Appropriate Thermal Water Quality Standards for the Chicago Sanitary and Ship Canal and Lower Des Plaines River

Midwest Generation Presentation to UAA Stakeholders Group—
March 22, 2007

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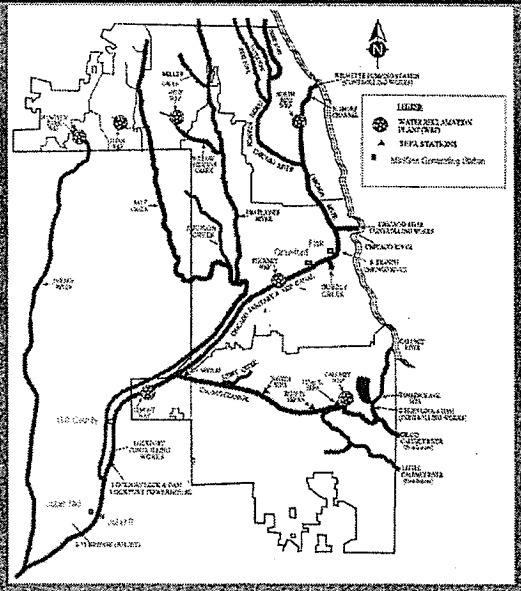
Location of Midwest Generation Power Plants on the Upper Illinois Waterway:



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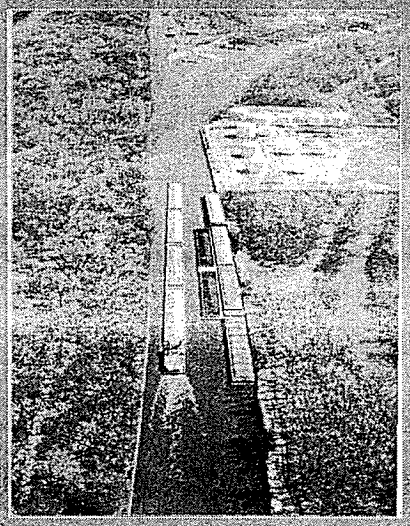
Use Attainability Analysis (UAA) Factors:

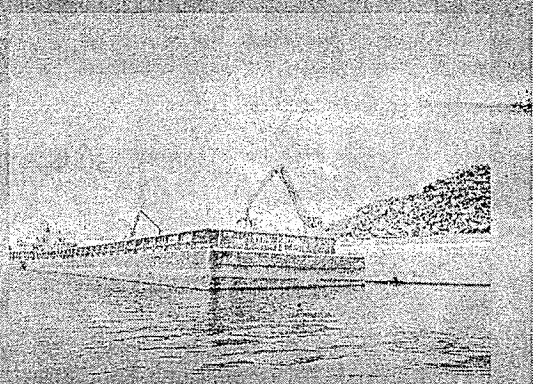
- **Factor 1:** Naturally occurring pollutant concentrations
- **Factor 2:** Natural, ephemeral, intermittent or low flow conditions or water levels
- **Factor 3:** Human-caused conditions or sources of pollution
- **Factor 4:** Dams, diversions, or other types of hydrologic modifications
- **Factor 5:** Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protections uses
- **Factor 6:** More stringent controls would result in substantial and widespread economic and social impact

The Chicago Area Waterways (CAW) are Permanently Impaired:

- Largely Concrete-lined Man-Made and/or Artificially Controlled
- Heavy Commercial Barge Traffic
- Highly Urbanized
- Abnormal Flow Fluctuations Caused by Lock and Dam Operations
- Dominated by Undisinfected Sewage Treatment Plant Effluents
- Frequent Combined Sewer Overflows with Untreated Bacteria
- Lack of Biological Habitat
- Marginal Aquatic Life

Channelized System with Heavy Commercial Barge Traffic

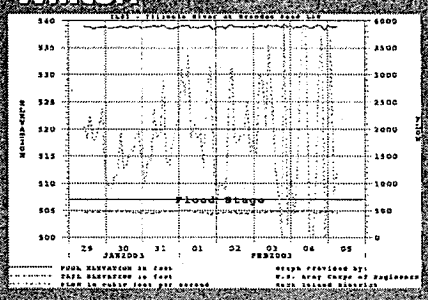




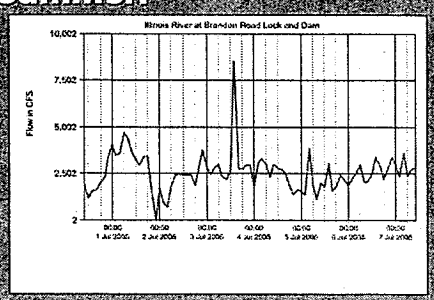
Frequent, Wide Fluctuations In Water Flow--Impair Aquatic Life Functions :

- Occur Year-Round to Regulate Navigation and Provide Flood Control
- Example of Variability During 7-Day Interval:

Winter:



Summer:



Dominated by Sewage Treatment Plant Effluent:

MWRDGC:

- Stickney Plant—1200 MGD
- Calumet Plant—355 MGD
- North Side Plant—333 MGD

2006 -- 65 Days of Recorded MWRDGC Combined Sewer Overflow (CSO) Discharges

Protecting Our Water Environment

Metropolitan Water Reclamation District of Greater Chicago

OUTFALL NUMBER XXX

CAUTION

THIS OUTFALL MAY DISCHARGE SEWAGE CONTAMINATED RAINWATER DURING AND FOLLOWING RAINFALL

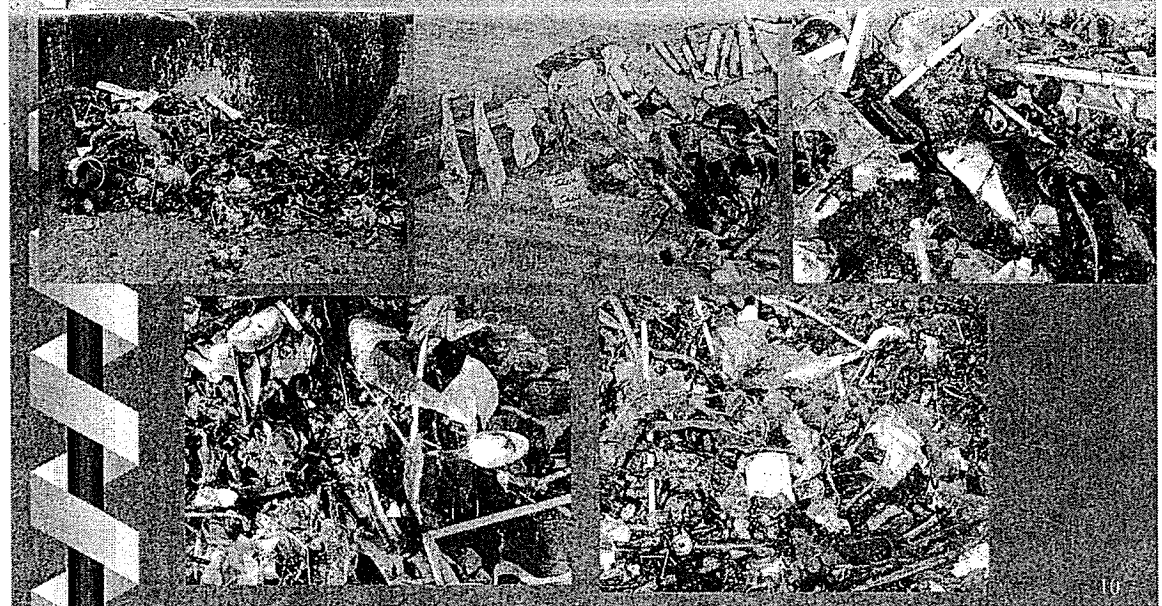
IF DISCHARGE IS OBSERVED DURING DRY WEATHER PLEASE CALL 1-800-332-DUMP

FOR MORE INFORMATION, CALL 1-847-294-4000 OR VISIT www.ChicagoAreaWaterways.org

Over 200 Additional City of Chicago CSO's Discharge into the CAW:

The Current "Quality" of the Waterway:

[MWGen Plants Collect Significant Amounts of CSO and Other Debris from Waterway on a 24/7 Basis.] – Photos from MWGen Intake Collections

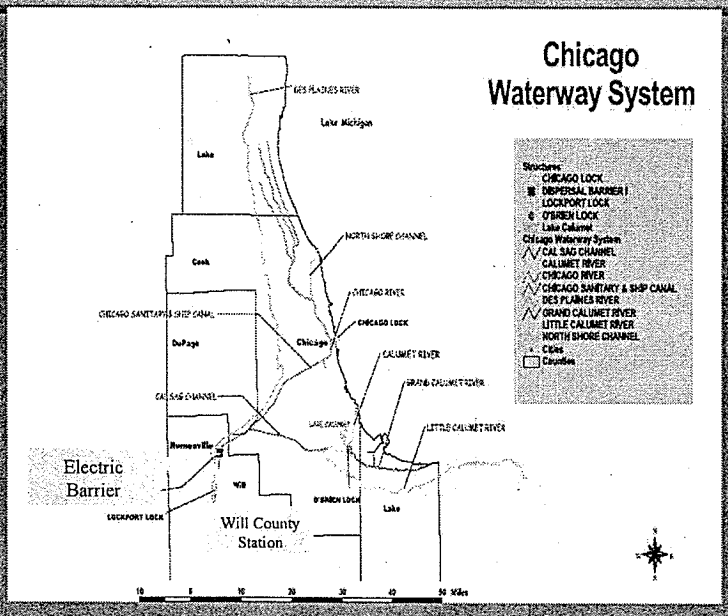


Annual Amount of Debris Collected from Waterway by MWGen Plants:

- **Fisk Station:** 60 tons
  - (South Branch of Chicago River)
- **Crawford Station:** 60 tons
  - (Chicago Sanitary and Ship Canal)
- **Joliet Station:** 30 tons
  - (Lower Des Plaines River)

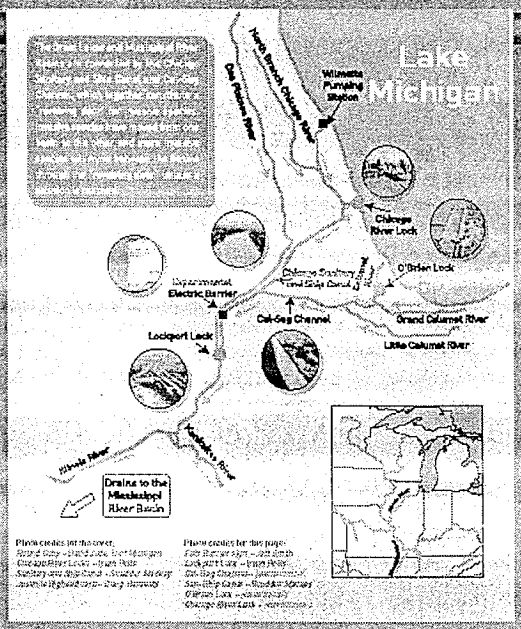
➢ MWGen Plants Provide a Valuable Service to the Community

Invasive Species Electric Barrier: A Consequence of the Impairment Caused by the Invasive Species Threat



The Invasive Species Electric Barriers: One Line of Defense is Not Enough---

Concern About Bypass from the Des Plaines River Requires Additional Barriers to be Built Upstream:



The Invasive Species Barrier is Supported by Many Agencies/Organizations:

- Illinois Department of Natural Resources
- U.S. Fish and Wildlife Service
- International Joint Commission
- Lake Michigan Fisheries Commission
- Alliance for the Great Lakes
- Lake Michigan Sport Fishing Council
- City of Chicago
- Others...

Invasive Species = Biological "Pollution"

- Most invasives are inadvertently introduced into the ecosystem by man.
- Therefore, the invasive species threat in the CAW meets UAA Factor 3

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Aquatic Nuisance Species—
An International Concern with Far-Reaching Implications:

- Protection of Lake Michigan and the Mississippi River Basin - utmost concern to U.S. and International Agencies
- Purpose of Electric Barrier - eliminate the zone of passage for fish
- More stringent water quality standards run counter to efforts to render CSSC less hospitable to invasive species
- **Invasive species threat is far more harmful to the ecosystem than any conceivable threat from thermal levels in the waterway**

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Invasive Species: A Costly and Urgent Problem

– Significant ecological and economic impacts:

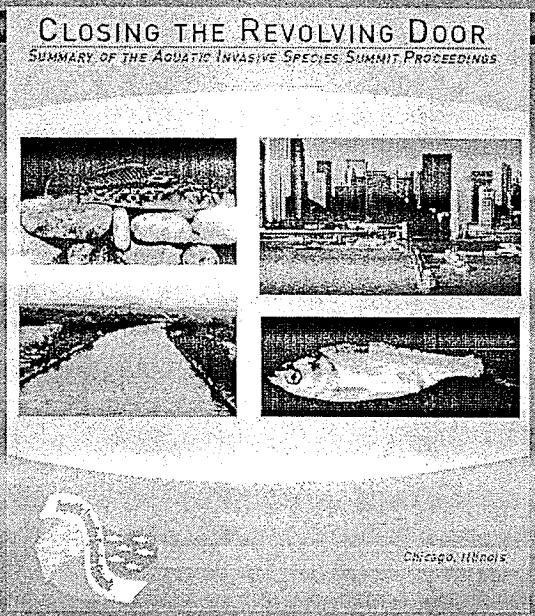
- Great Lakes Recreational Fishing - creates a total economic output greater than $7.5 billion
- Canadian commercial and recreational fisheries value - approx. $363 million annually
- Mississippi River Basin - aquatic nuisance species threaten a region of 32 states

Invasive Species: Effective Long-Term Solutions are Needed

– Electric dispersal barriers only a first step:

- Barriers will not last forever
- Multiple and/or more permanent methods needed to prevent invasive species transfer
- Electric and acoustic barriers do not affect all invasive organisms equally
- Redundant methods need to be employed as safeguards

Jointly Sponsored Invasive Species Summit held May 14-15, 2003:



Identified Solutions to the Invasive Species Problem (from Summit Proceedings):

- Hydraulic Separation of Great Lakes and Mississippi River Basins - create a physical or other type of barrier in the Chicago Canal System
- Establish a biological eradication zone—a reach of the Chicago Canal where oxygen is removed, high thermal temperatures are maintained, and/or chemicals applied to eradicate most aquatic organisms; and
- Employ technologies that affect animal behavior (e.g., electric and/or acoustic technologies) to deter fish from advancing through the Chicago Sanitary and Ship Canal

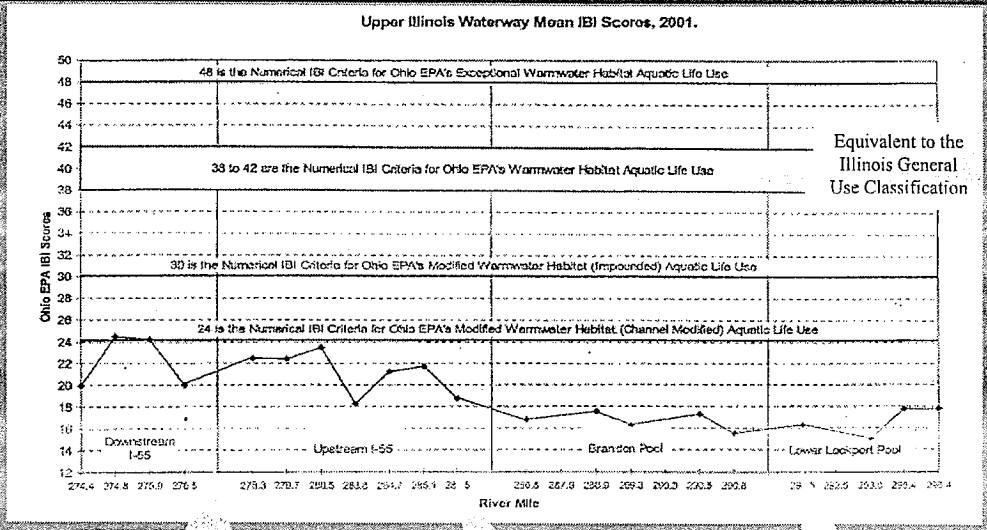
Invasive Species:
Development of Additional Technical and/or Biological Barriers is Critical

- The Chicago Waterway System provides the greatest potential for invasive species transfer between two highly valued ecological systems and should rightly be classified as an Invasive Species Barrier Zone

Invasive Species Barrier Zone:

- Acknowledges the importance of invasive species control as a national and international concern for the Great Lakes and Mississippi River Basin
- Allows for the expedited implementation of Technological and Behavioral Barriers
- Continues to support existing uses of the waterway
- Consistent with attainable aquatic life use and existing thermal standards

Index of Biotic Integrity (IBI):
An Assessment Tool Which Uses Fish Condition Factors to Gage Stream Integrity



Equivalent to the Illinois General Use Classification

I-55 Bridge; Beginning of General Use Waters

Joliet Station

Will County Station

Problems With Proposed IEPA Approach:

- Inconsistent with 25 years of aquatic life data collected on waterways -- Uses "literature" and laboratory-based values
- More stringent thermal standards = little or no positive effects on these particular waterways
- Period averages for temperature limits are unworkable from a practical standpoint
- Thermal standards far more stringent than existing General Use values for the CAW and LDP are entirely inappropriate
- No analysis of whether or not proposed standards are attainable in the waterway

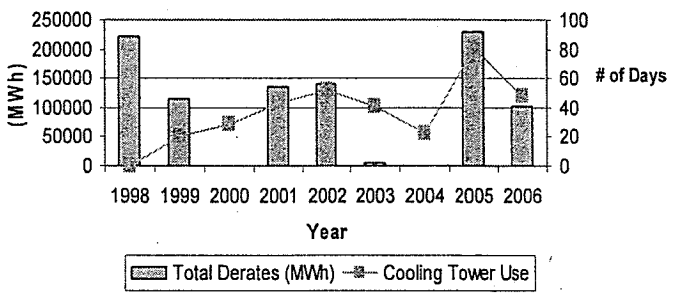
Changing Thermal Standards Will Not:

- Allow Swimming or Otherwise Improve Human Health Impacts of these Waterways
- Eliminate or Reduce the CSOs
- Eliminate the Effluent Domination of the Waterway
- Reduce the Urban Run-off to the Waterway
- Improve the Poor Habitat Conditions for Fish
- Reduce the Barge Traffic
- Change the Fluctuating Waterway Flows
- Result in an improved biological community in either the CSSC or Lower Des Plaines

Current MWGen Operational Restrictions:

- Use of the cooling towers alone is often not sufficient to control the magnitude of the thermal discharge to meet current thermal limits
- Under these situations, units have been and will continue to be derated when compliance conditions warrant

Total Deratings Required for Joliet Station to
Maintain Compliance with Existing Near-Field and Alternate I-55 Thermal Limitations



Future Operational Restrictions Under Proposed IEPA Thermal Limits?

- MWGen Stations would need to incur even more significant unit deratings and / or potential shutdowns during critical energy demand periods
- More cooling towers would not allow MWGen's plants to consistently maintain compliance

Cost to Comply with General Use Thermal Limits:

(Based on S&L Risk Assessment Study)

Fisk Station:	$72MM to $90MM
Crawford Station:	$94MM to $125MM
Will County Station:	$164MM to $233MM
Joliet Station—Unit 6:	$59MM to $84MM
Joliet Station—Units 7&8:	$170MM to $258MM
Total:	$559MM to $790MM

"Value" of Fish in the Waterway*

(From MWGen's 316(b) Compliance Assessment Studies):

Facility	Total Estimated Annual Value of 316(b) Compliance Based on Fish Impinged/Entrained (in 2006$)
FISK STATION	$5300 - $8195
CRAWFORD STATION	$6200 - $8887
WILL COUNTY STATION	$16,100 - $32,022
JOLIET STATION	$30,000 - $71,162
Total	$57,600 to $120,266

*Calculated according to USEPA Methods from Phase II Rule

How Do We Move Forward?:

- Develop New Use Designation to Acknowledge Invasive Species Threat and Need for Multiple Barriers
- Develop appropriate Water Quality standards for the Upper Waterway, considering all permanent impairments and limitations, while allowing for a Transition Zone prior to entering General Use waters
- Recognize that the proposed standards should be considered interim, until Illinois develops Tiered Aquatic Life Use designations consistent with USEPA guidance
- MWGen's proposal to retain existing thermal standards is consistent with Invasive Species Barrier Zone use