved oxygen concentrations less than 110% of the applicable criteria means or minima or both, the minimum acceptable concentrations is set at 90% of the natural concentration .... Absolutely no anthropogenic dissolved oxygen depression of the potentially lethal area below the 1-day minimum should be allowed unless special care is taken to ascertain the tolerance of resident species to low dissolved oxygen.

The U.S. EPA document also states that, during periodic cycles of DO concentrations, minima lower-than-acceptable constant exposure are tolerable so long as

- The average properly calculated concentration attained meets or exceeds the criterion and
- The minima are not unduly stressful and clearly are not lethal.

This wording allows consideration of "daily mean" instead of "instantaneous minimum" for waters that are affected by photosynthetic oxygen production and algal respiration. The state of Illinois has chosen an instantaneous minimum and U.S. EPA has accepted this interpretation.

The key to the Modified Impounded Use designation is to establish the fact that early life forms (fish) are not indigenous to the segment. As pointed out several times in this article, the Brandon Pool is an artificial, rectangular navigational channel and the fish surveys have found that early life forms cannot develop and propagate. The small numbers of more tolerant early life forms were most likely brought by currents from the upstream natural sections of the river and mostly pass through the Brandon Pool.

The federal DO criteria for early life forms absent are as follows: 30-day mean, 5.5 mg/L; 7-day mean minimum, 4.0 mg/L; and 1-day minimum, 3.0 mg/L.

The UAA study compiled DO tolerances from U.S. EPA and other literature sources for warm water fish indigenous to Northern Illinois (Figure 10). Additionally, the study analyzed the relationship between the minimum mean daily DO concentration and the 7-day minimum concentration and found that it suffices to use the 1-day minimum concentration; the 7-day and 30-day mean minima of DO concentrations are redundant. Therefore, the proposed DO standards for the Modified Impounded Use of the warm water body (Brandon Pool) were as follows: a minimum daily mean not to be below 4 mg/L and a daily absolute minimum of 3 mg/L.

The study recommended that IEPA consider developing a frequency of allowable excursions. Presently, the DO concentration is allowed to be less than the standard only at flows less than the 7 Q 10 (smallest 7 consecutive days average flow, with a recurrence interval of once in 10 years). Because there is a distinct probability that low DO concentrations may occur more frequently at flows higher than 7 Q 10, the frequency component of the standard could be expressed in terms of probability of compliance (e.g., 99.8%, which is the same as 1B3 notation) rather than an absolute minimum. However, the agency realized that, at this time, implementation of the frequency component may be legally

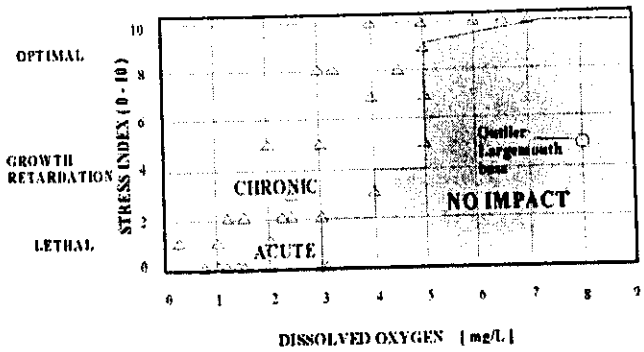

Figure 10—Impact of DO concentrations on fish that are or could be residing in the impounded Lower Des Plaines River. Data for fish effects were taken from several sources cited in the article (AquaNova International/Hey and Associates, 2003).

difficult. Conversely, 99.8% compliance may, in legal terms, have *de facto* the same effect as a "no excursion" limit.

The daily absolute minimum limit is needed and makes sense in situations where dissolved oxygen exhibits significant daily fluctuations caused by algal photosynthesis and respiration due to nutrient enrichment, which is the case of the Lower Des Plaines River.

Other parameters for the Modified Impounded Use standard (early life forms absent) that are different from the General Use standards include ammonium and the standard for recreation. Similar to the DO standards, criteria for ammonium are divided into those for water bodies with early life forms present or absent. Application of the early life forms absent standards requires the water body to be classified as a modified impounded warm water body.

Because of the irreversible physical attributes, navigation, and effluent domination of the Brandon Pool, adopting a primary contact recreation standard was not proposed and primary recreation is discouraged. However, because recreational boat traffic through the Brandon Pool is occurring and boat launches have been or are being built in Joliet, the designated use of the pool would be secondary noncontact recreation. The risk for such a use should be higher than the risk for primary contact recreation, which is recommended between 8 to 10 illnesses/1000 swimmers. The UAA proposes to establish a standard that would recognize the fact that primary contact either does not exist or would be rare and incidental. This standard would be 5 times the criterion based on the highest allowed primary contact risk that, at the conclusion of the study, was 10 illnesses/1000 swimmers. The corresponding standard would then be $5 \times 206 = 1030$ cfu/100 mL of *Escherichia Coli* indicator organisms measured as the geometric mean of samples. No single maximum standard was proposed because this limit is used for swimming beach protection.

It was recommended that all other parameters of the Modified Impounded Use would be based on the General Use standards. These standards are currently being met or are attainable. For metals, especially copper, the standards should develop and incorporate the water effect ratio concept included in the Water Quality Standards guidelines (U.S. EPA, 1994).

The study proposed that the Modified Impounded Use be implemented for the Brandon Pool only. Based on the evaluation of the existing water quality, habitat, attainable water quality, and biotic assessment, the study recommended that the General

Use (impounded) designation be extended to the entire Dresden Island Pool.

It was recommended that standards applicable to the Dresden Island Pool be based on the Illinois General Use standards. Site-specific standards are recommended for copper and dissolved oxygen. The "impounded" sub-use designation recognizes that the level of biotic integrity of impounded waters is not commensurate with the biotic integrity values typical for wadeable streams.

The Upper Dresden Island Pool has natural assets that promote primary recreation; hence, primary recreation use and the uniform standard for pathogens are recommended to be extended to the entire Dresden Island Pool. However, this stretch of the river also has a significant concentration of industrial activities and most recreation will occur downstream of the I-55 Bridge, which is outside the stretch analyzed by the UAA where the General Use is already the designated use. The expected frequency of swimming will still be low and the frequency of primary contact recreation will be much less than in other Illinois streams. Therefore, the state may choose the highest acceptable risk allowed by the U.S. EPA guidelines. The frequency of the primary use could be characterized as "Infrequent Full Body Contact" or "Marginal Primary Contact Recreation".

The UAA recommended the fecal coliform-based standard be discontinued. Because there is a correlation between *E. Coli* and fecal coliform densities and *E. Coli* density cannot exceed that of fecal coliforms, continuation of the fecal coliform-based standard does not make sense. The proposed bacteriological standards are attainable (with disinfection of Joliet effluents) and would provide adequate protection for contact recreation in the entire Dresden Island Pool.

The following modifications of the General Use standard were proposed for the Dresden Island Pool: DO standard expressed for daily mean and absolute minimum; copper standard modified by the water effect ratio to be developed for the segment; and chronic zinc standard at the level of the federal criterion continuous concentration.

The study also proposed that the temperature standard be made commensurate with the General Use standard. The current Secondary Use and Indigenous Aquatic Life Use standard for temperature does not provide protection against lethal temperature levels. The actual magnitudes of the proposed standards for the Lower Des Plaines River were subsequently developed in a U.S. EPA-commissioned study by Yoder and Rankin (2004). This extensive study based on temperature tolerances of fish indigenous to the northern Illinois modified water bodies suggested temperature limits that were more stringent than the current temperature levels of the General Use standards.

Action Plan and Conclusions

By statistically comparing the key water quality parameters with those measured in the 1970s and 1980s, the UAA found that the water quality of the Lower Des Plaines River has significantly improved since the 1970s, when the Secondary Contact Use designation was implemented by the Illinois Pollution Control Board. In the 1970s, DO levels frequently fell below 2 mg/L, ammonium levels in the river were high, and fecal coliform densities were two orders of magnitude larger than today. The bottoms of the pools were covered by dense mats of sludge worms and oxygen demand of the sediments was extremely large. In 2000, a majority of chemical water quality parameters met the Illinois General Use standards. Sediment quality has also improved. None of the sediment quality parameters analyzed by IEPA and MWRDGC from 1999 to 2000 were classified as "highly elevated" according to the IEPA scale, and the sediment texture, consisting mostly of bedrock sediments, has improved. However, sediment contamination by PCBs and several toxic pesticide degradation products that were revealed in U.S. EPA's (2001) extensive survey warrant a remedial investigation, especially in two depositional zones (AquaNova International/Hey and Associates, 2003).

The report suggested short- and long-term actions. In the short term, the UAA proposed the following actions:

- Adopt the federal criteria for pathogens and establish a Secondary Contact Use for the Brandon Road Pool and a primary higher risk recreational use for the Dresden Island Pool.
- For the Lower Des Plaines River only, express the magnitude of the DO standard as a minimum 24-hour mean dissolved oxygen concentration (5 mg/L in the Dresden Pool and 4 g/L in the Brandon Pool) and absolute minimum (4 mg/L in the Dresden Pool and 3 mg/L in the Brandon Pool, respectively).
- Develop a water effect ratio for metals based on toxicity difference between the waters of the Lower Des Plaines River and the laboratory water of the bioassays from which the standards were developed. Additionally, address the difference between the General Use chronic standard for zinc and the federal criterion.
- Consider establishing a water quality management system and coordinating group for the Lower Des Plaines River.
- To alleviate and resolve the DO problem in the Brandon Pool, the UAA suggested that, in the short-term, in-stream or side-stream aeration be implemented during the times when DO levels could drop below the proposed Modified Impounded Use standard.
- Regarding the PCB and pesticide contamination of sediments, the UAA proposed that a remediation study be conducted. The study should include a comprehensive assessment of the distribution of the contaminants and toxicity of the sediments throughout the area, and propose and assess remediation of the hot spots by sediment capping or removal and possible remediation (including recovery during no action) of contaminated sediments in and out of the navigational channels.
- Limit the use of the Brandon Pool for recreation. The governing agencies should post warnings, maintain railing and fencing along the Brandon Pool, and conduct public education to prevent use of the pool for swimming, especially by children.

For the Dresden Pool, there are four problems that prevent full attainment of ecological potential. The first problem is contamination of the sediments by three pesticide residues and PCBs in depositional zones. The second problem is the absence of disinfection of the effluents discharging wastewater with high levels of bacteria into the Dresden Island Pool. The third problem is the temperature in the Upper Dresden Island Pool. The fourth problem is lack of in-stream covers and riparian buffers that could be improved by artificial habitat improvements. As far as chemical parameters in water are concerned, the Dresden Island Pool meets the General Use standards for all parameters except mercury, temperature, and chronic zinc.

The recommendations for the Dresden Pool are:

- The UAA recommended that municipal discharges into the Dresden Pool (including tributaries) complete their program of elimination of CSOs and also consider effective best management practices for control of toxicity in urban runoff.
- While the General Use fecal coliform-based standard for

bacteria is not met, a higher risk primary contact standard based on the new U.S. EPA (2002) criteria is attainable. To accomplish the goal of providing limited contact recreation in the Dresden Island Pool, wastewater effluents containing pathogenic microorganisms should be disinfected.

- Implementing the General Use standard for temperature is a necessary step to improve the biotic integrity of the Upper Dresden Island Pool to a level commensurate with the impounded water bodies with balanced biological communities. This will require reducing thermal inputs from power plants discharging into the Dresden Island Pool.

Conditions in the Lower Des Plaines River have been steadily improving. After the common sense actions outlined in the UAA report are implemented, the potential for further improvement will increase. The Lower Des Plaines River in the Dresden Island Pool could meet the General Use classification and, in the Brandon Pool, the proposed Modified Impounded Use that are both commensurate with the goals of CWA. Although this potential for improvement is real, the water body may never reach the ecological status of pristine, wadeable streams.

Acronyms

CCC	Criterion continuous concentration (chronic toxicity limit)
CMC	Criterion maximum concentration (acute toxicity limit)
CSO	Combined sewer overflows
CSSC	Chicago Sanitary and Ship Canal
CWA	Clean Water Act
IBI	Index of Biotic Integrity
IEPA	Illinois Environmental Protection Agency
MWRDGC	Metropolitan Water Reclamation District of Greater Chicago
QHEI	Qualitative Habitat Evaluation Index
TARP	Tunnel and Reservoir Project
TMDL	Total maximum daily load
USGS	U.S. Geological Survey
UAA	Use Attainability Analysis
USEPA	U.S. Environmental Protection Agency

Credits

The UAA study of the Lower Des Plaines River was commissioned by IEPA by a consulting contract to AquaNova International, Ltd. (Mequon, Wisconsin, and Boston, Massachusetts). The authors acknowledge the contributions and cooperation of many other agencies and stakeholders in providing data, advice during stakeholders' committee meetings, and written comments. In addition to IEPA, data and advice for the study were provided by U.S. EPA, MWRDGC, Midwest Generation (previously Commonwealth Edison), Illinois Department of Natural Resources, city of Joliet, Tri-River Manufacturers Association, environmental nongovernmental organizations, and U.S. Geological Survey. The views and suggestions presented in this article are those of the UAA preparers and not of the funding or cooperating agencies. Copies of the complete UAA are available from IEPA, Springfield, Illinois. The authors also wish to thank two anonymous reviewers who provided valuable comments on the article.

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TITLE 35: ENVIRONMENTAL PROTECTION
SUBTITLE C: WATER POLLUTION
CHAPTER I: POLLUTION CONTROL BOARD

PART 301
INTRODUCTION

301.311	Method Detection Level
301.312	Minimum Level
301.313	Metals Translator
301.315	Modification
301.320	New Source
301.323	Non-Contact Recreation
301.324	Non-Recreational
301.325	NPDES
301.330	Other Wastes
301.331	Outlier
301.335	Person
301.340	Pollutant
301.341	Pollutant Minimization Program
301.345	Population Equivalent
301.346	Preliminary Effluent Limitation
301.350	Pretreatment Works
301.355	Primary Contact
301.356	Projected Effluent Quality
301.360	Public and Food Processing Water Supply
301.365	Publicly Owned Treatment Works
301.370	Publicly Regulated Treatment Works
301.371	Quantification Level
301.372	Reasonable Potential Analysis
301.373	Same Body of Water
301.375	Sanitary Sewer
301.380	Secondary Contact
301.385	Sewage
301.390	Sewer
301.395	Sludge
301.400	Standard of Performance
301.405	STORET
301.410	Storm Sewer
301.411	Total Maximum Daily Load
301.413	Total Metal
301.415	Treatment Works
301.420	Underground Waters
301.421	Wasteload Allocation
301.425	Wastewater
301.430	Wastewater Source
301.435	Watercraft
301.440	Waters
301.441	Water Quality Based Effluent Limitation
301.442	Wet Weather Point Source
301.443	Whole Effluent Toxicity

APPENDIX A
References to Previous Rules

AUTHORITY: Implementing Section 13 and authorized by Section 27 of the Environmental Protection Act [415 ILCS 5/13 and 27].

SOURCE: Filed with the Secretary of State January 1, 1978; amended at 3 Ill. Reg. 25, p. 190, effective June 21, 1979; amended at 5 Ill. Reg. 6384, effective May 28, 1981; codified at 6 Ill. Reg. 7818; amended in R88-1 at 13 Ill. Reg. 5984, effective April 18, 1989; amended in R88-21(A) at 14 Ill. Reg. 2879, effective February 13, 1990; amended in R99-8 at 23 Ill. Reg. 11277, effective August 26, 1999; amended in R02-11 at 27 Ill. Reg. 158, effective December 20, 2002; amended at in R08-_____ at _____ Ill. Reg. _____, effective _____.

Section 301.247 Chicago Area Waterway System

"Chicago Area Waterway System" means Calumet River, Grand Calumet River, Little Calumet River downstream from the confluence of Calumet River and Grand Calumet River, Calumet-Sag Channel, Lake Calumet, Chicago River and its branches downstream from their confluence with North Shore Channel, North Shore Channel and Chicago Sanitary and Ship Canal.

(Source: Added at _____Ill. Reg._____, effective _____)

Section 301.282 Incidental Contact Recreation

"Incidental Contact Recreation" means any recreational activity in which human contact with the water is incidental and in which the probability of ingesting appreciable quantities of water is minimal, such as fishing; commercial boating; small craft recreational boating; and any limited contact associated with shoreline activity such as wading.

(Source: Added at _____Ill. Reg._____, effective _____)

Section 301.307 Lower Des Plaines River

"Lower Des Plaines River" means Des Plaines River from its confluence with Chicago Sanitary and Ship Canal to the Interstate 55 bridge.

(Source: Added at _____Ill. Reg._____, effective _____)

Section 301.323 Non-Contact Recreation

"Non-Contact Recreation" means any recreational or other water use in which human contact with the water is unlikely, such as pass through commercial or recreational

navigation, and where physical conditions or hydrologic modifications make direct human contact unlikely or dangerous.

(Source: Added at _____Ill. Reg._____, effective _____)

Section 301.324 Non-Recreational

"Non-Recreational" means a water body where the physical conditions or hydrologic modifications preclude primary contact, incidental contact and non-contract recreation.

TITLE 35: ENVIRONMENTAL PROTECTION
SUBTITLE C: WATER POLLUTION
CHAPTER I: POLLUTION CONTROL BOARD

PART 302
WATER QUALITY STANDARDS

SUBPART A: GENERAL WATER QUALITY PROVISIONS

Section
302.100 Definitions
302.101 Scope and Applicability
302.102 Allowed Mixing, Mixing Zones and ZIDs
302.103 Stream Flows
302.104 Main River Temperatures
302.105 Antidegradation

SUBPART B: GENERAL USE WATER QUALITY STANDARDS

Section
302.201 Scope and Applicability
302.202 Purpose
302.203 Offensive Conditions
302.204 pH
302.205 Phosphorus
302.206 Dissolved Oxygen
302.207 Radioactivity
302.208 Numeric Standards for Chemical Constituents
302.209 Fecal Coliform
302.210 Other Toxic Substances
302.211 Temperature
302.212 Total Ammonia Nitrogen
302.213 Effluent Modified Waters (Ammonia)(Repealed)

SUBPART C: PUBLIC AND FOOD PROCESSING WATER SUPPLY STANDARDS

Section
302.301 Scope and Applicability
302.302 Algicide Permits
302.303 Finished Water Standards
302.304 Chemical Constituents
302.305 Other Contaminants
302.306 Fecal Coliform
302.3207 Radium 226 and 228

SUBPART D: CHICAGO AREA WATERWAY SYSTEM AND LOWER DES PLAINES RIVER WATER QUALITY ~~SECONDARY CONTACT AND INDIGENOUS AQUATIC LIFE~~ STANDARDS

Section
302.401 Scope and Applicability
302.402 Purpose
302.403 Unnatural Sludge
302.404 pH
302.405 Dissolved Oxygen
302.406 Fecal Coliform (Repealed)
302.407 Chemical Constituents
302.408 Temperature
302.409 Cyanide (Repealed)
302.410 Substances Toxic to Aquatic Life
302.412 Total Ammonia Nitrogen

SUBPART E: LAKE MICHIGAN BASIN WATER QUALITY STANDARDS

Section
302.501 Scope, Applicability, and Definitions
302.502 Dissolved Oxygen
302.503 pH
302.504 Chemical Constituents
302.505 Fecal Coliform
302.506 Temperature
302.507 Thermal Standards for Existing Sources on January 1, 1971
302.508 Thermal Standards for Sources Under Construction But Not In Operation on January 1, 1971
302.509 Other Sources
302.510 Incorporations by Reference
302.515 Offensive Conditions
302.520 Regulation and Designation of Bioaccumulative Chemicals of Concern (BCCs)

AUTHORITY: Implementing Section 13 and authorized by Sections 11(b) and 27 of the Environmental Protection Act [415 ILCS 5/13, 11(b), and 27]

SOURCE: Filed with the Secretary of State January 1, 1978; amended at 2 Ill. Reg. 44, p. 151, effective November 2, 1978; amended at 3 Ill. Reg. 20, p. 95, effective May 17, 1979; amended at 3 Ill. Reg. 25, p. 190, effective June 21, 1979; codified at 6 Ill. Reg. 7818; amended at 6 Ill. Reg. 11161, effective September 7, 1982; amended at 6 Ill. Reg. 13750, effective October 26, 1982; amended at 8 Ill. Reg. 1629, effective January 18, 1984; peremptory amendments at 10 Ill. Reg. 461, effective December 23, 1985; amended at R87-27 at 12 Ill. Reg. 9911, effective May 27, 1988; amended at R85-29 at 12 Ill. Reg. 12082, effective July 11, 1988; amended in R88-1 at 13 Ill. Reg. 5998, effective April 18, 1989; amended in R88-21(A) at 14 Ill. Reg. 2899, effective February 13, 1990; amended in R88-21(B) at 14 Ill. Reg. 11974, effective July 9, 1990; amended in R94-1(A) at 20 Ill. Reg. 7682, effective May 24, 1996; amended in R94-1(B) at 21 Ill. Reg. 370, effective December 23, 1996; expedited correction at 21 Ill. Reg. 6273,

effective December 23, 1996; amended in R97-25 at 22 Ill. Reg. 1356, effective December 24, 1997; amended in R99-8 at 23 Ill. Reg. 11249, effective August 26, 1999; amended in R01-13 at 26 Ill. Reg. 3505, effective February 22, 2002; amended in R02-19 at 26 Ill. Reg. 16931, effective November 8, 2002; amended in R02-11 at 27 Ill. Reg. 166, effective December 20, 2002; amended in R04-21 at 30 Ill. Reg. 4919, effective March 1, 2006; amended at in R08-_____ at _____ Ill. Reg. _____, effective _____.

SUBPART A: GENERAL WATER QUALITY PROVISIONS

Section 302.101 Scope and Applicability

a) This Part contains schedules of water quality standards which are applicable throughout the State as designated in 35 Ill. Adm. Code 303. Site specific water quality standards are found with the water use designations in 35 Ill. Adm. Code 303.

b) Subpart B contains general use water quality standards which must be met in waters of the State for which there is no specific designation (35 Ill. Adm. Code 303.201).

c) Subpart C contains the public and food processing water supply standards. These are cumulative with Subpart B and must be met by all designated waters at the point at which water is drawn for treatment and distribution as a potable supply or for food processing (35 Ill. Adm. Code 303.202).

d) Subpart D contains the Chicago Area Waterway System and the Lower Des Plaines River water quality ~~secondary contact and indigenous aquatic life~~ standards. These standards must be met only by certain waters designated in 35 Ill. Adm. Code 303.204, 303.220, 303.225, 303.227, 303.230, 303.235 and 303.237 ~~303.441~~.

e) Subpart E contains the Lake Michigan Basin water quality standards. These must be met in the waters of the Lake Michigan Basin as designated in 35 Ill. Adm. Code 303.443.

f) Subpart F contains the procedures for determining each of the criteria designated in Sections 302.210 and 302.410.

g) Unless the contrary is clearly indicated, all references to "Parts" or "Sections" are to Ill. Adm. Code, Title 35: Environmental Protection. For example, "Part 309" is 35 Ill. Adm. Code 309, and "Section 309.101" is 35 Ill. Adm. Code 309.101.

(Source: Amended at _____Ill. Reg._____, effective _____)

Section 302.102 Allowed Mixing, Mixing Zones and ZIDs

a) Whenever a water quality standard is more restrictive than its corresponding effluent standard, or where there is no corresponding effluent standard specified at 35 Ill. Adm. Code 304, an opportunity shall be allowed for compliance with 35 Ill. Adm. Code 304.105 by mixture of an effluent with its receiving waters, provided the discharger has made every effort to comply with the requirements of 35 Ill. Adm. Code 304.102.

b) The portion, volume and area of any receiving waters within which mixing is allowed pursuant to subsection (a) shall be limited by the following:

1) Mixing must be confined in an area or volume of the receiving water no larger than the area or volume which would result after incorporation of outfall design measures to attain optimal mixing efficiency of effluent and receiving waters. Such measures may include, but are not limited to, use of diffusers and engineered location and configuration of discharge points.

2) Mixing is not allowed in waters which include a tributary stream entrance if such mixing occludes the tributary mouth or otherwise restricts the movement of aquatic life into or out of the tributary.

3) Mixing is not allowed in water adjacent to bathing beaches, bank fishing areas, boat ramps or dockages or any other public access area.

4) Mixing is not allowed in waters containing mussel beds, endangered species habitat, fish spawning areas, areas of important aquatic life habitat, or any other natural features vital to the well being of aquatic life in such a manner that the maintenance of aquatic life in the body of water as a whole would be adversely affected.

5) Mixing is not allowed in waters which contain intake structures of public or food processing water supplies, points of withdrawal of water for irrigation, or watering areas accessed by wild or domestic animals.

6) Mixing must allow for a zone of passage for aquatic life in which water quality standards are met.

7) The area and volume in which mixing occurs, alone or in combination with other areas and volumes of mixing, must not intersect any area of any body of water in such a manner that the

maintenance of aquatic life in the body of water as a whole would be adversely affected.

8) The area and volume in which mixing occurs, alone or in combination with other areas and volumes of mixing must not contain more than 25% of the cross-sectional area or volume of flow of a stream except for those streams where the dilution ratio is less than 3:1. Mixing is not allowed in receiving waters which have a zero minimum seven day low flow which occurs once in ten years.

9) No mixing is allowed where the water quality standard for the constituent in question is already violated in the receiving water.

10) No body of water may be used totally for mixing of single outfall or combination of outfalls.

11) Single sources of effluents which have more than one outfall shall be limited to a total area and volume of mixing no larger than that allowable if a single outfall were used.

12) The area and volume in which mixing occurs must be as small as is practicable under the limitations prescribed in this subsection, and in no circumstances may the mixing encompass a surface area larger than 26 acres.

c) All water quality standards of this Part must be met at every point outside of the area and volume of the receiving water within which mixing is allowed. The acute toxicity standards of this Part ~~Sections 302.208 and 302.210~~ must be met within the area and volume within which mixing is allowed, except as provided in subsection (e).

d) Pursuant to the procedures of Section 39 of the Act and 35 Ill. Adm. Code 309, a person may apply to the Agency to include as a condition in an NPDES permit formal definition of the area and volume of the waters of the State within which mixing is allowed for the NPDES discharge in question. Such formally defined area and volume of allowed mixing shall constitute a "mixing zone" for the purposes of 35 Ill. Adm. Code: Subtitle C. Upon proof by the applicant that a proposed mixing zone conforms with the requirements of Section 39 of the Act, this Section and any additional limitations as may be imposed by the Clean Water Act (CWA) (33 U.S.C 1251 et seq.), the Act or Board regulations, the Agency shall, pursuant to Section 39(b) of the Act, include within the NPDES permit a condition defining the mixing zone.

e) Pursuant to the procedures of Section 39 of the Act and 35 Ill. Adm. Code 309, a person may apply to the Agency to include as a condition in an NPDES permit a ZID as a component portion of a mixing zone. Such ZID shall, at a minimum, be limited to waters within which effluent dispersion is immediate and rapid. For the purposes of this subsection, "immediate" dispersion means an effluent's merging with receiving waters without delay in time after its discharge and within close proximity of the end of the discharge pipe, so as to minimize the length of exposure time of aquatic life to undiluted effluent, and "rapid" dispersion means an effluent's merging with receiving waters so as to minimize the length of exposure time of aquatic life to undiluted effluent. Upon proof by the applicant that a proposed ZID conforms with the requirements of Section 39 of the Act and this Section, the Agency shall, pursuant to Section 39(b) of the Act, include within the NPDES permit a condition defining the ZID.

f) Pursuant to Section 39 of the Act and 35 Ill. Adm. Code 309.103, an applicant for an NPDES permit shall submit data to allow the Agency to determine that the nature of any mixing zone or mixing zone in combination with a ZID conforms with the requirements of Section 39 of the Act and of this Section. A permittee may appeal Agency determinations concerning a mixing zone or ZID pursuant to the procedures of Section 40 of the Act and 35 Ill. Adm. Code 309.181.

g) Where a mixing zone is defined in an NPDES permit, the waters within that mixing zone, for the duration of that NPDES permit, shall constitute the sole waters within which mixing is allowed for the permitted discharge. It shall not be a defense in any action brought pursuant to 35 Ill. Adm. Code 304.105 that the area and volume of waters within which mixing may be allowed pursuant to subsection (b) is less restrictive than the area or volume or waters encompassed in the mixing zone.

h) Where a mixing zone is explicitly denied in a NPDES permit, no waters may be used for mixing by the discharge to which the NPDES permit applies, all other provisions of this Section notwithstanding.

i) Where an NPDES permit is silent on the matter of a mixing zone, or where no NPDES permit is in effect, the burden of proof shall be on the discharger to demonstrate compliance with this Section in any action brought pursuant to 35 Ill. Adm. Code 304.105.

(Source: Amended at _____ Ill. Reg. _____, effective _____)

SUBPART D: CHICAGO AREA WATERWAY SYSTEM AND LOWER DES PLAINES RIVER WATER QUALITY ~~SECONDARY CONTACT AND INDIGENOUS AQUATIC LIFE~~ STANDARDS

Section 302.401 Scope and Applicability

Subpart D contains the Chicago Area Waterway System and Lower Des Plaines River water quality ~~secondary contact and indigenous aquatic life~~ standards. These must be met only by ~~certain~~ waters specifically designated in Part 303. The Subpart B general use and Subpart C public water supply standards of this Part do not apply to waters described in 35 Ill. Adm. Code 303.204 and listed in 35 Ill. Adm. Code 303.220 through 303.237 as the Chicago Area Waterway System or Lower Des Plaines River ~~designated for secondary contact and indigenous aquatic life (Section 303.204)~~.

Section 302.402 Purpose

The Chicago Area Waterway System and Lower Des Plaines River standards shall protect incidental contact or non-contact recreational uses, except where designated as non-recreational waters; commercial activity, including navigation and industrial water supply uses; and the highest quality aquatic life and wildlife that is attainable, limited only by the physical condition of these waters and hydrologic modifications to these waters. The numeric and narrative standards contained in this Part will assure the protection of the aquatic life and recreational uses of the Chicago Area Waterway System and Lower Des Plaines River as those uses are defined in 35 Ill. Adm. Code Part 301 and designated in 35 Ill. Adm. Code Part 303. ~~Secondary contact and indigenous aquatic life standards are intended for those waters not suited for general use activities but which will be appropriate for all secondary contact uses and which will be capable of supporting an indigenous aquatic life limited only by the physical configuration of the body of water, characteristics and origin of the water and the presence of contaminants in amounts that do not exceed the water quality standards listed in Subpart D.~~

(Source: Amended at _____ Ill. Reg. _____, effective _____)

Section 302.404 pH

pH ~~(STORET number 00400)~~ shall be within the range of 6.5 ~~6.0~~ to 9.0 except for natural causes.

(Source: Amended at _____ Ill. Reg. _____, effective _____)

Section 302.405 Dissolved Oxygen

Dissolved oxygen ~~(STORET number 00300)~~ concentrations shall not be less than the applicable values in subsections (a), (b) and (c) of this Section ~~4.0 mg/l at any time except that the Calumet-Sag Channel shall not be less than 3.0 mg/l at any time~~.

a) For the Upper Dresden Island Pool Aquatic Life Use waters listed in Section 303.237,

1) during the period of March through July:

A) 6.0 mg/l as a daily mean averaged over 7 days, and

B) 5.0 mg/l at any time; and

2) during the period of August through February:

A) 5.5 mg/l as a daily mean averaged over 30 days,

B) 4.0 mg/l as a daily minimum averaged over 7 days, and

C) 3.5 mg/l at any time.

b) For the Chicago Area Waterway System Aquatic Life Use A waters listed in Section 303.230,

1) during the period of March through July, 5.0 mg/l at any time; and

2) during the period of August through February:

A) 4.0 mg/l as a daily minimum averaged over 7 days, and

B) 3.5 mg/l at any time.

c) For the Chicago Area Waterway System and Brandon Pool Aquatic Life Use B waters listed in Section 303.235,

1) 4.0 mg/l as a daily minimum averaged over 7 days, and

2) 3.5 mg/l at any time.

d) Assessing attainment of dissolved oxygen minimum values.

1) Daily mean is the arithmetic mean of dissolved oxygen values measured in a single 24-hour calendar day.

2) Daily minimum is the minimum dissolved oxygen value measured in a single 24-hour calendar day.

3) The measurements of dissolved oxygen used to determine attainment or lack of attainment with any of the dissolved oxygen standards in this Section must assure daily minima and daily means that represent the true daily minima and daily means.

4) The dissolved oxygen values used in calculating or determining any daily mean or daily minimum should not exceed the air-equilibrated value.

(Source: Amended at _____ Ill. Reg. _____, effective _____)

Section 302.407 Chemical Constituents

a) The acute standard (AS) for the chemical constituents listed in subsection (e) shall not be exceeded at any time except as provided in subsection (d).

b) The chronic standard (CS) for the chemical constituents listed in subsection (e) shall not be exceeded by the arithmetic average of at least four consecutive samples collected over any period of at least four days, except as provided in subsection (d). The samples used to demonstrate attainment or lack of attainment with a CS must be collected in a manner that assures an average representative of the sampling period. For the metals that have water quality based standards dependent upon hardness, the chronic water quality standard will be calculated according to subsection (e) using the hardness of the water body at the time the metals sample was collected. To calculate attainment status of chronic metals standards, the concentration of the metal in each sample is divided by the calculated water quality standard for the sample to determine a quotient. The water quality standard is attained if the mean of the sample quotients is less than or equal to one for the duration of the averaging period.

c) The human health standard (HHS) for the chemical constituents listed in subsection (f) shall not be exceeded when the stream flow is at or above the harmonic mean flow pursuant to Section 302.658 nor shall an annual average, based on at least eight samples, collected in a manner representative of the sampling period, exceed the HHS except as provided in subsection (d).

d) In waters where mixing is allowed pursuant to Section 302.102 of this Part, the following apply:

1) The AS shall not be exceeded in any waters except for those waters for which a zone of initial dilution (ZID) applies pursuant to Section 302.102 of this Part.

2) The CS shall not be exceeded outside of waters in which mixing is allowed pursuant to Section 302.102 of this Part.

3) The HHS shall not be exceeded outside of waters in which mixing is allowed pursuant to Section 302.102 of this Part.

e) Numeric Water Quality Standards for the Protection of Aquatic Organisms

Constituent	AS (µg/L)	CS (µg/L)
Arsenic (trivalent, dissolved)	340 X 1.0*=340	150 X 1.0*=150
Benzene	4200	860
Cadmium (dissolved)	exp[A+Bln(H)] X {1.138672-[(lnH)(0.041838)]}*, where A=-2.918 and B=1.128	exp[A+Bln(H)] X {1.101672-[(lnH)(0.041838)]}*, where A= -3.490 and B=0.7852
Chromium (hexavalent, total)	16	11
Chromium (trivalent, dissolved)	exp[A+Bln(H)] X 0.316*, where A=3.7256 and B=0.8190	exp[A+Bln(H)] X 0.860*, where A=0.6848 and B=0.8190
Copper (dissolved)	exp[A+Bln(H)] X 0.960*, where A=-1.645 and B=0.9422	exp[A+Bln(H)] X 0.960*. where A=-1.646 and B=0.8545
Cyanide**	22	5.2
Ethylbenzene	150	14
Lead (dissolved)	exp[A+Bln(H)] X {1.46203-[(lnH)(0.145712)]}*, where A=-1.301 and B=1.273	exp[A+Bln(H)] X {1.46203-[(lnH)(0.145712)]}*, where A=-2.863 and B=1.273
Mercury (dissolved)	1.4 X 0.85*=1.2	0.77 X 0.85*=0.65
Nickel (dissolved)	exp[A+Bln(H)] X 0.998*, where A=0.5173 and B=0.8460	exp[A+Bln(H)] X 0.997*, where A=-2.286 and B=0.8460
Toluene	2000	600
TRC	19	11
Xylene(s)	920	360
Zinc (dissolved)	exp[A+Bln(H)] X 0.978*, where A=0.9035 and B=0.8473	exp[A+Bln(H)] X 0.986*, where A=-0.8165 and B=0.8473

where: µg/L = microgram per liter,

exp[x] = base natural logarithms raised to the x- power,

ln(H) = natural logarithm of Hardness in milligrams per liter,

* = conversion factor multiplier for dissolved metals, and

** = sample may be in the available or weak acid dissociable (WAD) forms

f) Numeric Water Quality Standard for the Protection of Human Health

Constituent	HHS in micrograms per liter (µg/L)
Benzene	310
Mercury	0.012

g) Numeric Water Quality Standards for other chemical constituents

Concentrations of the following chemical constituents shall not be exceeded except in waters for which mixing is allowed pursuant to Section 302.102 of this Part.

Constituent	Unit	Standard
Chloride	mg/L	500
Iron (dissolved)	mg/L	1.0
Selenium (total)	mg/L	1.0
Silver (dissolved)	µg/L	exp[A+Bln(H)] X 0.85*, where A=-6.52 and B=1.72
Sulfate (where H is ≥ 100 but ≤ 500 and C is ≥ 25 but ≤ 500)	mg/L	[1276.7+5.508(H)-1.457(C)] X 0.65
Sulfate (where H is ≥ 100 but ≤ 500 and C is ≥ 5 but < 25)	mg/L	[-57.478 + 5.79(H) + 54.163(C)] X 0.65
Sulfate (where H > 500 and C ≥ 5)	mg/L	2,000

where: mg/L = milligram per liter,

ug/L = microgram per liter,

H = Hardness concentration of receiving water in mg/L as $CaCO_3$,

C = Chloride concentration of receiving water in mg/L,

exp[x] = base natural logarithms raised to the x-power,

ln(H) = natural logarithm of Hardness in milligrams per liter, and

* = conversion factor multiplier for dissolved metals

~~Concentrations of other chemical constituents shall not exceed the following standards:~~

	~~STORET~~	~~CONCENTRATION~~

CONSTITUENTS	NUMBER	(mg/L)
Ammonia Un-ionized (as N*)	00612	0.1
Arsenic (total)	01002	1.0
Barium (total)	01007	5.0
Cadmium (total)	01027	0.15
Chromium (total hexavalent)	01032	0.3
Chromium (total trivalent)	01033	1.0
Copper (total)	01042	1.0
Cyanide (total)	00720	0.10
Fluoride (total)	00951	15.0
Iron (total)	01045	2.0
Iron (dissolved)	01046	0.5
Lead (total)	01051	0.1
Manganese (total)	01055	1.0
Mercury (total)	71900	0.0005
Nickel (total)	01067	1.0
Oil, fats and grease	00550, 00556 or 00560	15.0**
Phenols	32730	0.3
Selenium (total)	01147	1.0
Silver	01077	1.1
Zinc (total)	01092	1.0
Total Dissolved Solids	70300	1500

*For purposes of this section the concentration of un-ionized ammonia shall be computed according to the following equation:

$$U = \frac{N}{[0.94412(1 + 10^{X}) + 0.0559]}$$ where:

$$X = 0.09018 + \frac{2729.92}{(T + 273.16)} - pH$$

U = Concentration of un-ionized ammonia as N in mg/L

~~N = Concentration of ammonia nitrogen as N in mg/L~~
~~T = Temperature in degrees Celsius~~

~~**Oil shall be analytically separated into polar and non-polar components if the total concentration exceeds 15 mg/L. In no case shall either of the components exceed 15 mg/L (i.e., 15 mg/L polar materials and 15 mg/L non-polar materials).~~

(Source: Amended at _____ Ill. Reg. _____, effective _____)

Section 302.408 Temperature

a) Water temperature shall not exceed the maximum limits in the applicable table that follows during more than two percent of the hours in the 12-month period ending with any month. Moreover, at no time shall the water temperature at such locations exceed the maximum limits in the applicable table that follows by more than 2° C (3.6° F).

b) Water temperature in the Chicago Area Waterway System Aquatic Life Use A waters listed in 35 Ill. Adm. Code 303.230 shall not exceed the period average limits in the following table during any period on an average basis.

Months – dates	Period Average (°F)	Daily Maximum (°F)
January 1-31	54.3	88.7
February 1-28	53.6	88.7
March 1-31	57.2	88.7
April 1-15	60.8	88.7
April 16-30	62.1	88.7
May 1-15	69.2	88.7
May 16-31	71.4	88.7
June 1-15	74.2	88.7
June 16-30	85.1	88.7
July 1-31	85.1	88.7
August 1-31	85.1	88.7
September 1-15	85.1	88.7
September 16-30	77.0	88.7
October 1-15	73.2	88.7
October 16-31	69.6	88.7
November 1-30	66.2	88.7
December 1-31	59.9	88.7

c) Water temperature in the Chicago Area Waterway System and Brandon Pool Aquatic Life Use B waters listed in 303.325, shall not exceed the

period average limits in the following table during any period on an average basis.

Months – dates	Period Average (°F)	Daily Maximum (°F)
January 1-31	54.3	90.3
February 1-28	53.6	90.3
March 1-31	57.2	90.3
April 1-15	60.8	90.3
April 16-30	62.1	90.3
May 1-15	69.2	90.3
May 16-31	71.4	90.3
June 1-15	74.2	90.3
June 16-30	86.7	90.3
July 1-31	86.7	90.3
August 1-31	86.7	90.3
September 1-15	86.7	90.3
September 16-30	77.0	90.3
October 1-15	73.2	90.3
October 16-31	69.6	90.3
November 1-30	66.2	90.3
December 1-31	59.9	90.3

d) Water temperature for the Upper Dresden Island Pool, as defined in 35 Ill. Adm. Code 303.237, shall not exceed the period average limits in the following table during any period on an average basis.

Months – dates	Period Average (°F)	Daily Maximum (°F)
January 1-31	54.3	88.7
February 1-28	53.6	88.7
March 1-31	57.2	88.7
April 1-15	60.8	88.7
April 16-30	62.1	88.7
May 1-15	69.2	88.7
May 16-31	71.4	88.7
June 1-15	74.2	88.7
June 16-30	85.1	88.7
July 1-31	85.1	88.7
August 1-31	85.1	88.7
September 1-15	85.1	88.7
September 16-30	77.0	88.7
October 1-15	73.2	88.7

October 16-31	69.6	88.7
November 1-30	66.2	88.7
December 1-31	59.9	88.7

~~Temperature (STORET number (° F) 00011 and (° C) 00010) shall not exceed 34° C(93° F) more than 5% of the time, or 37.8° C (100° F) at any time.~~

(Source: Amended at _____ Ill. Reg. _____, effective _____)

Section 302.409 Cyanide (Repealed)

~~Cyanide (total) shall not exceed 0.10 mg/l~~

(Source: Repealed at _____ Ill. Reg. _____, effective _____)

Section 302.410 Substances Toxic to Aquatic Life

Any substance or combination of substances toxic to aquatic life not listed in Section 302.407 shall not be present in amounts toxic to aquatic life or wildlife ~~exceed one half of the 96-hour median tolerance limit (96-hour TL_m) for native fish or essential fish food organisms~~.

a) Any substance or combination of substances shall be deemed to be toxic or harmful to aquatic life if present in concentrations that exceed the following:

1) An Acute Aquatic Toxicity Criterion (AATC) validly derived and correctly applied pursuant to procedures set forth in Sections 302.612 through 302.618 or in Section 302.621; or

2) A Chronic Aquatic Toxicity Criterion (CATC) validly derived and correctly applied pursuant to procedures set forth in Sections 302.627 or 302.630.

b) Any substance or combination of substances shall be deemed to be toxic or harmful to wild or domestic animal life if present in concentrations that exceed any Wild and Domestic Animal Protection Criterion (WDAPC) validly derived and correctly applied pursuant to Section 302.633.

c) The most stringent criterion of subsections (a) and (b) shall apply at all points outside of any waters within which, mixing is allowed pursuant to Section 302.102. In addition, the AATC derived pursuant to subsection (a)(1) shall apply in all waters except that it shall not apply within a ZID that is prescribed in accordance with Section 302.102.

d) The procedures of Subpart F set forth minimum data requirements, appropriate test protocols and data assessment methods for establishing criteria pursuant to subsections (a) and (b). No other procedures may be used to establish such criteria unless approved by the Board in a rulemaking or adjusted standard proceeding pursuant to Title VII of the Act. The validity and applicability of the Subpart F procedures may not be challenged in any proceeding brought pursuant to Titles VIII or X of the Act, although the validity and correctness of application of the numeric criteria derived pursuant to Subpart F may be challenged in such proceedings pursuant to subsection (e).

e) Agency derived criteria may be challenged as follows:

1) A permittee may challenge the validity and correctness of application of a criterion derived by the Agency pursuant to this Section only at the time such criterion is first applied in an NPDES permit pursuant to 35 Ill. Adm. Code 309.152 or in an action pursuant to Title VIII of the Act for violation of the toxicity water quality standard. Failure of a person to challenge the validity of a criterion at the time of its first application shall constitute a waiver of such challenge in any subsequent proceeding involving application of the criterion to that person.

2) Consistent with subsection (e)(1), if a criterion is included as, or is used to derive, a condition of an NPDES discharge permit, a permittee may challenge the criterion in a permit appeal pursuant to Section 40 of the Act and 35 Ill. Adm. Code 309.181. In any such action, the Agency shall include in the record all information upon which it has relied in developing and applying the criterion, whether such information was developed by the Agency or submitted by the Petitioner. THE BURDEN OF PROOF SHALL BE ON THE PETITIONER TO DEMONSTRATE THAT THE CRITERION-BASED CONDITION IS NOT NECESSARY TO ACCOMPLISH THE PURPOSES OF SUBSECTION (a) (Section 40(a)(1) of the Act), but there is no presumption in favor of the general validity and correctness of the application of the criterion as reflected in the challenged condition.

3) Consistent with subsection (e)(1), in an action where alleged violation of the toxicity water quality standard is based on alleged excursion of a criterion, the person bringing such action shall have the burdens of going forward with proof and of persuasion regarding the general validity and correctness of application of the criterion.

f) Subsections (a) through (d) do not apply to USEPA registered pesticides approved for aquatic application and applied pursuant to the following conditions:

1) Application shall be made in strict accordance with label directions;

2) Applicator shall be properly certified under the provisions of the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 135 et seq. (1972));

3) Applications of aquatic pesticides must be in accordance with the laws, regulations and guidelines of all state and federal agencies authorized by law to regulate, use or supervise pesticide applications.

(Source: Amended at _____ Ill. Reg. _____, effective _____)

Section 302.412 Total Ammonia Nitrogen

a) Total ammonia nitrogen must in no case exceed 15 mg/L.

b) The total ammonia nitrogen acute, chronic, and sub-chronic standards are determined by the equations given in subsections (b)(1) and (b)(2) of this Section. Attainment of each standard must be determined by subsections (c) and (d) of this Section in mg/L.

1) The acute standard (AS) is calculated using the following equation:

$$AS = \frac{0.411}{1 + 10^{7.204-pH}} + \frac{58.4}{1 + 10^{pH-7.204}}$$

2) The chronic standard (CS) is calculated using the following equations:

A) During the Early Life Stage Present period, as defined in subsection (e) of this Section:

i) When water temperature is less than or equal to 14.51°C:

$$CS = \left\{ \frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}} \right\} (2.85)$$

ii) When water temperature is above 14.51°C:

$$CS = \left\{ \frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}} \right\} \left(1.45*10^{0.028*(25-T)}\right)$$

Where T = Water Temperature, degrees Celsius

B) During the Early Life Stage Absent period, as defined in subsection (e) of this Section:

i) When water temperature is less than or equal to 7°C:

$$CS = \left\{ \frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}} \right\} \left(1.45*10^{0.504}\right)$$

ii) When water temperature is greater than 7°C:

$$CS = \left\{ \frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}} \right\} \left(1.45*10^{0.028(25-T)}\right)$$

Where T = Water Temperature, degrees Celsius

3) The sub-chronic standard is equal to 2.5 times the chronic standard.

c) Attainment of the Total Ammonia Nitrogen Water Quality Standards

1) The acute standard for total ammonia nitrogen (in mg/L) must not be exceeded at any time except in those waters for which the Agency has approved a ZID pursuant to Section 302.102 of this Part.

2) The 30-day average concentration of total ammonia nitrogen (in mg/L) must not exceed the chronic standard (CS) except in those waters in which mixing is allowed pursuant to Section 302.102 of this Part. Attainment of the chronic standard (CS) is evaluated pursuant to subsection (d) of this Section by averaging at least four samples collected at weekly intervals or at other sampling intervals that statistically represent a 30-day sampling period. The samples must be collected in a manner that assures a representative sampling period.

3) The 4-day average concentration of total ammonia nitrogen (in mg/L) must not exceed the sub-chronic standard except in those waters in which mixing is allowed pursuant to Section 302.102. Attainment of the sub-chronic standard is evaluated pursuant to subsection (d) of this Section by averaging daily sample results

collected over a period of four consecutive days within the 30-day averaging period. The samples must be collected in a manner that assures a representative sampling period.

d) The water quality standard for each water body must be calculated based on the temperature and pH of the water body measured at the time of each ammonia sample. The concentration of total ammonia in each sample must be divided by the calculated water quality standard for the sample to determine a quotient. The water quality standard is attained if the mean of the sample quotients is less than or equal to one for the duration of the averaging period.

e) The Early Life Stage Present period occurs from March through October. All other periods are subject to the Early Life Stage Absent period, except that waters listed in Section 303.235 are not subject to Early Life Stage Present ammonia limits at any time.

BOARD NOTE: Acute and chronic standard concentrations for total ammonia nitrogen (in mg/L) for different combinations of pH and temperature are shown in Appendix C.

(Source: Added at _____ Ill. Reg. _____, effective _____)

TITLE 35: ENVIRONMENTAL PROTECTION
SUBTITLE C: WATER POLLUTION
CHAPTER I: POLLUTION CONTROL BOARD

PART 303
WATER USE DESIGNATIONS AND SITE SPECIFIC WATER QUALITY STANDARDS

SUBPART A: GENERAL PROVISIONS

Section
303.100 Scope and Applicability
303.101 Multiple Designations
303.102 Rulemaking Required (Repealed)

SUBPART B: NONSPECIFIC WATER USE DESIGNATIONS

Section
303.200 Scope and Applicability
303.201 General Use Waters
303.202 Public and Food Processing Water Supplies
303.203 Underground Waters
303.204 Chicago Area Waterway System and Lower Des Plaines River ~~Secondary Contact and Indigenous Aquatic Life~~ Waters

SUBPART C: SPECIFIC USE DESIGNATIONS AND SITE SPECIFIC WATER QUALITY STANDARDS

SUBPART D: THERMAL DISCHARGES

APPENDIX B Sources of Codified Sections

AUTHORITY: Implementing Section 13 and authorized by Sections 11(b) and 27 of the Environmental Protection Act [415 ILCS 5/13, 11(b) and 27].

SOURCE: Filed with the Secretary of State January 1, 1978; amended at 2 Ill. Reg. 27, p. 221, effective July 5, 1978; amended at 3 Ill. Reg. 20, p. 95, effective May 17, 1979; amended at 5 Ill. Reg. 11592, effective October 19, 1981; codified at 6 Ill. Reg. 7818; amended at 6 Ill. Reg. 11161 effective, September 7, 1982; amended at 7 Ill. Reg. 8111, effective June 23, 1983; amended in R87-27 at 12 Ill. Reg. 9917, effective May 27, 1988; amended in R87-2 at 13 Ill. Reg. 15649, effective September 22, 1989; amended in R87-36 at 14 Ill. Reg. 9460, effective May 31, 1990; amended in R86-14 at 14 Ill. Reg. 20724, effective December 18, 1990; amended in R89-14(C) at 16 Ill. Reg. 14684, effective September 10, 1992; amended in R92-17 at 18 Ill. Reg. 2981, effective February 14, 1994; amended in R91-23 at 18 Ill. Reg. 13457, effective August 19, 1994; amended in R93-13 at 19 Ill. Reg. 1310, effective January 30, 1995; amended in R95-14 at 20 Ill. Reg. 3534, effective February 8, 1996; amended in R97-25 at 22 Ill. Reg. 1403, effective December 24, 1997; amended in R01-13 at 26 Ill. Reg. 3517, effective February 22, 2002; amended in R03-11, at 28 Ill. Reg 3071, effective February 4, 2004; amended in R06-24 at 31 Ill. Reg. 4440, effective February 27, 2007; amended in R08-___ at _____ Ill. Reg. _____, effective _____.

SUBPART A: GENERAL PROVISIONS

Section 303.102 Rulemaking Required (Repealed)

~~Designation of waters to meet secondary contact and indigenous aquatic life standards is governed by Part 102 of Subtitle A.~~

(Note: Prior to codification, Part II of Chapter I: Procedural Rules.)

(Source: Repealed at _____ Ill. Reg. _____, effective_____)

SUBPART B: NONSPECIFIC WATER USE DESIGNATIONS

Section 303.204 Chicago Area Waterway System and Lower Des Plaines River ~~Secondary Contact and Indigenous Aquatic Life~~ Waters

The Chicago Area Waterway System and Lower Des Plaines River Waters ~~which~~ are designated to protect for incidental contact or non-contact recreational uses, except where designated as non-recreational waters; commercial activity, including navigation and industrial water supply uses; and the highest quality aquatic life and wildlife that is attainable, limited only by the physical condition of these waters and hydrologic modifications to these waters. These waters are required to meet the ~~secondary contact and indigenous aquatic life~~ standards contained in ~~of~~ Subpart D~~,~~ of Part 302, but are not required to meet the general use standards or the public and food processing water supply

standards of Subparts B and C, of Part 302. Designated recreational and aquatic life uses and subcategories or seasonal uses for each segment of the Chicago Area Waterway System and Lower Des Plaines River are identified in this Subpart.

(Source: Amended at _____ Ill. Reg. _____, effective _____)

303.220 Incidental Contact Recreation Waters

The following waters are designated as Incidental Contact Recreation waters and must protect for incidental contact recreational uses as defined in 35 Ill. Adm. Code 301.282.

a) North Shore Channel;

b) North Branch Chicago River from its confluence with North Shore Channel to its confluence with South Branch Chicago River and Chicago River;

c) Chicago River;

d) South Branch Chicago River and its South Fork;

e) Chicago Sanitary and Ship Canal from its confluence with South Branch Chicago River to its confluence with Calumet-Sag Channel;

f) Calumet River, from Torrence Avenue to its confluence with Grand Calumet River and Little Calumet River;

g) Lake Calumet;

h) Lake Calumet Connecting Channel;

i) Grand Calumet River;

j) Little Calumet River from its confluence with Calumet River and Grand Calumet River to its confluence with Calumet-Sag Channel;

k) Calumet-Sag Channel; and

l) Lower Des Plaines River from the Brandon Road Lock and Dam to the Interstate 55 bridge.

(Source: Added at _____ Ill. Reg. _____, effective _____)

303.225 Non-Contact Recreation Waters

Calumet River from Lake Michigan to Torrence Avenue is designated as a Non-Contact Recreation water and must protect for non-contact recreational uses as defined in 35 Ill. Adm. Code 301.323.

(Source: Added at _____ Ill. Reg. _____, effective _____)

303.227 Non-Recreational Waters

The following waters are designated as Non-Recreational waters as defined in 35 Ill. Adm. Code 301.324.

a) Chicago Sanitary and Ship Canal from its confluence with the Calumet-Sag Channel to its confluence with Des Plaines River; and

b) Lower Des Plaines River from its confluence with Chicago Sanitary and Ship Canal to the Brandon Road Lock and Dam.

(Source: Added at _____ Ill. Reg. _____, effective _____)

303.230 Chicago Area Waterway System Aquatic Life Use A Waters

Waters designated as Chicago Area Waterway System Aquatic Life Use A Waters are capable of maintaining aquatic-life populations predominated by individuals of tolerant or intermediately tolerant types that are adaptive to the unique physical conditions, flow patterns, and operational controls necessary to maintain navigational use, flood control, and drainage functions of the waterway system. The following waters are designated as Chicago Area Waterway System Aquatic Life Use A waters and must meet the water quality standards of 35 Ill. Adm. Code 302, Subpart D:

a) North Shore Channel;

b) North Branch Chicago River from its confluence with North Shore Channel to the south end of the North Avenue Turning Basin;

c) Calumet River from Torrence Avenue to its confluence with Grand Calumet River and Little Calumet River;

d) Lake Calumet;

e) Grand Calumet River;

f) Little Calumet River from its confluence with Calumet River and Grand Calumet River to its confluence with Calumet-Sag Channel; and

g) Calumet-Sag Channel.

(Source: Added at _____ Ill. Reg. _____, effective _____)

303.235 Chicago Area Waterway System and Brandon Pool Aquatic Life Use B Waters

Waters designated as Chicago Area Waterway System and Brandon Pool Aquatic Life Use B Waters are capable of maintaining aquatic-life populations predominated by individuals of tolerant types that are adaptive to the unique physical conditions, flow patterns, and operational controls designed to maintain navigational use, flood control, and drainage functions in deep-draft, steep-walled shipping channels. The following waters are designated as Chicago Area Waterway System and Brandon Pool Aquatic Life Use B waters and must meet the water quality standards of 35 Ill. Adm. Code 302, Subpart D:

a) North Branch Chicago River from the south end of the North Avenue Turning Basin to its confluence with South Branch Chicago River and Chicago River;

b) Chicago River;

c) South Branch Chicago River and its South Fork;

d) Chicago Sanitary and Ship Canal;

e) Calumet River from Lake Michigan to Torrence Avenue;

f) Lake Calumet Connecting Channel; and

g) Lower Des Plaines River from its confluence with Chicago Sanitary and Ship Canal to the Brandon Road Lock and Dam.

(Source: Added at _____ Ill. Reg. _____, effective _____)

303.237 Upper Dresden Island Pool Aquatic Life Use Waters

Lower Des Plaines River from the Brandon Road Lock and Dam to the Interstate 55 bridge shall be designated for the Upper Dresden Island Pool Aquatic Life Use. These waters are capable maintaining aquatic-life populations consisting of individuals of tolerant, intermediately tolerant and intolerant types that are adaptive to the unique flow conditions necessary to maintain navigational use and upstream flood control functions of the waterway system. These waters must meet the water quality standards of 35 Ill. Adm. Code 302, Subpart D.

(Source: Added at _____ Ill. Reg. _____, effective _____)

SUBPART C: SPECIFIC USE DESIGNATIONS AND SITE SPECIFIC WATER QUALITY STANDARDS

Section 303.441 Secondary Contact Waters (Repealed)

~~The following are designated as secondary contact and indigenous aquatic life waters and must meet the water quality standards of 35 Ill. Adm. Code 302.Subpart D:~~

~~a) The Chicago Sanitary and Ship Canal;~~

~~b) The Calumet-Sag Channel;~~

~~c) The Little Calumet River from its junction with the Grand Calumet River to the Calumet-Sag Channel;~~

~~d) The Grand Calumet River;~~

~~e) The Calumet River, except the 6.8 mile segment extending from the O'Brien Locks and Dam to Lake Michigan;~~

~~f) Lake Calumet;~~

~~g) The South Branch of the Chicago River;~~

~~h) The North Branch of the Chicago River from its confluence with the North Shore Channel to its confluence with the South Branch;~~

~~i) The Des Plaines River from its confluence with the Chicago Sanitary and Ship Canal to the Interstate 55 bridge; and~~

~~j) The North Shore Channel, excluding the segment extending from the North Side Sewage Treatment Works to Lake Michigan. The dissolved oxygen in said Channel shall be not less than 5 mg/l during 16 hours of any 24 hour period, nor less than 4 mg/l at any time.~~

(Source: Repealed at _____ Ill. Reg. _____, effective _____)

TITLE 35: ENVIRONMENTAL PROTECTION
SUBTITLE C: WATER POLLUTION
CHAPTER I: POLLUTION CONTROL BOARD

PART 304
EFFLUENT STANDARDS

SUBPART A: GENERAL EFFLUENT STANDARDS

Section

SUBPART B: SITE SPECIFIC RULES AND EXCEPTIONS NOT OF GENERAL APPLICABILITY

Section

SUBPART C: TEMPORARY EFFLUENT STANDARDS

Section

AUTHORITY: Implementing Section 13 and authorized by Section 27 of the Environmental Protection Act [415 ILCS 5/13 and 27].

SOURCE: Filed with the Secretary of State January 1, 1978; amended at 2 Ill. Reg. 30, p. 343, effective July 27, 1978; amended at 2 Ill. Reg. 44, p. 151, effective November 2, 1978; amended at 3 Ill. Reg. 20, p. 95, effective May 17, 1979; amended at 3 Ill. Reg. 25, p. 190, effective June 21, 1979; amended at 4 Ill. Reg. 20, p. 53, effective May 7, 1980; amended at 6 Ill. Reg. 563, effective December 24, 1981; codified at 6 Ill. Reg. 7818; amended at 6 Ill. Reg. 11161, effective September 7, 1982; amended at 6 Ill. Reg. 13750, effective October 26, 1982; amended at 7 Ill. Reg. 3020, effective March 4, 1983; amended at 7 Ill. Reg. 8111, effective June 23, 1983; amended at 7 Ill. Reg. 14515, effective October 14, 1983; amended at 7 Ill. Reg. 14910, effective November 14, 1983; amended at 8 Ill. Reg. 1600, effective January 18, 1984; amended at 8 Ill. Reg. 3687, effective March 14, 1984; amended at 8 Ill. Reg. 8237, effective June 8, 1984; amended at 9 Ill. Reg. 1379, effective January 21, 1985; amended at 9 Ill. Reg. 4510, effective March 22, 1985; peremptory amendment at 10 Ill. Reg. 456, effective December 23, 1985; amended at 11 Ill. Reg. 3117, effective January 28, 1987; amended in R84-13 at 11 Ill. Reg. 7291, effective April 3, 1987; amended in R86-17(A) at 11 Ill. Reg. 14748, effective August 24, 1987; amended in R84-16 at 12 Ill. Reg. 2445, effective January 15, 1988; amended in R83-23 at 12 Ill. Reg. 8658, effective May 10, 1988; amended in R87-27 at 12 Ill. Reg. 9905, effective May 27, 1988; amended in R82-7 at 12 Ill. Reg. 10712, effective June 9, 1988; amended in R85-29 at 12 Ill. Reg. 12064, effective July 12, 1988; amended in R87-22 at 12 Ill. Reg. 13966, effective August 23, 1988; amended in R86-3 at 12 Ill. Reg. 20126, effective November 16, 1988; amended in R84-20 at 13 Ill. Reg. 851, effective January 9, 1989; amended in R85-11 at 13 Ill. Reg. 2060, effective February 6, 1989; amended in R88-1 at 13 Ill. Reg. 5976, effective April 18, 1989; amended in R86-17(B) at 13 Ill. Reg. 7754, effective May 4, 1989; amended in R88-22 at 13 Ill. Reg. 8880, effective May 26, 1989; amended in R87-6 at 14 Ill. Reg. 6777, effective April 24, 1990; amended in R87-36 at 14 Ill. Reg. 9437, effective May 31, 1990; amended in R88-21(B) at 14 Ill. Reg. 12538, effective July 18, 1990; amended in R84-44 at 14 Ill. Reg. 20719, effective December 11, 1990; amended in R86-14 at 15 Ill. Reg. 241, effective December 18, 1990; amended in R93-8 at 18 Ill. Reg. 267, effective December 23, 1993; amended in R87-33 at 18 Ill. Reg. 11574, effective July 7, 1994; amended in R95-14 at 20 Ill. Reg. 3528, effective February 8, 1996; amended in R94-1(B) at 21 Ill. Reg. 364, effective December 23, 1996; expedited correction in R94-1(B) at 21 Ill. Reg. 6269, effective December 23, 1996; amended in

R97-25 at 22 Ill. Reg. 1351, effective December 24, 1997; amended in R97-28 at 22 Ill. Reg. 3512, effective February 3, 1998; amended in R98-14 at 23 Ill. Reg. 687, effective December 31, 1998; amended in R02-19 at 26 Ill. Reg. 16948, effective November 8, 2002; amended in R02-11 at 27 Ill. Reg. 194, effective December 20, 2002; amended in R04-26 at 30 Ill. Reg. 2365, effective February 2, 2006; amended in R08-___ at _____Ill. Reg. _____, effective _____.

SUBPART B: SITE SPECIFIC RULES AND EXCEPTIONS NOT OF GENERAL APPLICABILITY

304.224 Effluent Bacteria Standards for Discharges to the Chicago Area Waterway System and Lower Des Plaines River

Effluents discharged to the Incidental Contact Recreation waters listed in 35 Ill. Adm. Code 303.220 and the Non-Contact Recreation waters listed in 35 Ill. Adm. Code 303.225 shall not exceed 400 fecal coliforms per 100 ml during the recreational season lasting from March 1 through November 30. All effluents in existence on or before the effective date of this Section shall meet these standards by March 1, 2011. All new discharges shall meet these standards upon the initiation of discharge.

(Source: Added at _____ Ill. Reg. _____, effective _____)