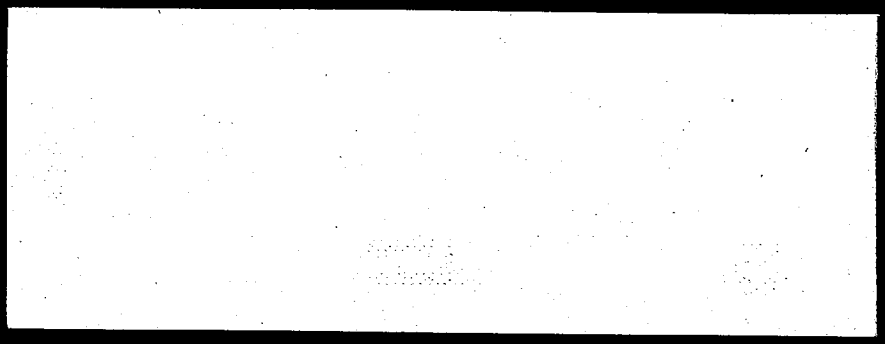
May 2000

Waterways for Our Future



A collaborative study of the water, land, and governance/organizational structure of the Metropolitan Water Reclamation District and their impact on Chicago River waterways

Friends of the Chicago River

Openlands Project

The Civic Federation

Metropolitan Water Reclamation District Wastewater Treatment and the Chicago River
Friends of the Chicago River Report

May 2000

This report is part of the *Waterways for Our Future* study, carried out by Friends of the Chicago River, Openlands Project, and The Civic Federation. Funding for the study was provided by the John D. and Catherine T. MacArthur Foundation, the Chicago Community Trust, the Prince Charitable Trusts, and the MR Bauer Foundation.

This portion of the study was researched, written and prepared by:

Timothy Oppenheim, Consultant
Steven Skavronek, Environmental Consultant
Laurene von Klan, Executive Director, Friends of the Chicago River
Gricelda Hernandez, Intern, Friends of the Chicago River

Friends of the Chicago River
407 S. Dearborn Street
Suite 1580
Chicago, IL 60605
Tel: (312) 939-0490
Fax: (312) 939-0931
e-mail: friends@chicagoriver.org
website: www.chicagoriver.org

Waterways for Our Future

Table of Contents

Table of Figures

List of Frequent Abbreviations

BOD	Biochemical Oxygen Demand
CBOD	Carbonaceous Biochemical Oxygen Demand
CSO	Combined Sewer Overflow
CWA	Clean Water Act
ILEPA	Illinois Environmental Protection Agency
MWRD	Metropolitan Water Reclamation District of Greater Chicago
NPDES	National Pollution Discharge Elimination System
TARP	Tunnel and Reservoir Project
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
WET	Whole Effluent Toxicity

This page left blank intentionally

I. Executive Summary - Water Study, Waterways for Our Future

The Chicago River and its related waterways are important components of the infrastructure, economy, and environmental fabric of Chicago and the region. Improvements to the Chicago River waterways in recent years have sparked renewed interest in their use and potential. This renewed interest creates a need to discuss public policies that will have an impact on the River's future.

As the regional sanitary district, the Metropolitan Water Reclamation District of Greater Chicago (MWRD) has significant responsibility for the land and water of the Chicago River waterways. In order to provide an objective analysis of how the MWRD manages these resources, Friends of the Chicago River, Openlands Project, and The Civic Federation have undertaken the *Waterways for Our Future* project. The project consists of three studies. Friends of the Chicago River has written the Water portion of the study. Openlands has written the Land study. The Civic Federation has written the Governance/Organizational structure study.

The water study consists of two sections providing background and two analytical sections. The first analytical section is a review of wastewater discharge permits held by the MWRD. Only the three largest MWRD plants were considered in this study. These facilities account for 95% of the effluent discharged by MWRD. These permits are compared to permits for other similar wastewater treatment facilities around the country. Comparing permits provides a basis for considering how high or low the bar is set for MWRD's wastewater treatment versus other sewerage utilities in other areas. Insights are provided into both the level of performance required by government agencies that regulate the MWRD and how well the MWRD meets those requirements. The second analytical portion of the study is a review of programs and processes typically used by wastewater treatment agencies. This portion of the study is based on findings from a survey of wastewater agencies similar to MWRD and others that were selected based on their acknowledged outstanding performance. The survey results are analyzed to develop a list of "best practices and benchmarks" that provide a basis for evaluating how MWRD compares to its peers. From this evaluation, a list of recommendations is developed.

In summary, the study findings indicate that in some areas of wastewater treatment, the MWRD excels. It has a superior record of compliance with its discharge permits and does significantly better than is required for many parameters. This performance has contributed to the improvement of the Chicago River waterways. However, the MWRD's performance is significantly less protective than that of many other sewerage utilities. At the heart of this disparity is the regulatory framework within which MWRD operates: it is only required by the state to meet low water quality standards which apply only to Chicago area waterways. The Illinois standards for the Chicago River set the context for MWRD performance. As a result, the following key findings and recommendations, while focused on the MWRD operations, should also be directed to state and federal agencies responsible for regulating these operations, and to the general public upon whose vision for the River regulations are to be based.

Key Findings:

- *MWRD achieves almost 100% compliance with existing permits, however the permits are comparatively weak, especially for some toxic pollutants and bacteria.* MWRD meets its permit limits for toxic pollutants such as mercury, cadmium and cyanide; however, these are the weakest limits for toxics found in any study group permit. MWRD has no limits for bacteria or phosphorus in its permits. Every other permit in the study group has bacteria limits. More than one-third of the permits studied have phosphorus limits.

- *Waterways downstream of MWRD discharges fail to meet water quality standards. Uses of waterways receiving MWRD effluent discharges are not fully protected.*

- *MWRD discharge permits are extraordinarily out of date and are joined in this regard by only a tiny minority of all sewage treatment plants operating in the region.*

- *For many parameters, the MWRD effluent and the Chicago River itself meet the more stringent standards applied to most other Illinois water bodies.*

- *MWRD is the only agency in the study group that does not disinfect its effluent or otherwise meet bacterial contamination standards or limits.*

- *Both chronic and acute Whole Effluent Toxicity (WET) testing are conducted by most agencies; MWRD does only acute testing at its three largest facilities.*

- *The "Nine Minimum Controls," federal guidance for control of combined sewer overflows, have never been incorporated into MWRD permits; whether or not these controls are being fully implemented is debatable.*

- *MWRD has developed partnerships to implement a pollution prevention program with significant innovative features.*

- *Most agencies do monitoring of stream conditions during wet weather, when pollution is likely to be highest, as well as monitoring of the quality of sewage overflows; MWRD does not do stream quality monitoring during wet weather, and its sewage overflow monitoring program is limited.*

Recommendations:

- *MWRD wastewater treatment plant permits should be promptly issued and should reflect the latest US and IL EPA requirements for other similar agencies.*

- *MWRD should evaluate its wastewater treatment practices, in particular those related to effluent disinfection and toxic substances, in relation to evolving regional goals and uses for water resources; such an evaluation should be done in conjunction with other agencies and should address the water quality standards applied to the Chicago River.*

- *The MWRD's new permits should be revised to include the "Nine Minimum Controls" for CSOs.*

- *MWRD should conduct both chronic and acute wet testing at its three largest facilities.*

- *MWRD should evaluate the full range of potential pollution prevention strategies, including strategies for expanded household hazardous waste reduction and collection.*

- *MWRD should expand its wet weather monitoring of sewer overflows and stream conditions.*

II. Introduction and Background

The Chicago River and its related waterways are important components of the infrastructure, economy, and environmental fabric of Chicago and the region. These waterways serve as wildlife corridors, transportation routes, economic development hubs, recreation centers, and flood water conveyance resources. They are integral to the region's development, taking on various roles and experiencing changes through the years. As the City of Chicago and the region continue to change, so do the Chicago River system and the region's other waterways. Renewed interest in the Chicago River and other waterways presents an opportunity to discuss public policies that have an impact on the future of these resources.

As the regional sanitary district, the Metropolitan Water Reclamation District of Greater Chicago (MWRD) has significant responsibility for the land and water of the Chicago River waterways. The MWRD operates multiple sewage treatment facilities and one of the nation's largest public works projects for pollution and flood control, the Tunnel and Reservoir Project (TARP, otherwise known as Deep Tunnel, now under construction). Currently the MWRD is seeking legislative authority for additional responsibilities related to stormwater management for Cook County.

In order to provide an objective analysis of how the MWRD manages these resources, Friends of the Chicago River, the Openlands Project, and The Civic Federation have undertaken the *Waterways for Our Future* project. The project consists of three studies. Friends of the Chicago River has written the Water portion of the study. Openlands has written the Land study. The Civic Federation has written the Governance/Organizational structure study.

The water study applies a "benchmarking"[1] or "best practices"[2] approach. It reviews practices in the wastewater treatment industry and identifies practices and goals that may help the Chicago area achieve superior performance based on visions for its waterways. The study results should be transferable and of interest to other metropolitan areas.

It is important to note that MWRD operates within a regulatory framework established by the federal government through the Clean Water Act and implemented by state government, primarily the Illinois EPA. In addition, MWRD operates in a metropolitan area where there are numerous dispersed pollution sources that contribute to the quality and degradation of the Chicago River; their wastewater treatment works are by no means the sole source of water quality or degradation. Therefore, the findings and recommendations of this study, while focused on MWRD operations, should also be directed to state and federal agencies responsible for regulating MWRD as well as the local governments, municipalities, and citizens of the region, upon whose vision for the River regulations are to be based.

---

[1] Benchmarking is defined as "the systematic process of searching for best practices, innovative ideas, and highly effective operating procedures that lead to superior performance - and then adapting those practices, ideas, and procedures to improve the performance of one's own organization. Therefore, the practice of benchmarking can be considered as the continuous practice of striving for and even surpassing some previously determined standard. Benchmarking Wastewater Operations - Collection, Treatment, and Biosolids Management, Water Environment Research Foundation, p. ES-1.

[2] Best practices are defined as " the best ways to perform a business practice," recognizing that "no single practice works for everyone in every situation." Best Practices: Building your Business with Customer Focused Solutions; pages 7 and 28.

III. Purpose and Scope of the Study

The purpose of the *Waterways for Our Future* project is to gather information that will support continued improvement of the Chicago River. The three studies provide a baseline for the continued involvement of advocacy groups in regional water quality related issues. The project is intended to help citizens, local officials, and others in the greater Chicago area better understand the vital role of wastewater treatment in regional quality of life and health of the waterways, as well as the agencies that fulfill that role. It helps answer the question: are we following, to the best of our ability, practices and procedures that will achieve goals set now for future generations of river users and area residents?

The water portion of this study consists of two sections providing background and two analytical sections. The first analytical section is a review of wastewater discharge permits issued to the MWRD. Only the three largest MWRD plants were considered. These facilities account for 95% of the effluent discharged by MWRD. These permits are compared to permits for other similar wastewater treatment facilities around the country. Comparing permits provides a basis for considering how high or low the bar is set for MWRD's wastewater treatment versus sewerage utilities in other areas. Insights are provided into both the level of performance required by government agencies that regulate the MWRD and how well the MWRD meets those requirements. The second analytical portion of the study is a review of programs and processes typically used by wastewater treatment agencies. This portion of the study is based on findings from a survey of wastewater agencies similar to MWRD and others that were selected based on their acknowledged outstanding performance. The survey results were analyzed to develop a list of "best practices and benchmarks" that provide a basis for evaluating how MWRD compares to its peers in various areas. From this evaluation, a list of recommendations was developed.

Toward the end of the study period, new draft permits for MWRD treatment plants were issued for public review and comment by ILEPA. An appendix has been added to this report which compares the new draft permits to the old permits and the study's recommendations. For the purposes of this study, we have focused on the old permits because the new ones are just drafts, are subject to change, and could take much more time to finalize.

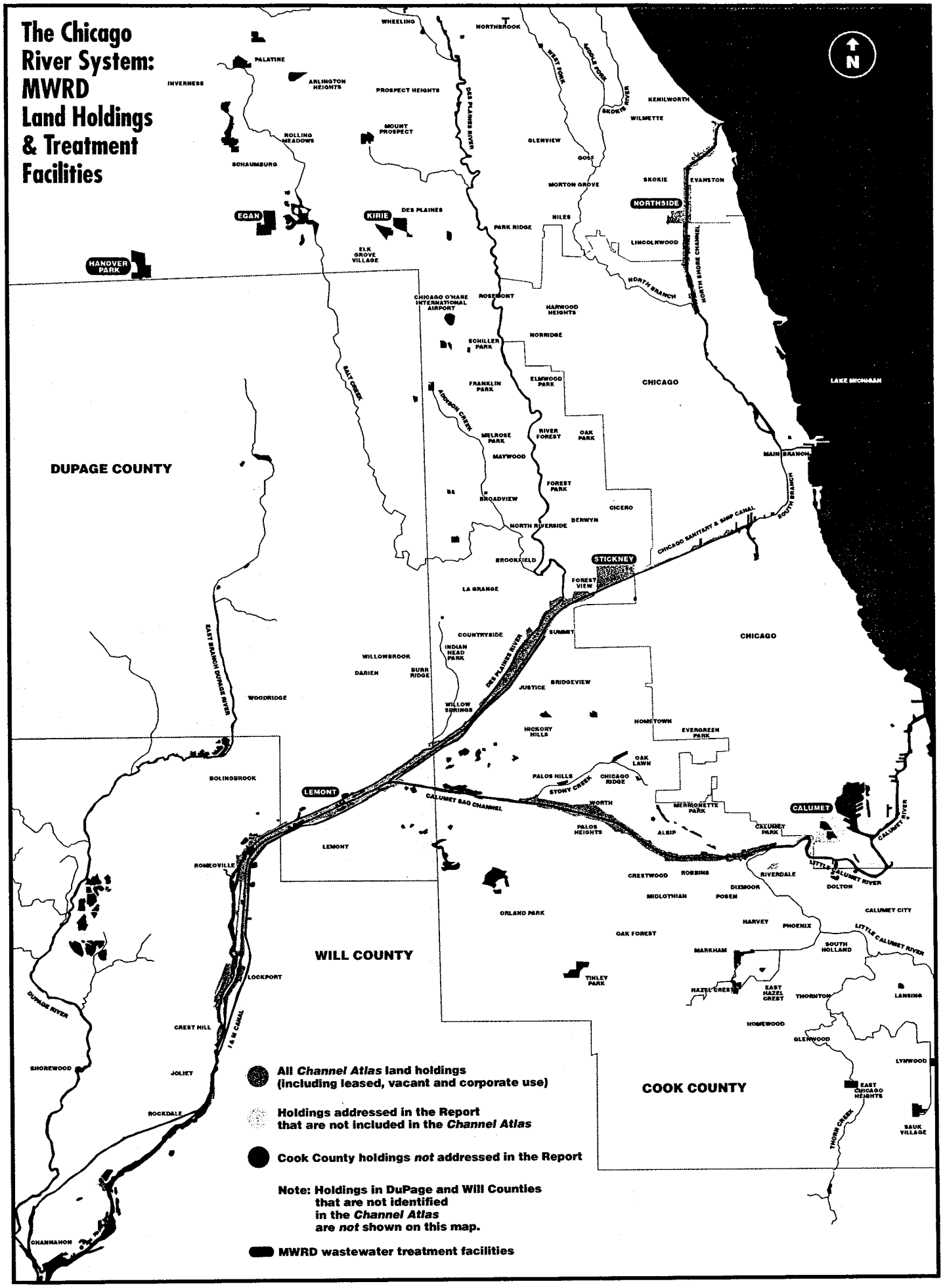


Figure 1 – Map of the Chicago River system, including other regional waterways and MWRD treatment facilities

IV. The Chicago River system

A. The Natural River

The natural Chicago River was a slow moving prairie stream that meandered across the flat Chicago landscape. The Chicago had two headwater sources, coming from the north and the southwest, that formed the North and the South Branches of the River. The north and south branches converged downtown, at the area where the Merchandise Mart sits today, and flowed out to the Lake.

Figure 2 -This historic photo of the Dead River in Waukegan gives an idea of what the Chicago River must have looked like.

Numerous small tributaries and sloughs drained into these major forks, however many of them are now filled or buried in pipes. At its northern headwaters, in what is now Lake County, the shallow channels of its tributaries were barely discernible as it wound its way through wetlands, prairies and savannas. At its most southern headwaters it was similar, starting in a vast wetland that early settlers called Mud Lake. In dry weather, Mud Lake was dry and required a portage by foot to cross from the DesPlaines to the Chicago River. In wet weather Mud Lake was wet enough to canoe across. It was the continental divide upon which Mud Lake sat that Pere Marquette and Louis Joliet recognized as a key to the establishment of a major metropolis in what is now Chicago. By building a canal across Mud Lake, the Great Lakes could be connected to the DesPlaines, the Illinois, and the heartland of the country via the Chicago River.

B. The River Manipulated, Abused, and Improved

Chicagoans have been making changes to the River ever since the earliest settlers arrived here. Jean Baptiste Point Du Sable settled on the River near what is today the Sheraton Hotel (east of Michigan Avenue downtown) and planted trees along the River bank. In 1834, the Chicago harbor was built at the mouth of the River, deepening the River mouth and cutting through a large sandbar where the River met the lake. The Illinois and Michigan Canal was built in 1847, connecting the Chicago to the DesPlaines. Following these hydrologic modifications, Chicago's population boomed. Sewage from the growing city was dumped into the River, the city's open sewer, fouling the River and the lake it flowed into, the city's drinking water source.

The Illinois & Michigan Canal was deepened in 1871, effecting a partial reversal of Chicago River flow away from Lake Michigan as a means of diverting pollution in the River from entering the lake. In the 1870s through the end of the century, epidemics of water borne diseases killed as much as 10 percent of the population. In response to this health crisis, the Chicago Sanitary District (now known as the Metropolitan Water Reclamation District of Greater Chicago) was formed. Its purpose was to clean up the city's drinking water supply (Lake Michigan) by more completely reversing the flow of the River. This was accomplished through construction of canals that directed flow away from Lake Michigan and flushed out the River, sending Chicago's waste downstream and down state with the idea that it would

Notable recovery of the River system was observed during the mid-1980s. Fish populations, for example, began to increase in number and species diversity. This is probably due to a number of factors, including the commencement of TARP operation. In addition, in 1985 following regulatory changes, the MWRD stopped chlorinating its effluent to kill bacteria. This may have permitted fish populations to increase, (though, at the same time, bacteria levels in the River rose).

The trend of River improvement has steadily continued upward. The River is emerging as a resource for the city and the region.

1. The Chicago River Waterway System Today

Today the Chicago River is a waterway system composed of natural river and related canals. It is a recreational corridor enjoyed by paddlers, walkers and bikers. Trails are being constructed along its banks. Fishing is becoming common. The River remains an economic corridor, with new river-oriented businesses, such as restaurants and cafes, locating on its banks. The River is now at a transition point. A level of water quality has been achieved that allows a variety of uses that were not possible decades ago. Nonetheless, a snapshot of the River today shows both the improvements that have been achieved and the problems that remain.

2. Environmental Quality

The environmental quality of the Chicago River varies by reach. The study called "Nature and the River" (1998) reveals a mixed bag of degraded areas, significant natural features, improvements in fish populations, and lingering problems. (See Appendix A)

To gain a picture of the environmental quality of the River, one can look at a variety of measures. Some major pollutants, such as ammonia and biological oxygen demand (BOD) have been dramatically reduced, largely through MWRD's wastewater treatment. (See Figure 4.)

Another benchmark is fish populations, which have increased. Most of the increase, based on tonnage and individuals, is in the carp family, a highly pollution tolerant group. Nonetheless, species diversity has increased significantly to include a variety of native fish, including some game species such as largemouth bass. There were as many as 63 species of fish in the River in 1999. On some stretches of the River where there were only two species of fish in the late 1970s, there are 17 species today. (See Appendix B) In other reaches fish diversity is still limited.

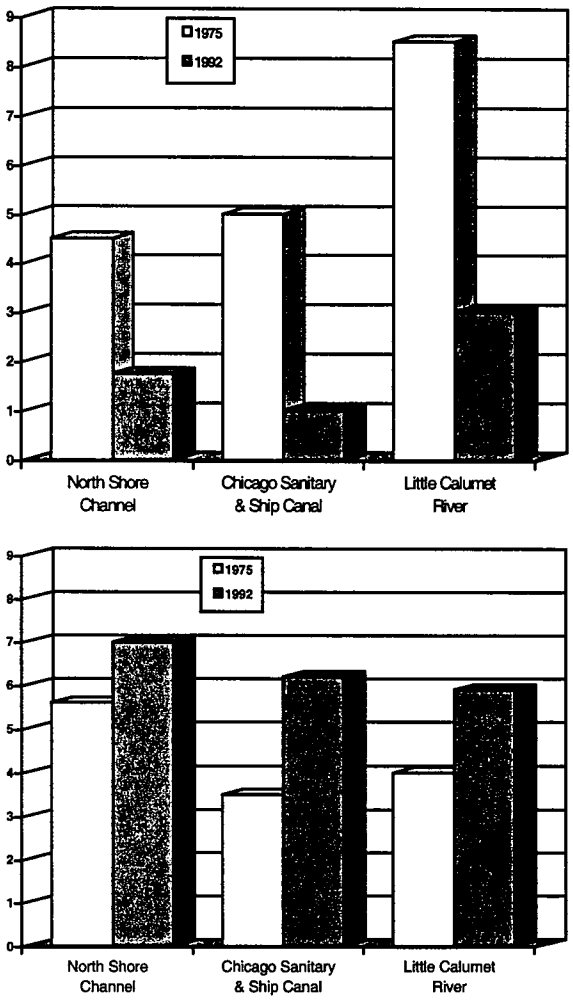


Figure 4 - MWRD facilities have significantly reduced levels of Ammonia (top) and BOD (bottom) in effluent. (Source, MWRD "Fact or Fiction" Report)

Other benchmarks reveal a different side of the story. The Illinois EPA 1996 Water Quality Report (Vol. II) shows that many Chicago River stream segments do not fully support the uses the state has determined that it should support, such as indigenous aquatic life. The sources and causes of this "non-support" include high concentrations of metals, contaminated sediment, and poor habitat. (See Appendix C)

Another measure of environmental quality is the state's classification for the River. Each section of the River is given a class based on the "index of biotic integrity" (IBI), a measure of the biota in the stream. The Chicago River has a low classification under this framework. Most of the Chicago River system has been given a C or D classification. (See Figure 5.)

A measure of sewage treatment system effectiveness, though not necessarily stream quality, is how well a treatment facility, such as those operated by MWRD, complies with the standards for the effluent that it

discharges from its facilities into the River. MWRD's record of compliance is "considered excellent."[3] (See Figure 6.) This measure is dependent on the level of the standards for the effluent; stringent standards are likely to result in lower records of compliance.

Stream Classification

- ***Class A.*** Excellent stream quality for fish. IBI from 51 to 60, a unique aquatic resource, comparable to the best situations without human disturbance.
- ***Class B.*** Good stream quality for fish. IBI from 41 to 50, a highly valued aquatic resource, a good sport fishery.
- ***Class C.*** Fair stream quality for fish. IBI from 31 to 40, a moderate aquatic resource, bullhead, sunfish, and carp.
- ***Class D.*** Poor stream quality for fish. IBI from 21 to 30, a limited aquatic resource, carp and other less desirable species.
- ***Class E.*** Very poor stream quality for fish. IBI less than or equal to 20, a restricted-use aquatic resource, no sport fishery, few fish of any species present.

Figure 5 - Illinois Stream Classifications. Most of the Chicago River is a C or D.

MWRD Compliance with NPDES Permits			
Plant	*1997*	*1996*	*1995*
North Side WRP	100.00%	100.00%	100.00%
Egan WRP	99.84%	99.65%	99.94%
Kirie WRP	100.00%	99.87%	99.84%
Hanover Park WRP	99.96%	99.93%	100.00%
Lemont WRP	100.00%	99.83%	100.00%
Calumet WRP	100.00%	100.00%	100.00%
Stickney WRP	100.00%	99.91%	100.00%

Figure 6 - MWRD permit compliance record

Finally, quality of the stream is indicated by the health of the life of the stream. A 1998 study of one area downstream of MWRD discharges along the Des Plaines River shows that 7.5 to 14.6 percent of fish in this sampling location have some form of anomaly, such as rotted fins.[4] The source of pollutants causing this disease is debated. Adult fish in this area also show significant body burdens of contaminants. These contaminants act as poisons to developing fry.[5]

3. River Uses Today

Uses of the River vary by reach, though many uses are prevalent on all reaches. Uses today include canoeing, kayaking, and rowing. Passenger and recreational boating have been a major source of growth in river traffic downtown. Commercial use by barges still occurs, though less on the North Branch and Main Branch than in the past.

---

[3] Illinois EPA correspondence, February 18, 1998.
[4] Aquatic Ecological Study of the Upper Illinois Waterway, Commonwealth Edison. Page 9.9-8.
[5] Ibid., 10.5-7

Fishing on the River is on the rise. There are now fishing derbies in the city and major tournaments are anticipated.[6] Popular spots include the industrial South Branch of the River near Bubbly Creek, Sanitary and Ship Canal and Cal Sag Channel near MWRD SEPA[7] stations, Clark and River Parks on the north side and Ogden Slip downtown. Fishing for consumption is observed. Swimming, though infrequent, has been documented as well.[8]

Other forms of recreation - such as use of river trails and viewing of and appreciation of wildlife - exist today and will be enhanced through a new city plan for the River. A continuous river trail is envisioned in the 1999 City of Chicago River Corridor Plan. Areas previously fenced off or with steep banks have been regraded and opened to the public for water access.

---

[6] John Husar, *Chicago Tribune*, April 21, 1999.

[7] SEPA stations (sidestream elevated pool aeration stations) put oxygen back in the water. Game fish have minimum oxygen needs higher than fish like carp.

[8] The Chicago, Harry Hansen, p. 208. Also see *Chicago Tribune* August 27, 1995 and *Sun-Times* September 6, 1996. Page 16. For several years beginning in 1907 there was an AAU Chicago River Swim competition.

Figure 7 - Fishing occurs at many locations on the River, such as the "waterfall" at River Park.

Citizen and agency stewardship of the River have also increased. Community-led work days to build nature trails and native plant gardens and conduct water quality monitoring and stream clean-up occur throughout the year in numerous locations. In 1999, 127 teachers participated in the Chicago River Schools Network, 34 sites along the River were adopted for River Rescue Day cleanups, and several river bank and wetland restoration projects were undertaken with citizen participation and leadership. In 1999, the City of Chicago also launched a series of "model projects" which will create habitat for wildlife on the River as well as new public access opportunities and enhance river bank stabilization.

The River also serves the region through stormwater conveyance. When it rains, water is quickly shed from the landscape by streets, roofs, parking lots and other impervious land cover, and directed to the River. It gets to the River directly via separated storm sewers, or through combined sewers, which most of the time convey the water to TARP. TARP gradually pumps it to the wastewater treatment plants, where the water is treated and then released to the River. Over-bank flooding on the River in the city and in the region occurs periodically.

C. Regulatory Framework Affecting Water Quality

Regulatory guidance for the water quality of the River stems primarily, though not exclusively, from the Federal Clean Water Act. The objective of the Act is to "restore and maintain the chemical, physical, and

biological integrity of the nation's waters."[9] Important in the Act are provisions for required permitting of discharges to waterways, pretreatment of toxic pollutants by industry, citizen suits, and loans for wastewater treatment facility construction. The USEPA generally delegates some of its authority for implementing this Act to the states. In Illinois, the Illinois EPA is the delegated authority. The Illinois Pollution Control Board is an administrative body that makes determinations on specific criteria that must be followed and enforced by the Illinois EPA as it implements the Clean Water Act. Illinois EPA, under delegated authority by the USEPA, grants permits for the discharge of treated wastewater into waterways by sewage treatment facilities such as the MWRD and other direct dischargers. These permits are called NPDES (National Pollutant Discharge Elimination System) permits. The goal of the permit is to help achieve the quality desired for a water body. In turn, to meet its permit requirements, the MWRD regulates those entities that discharge wastewater to its treatment works.

Following this framework, the water quality goals for the Chicago River are set by the Illinois Pollution Control Board. The board does this by enacting water quality standards, which are in turn enforced by Illinois EPA. Water quality standards consist of two components: a designated use classification and water quality criteria. Designated uses are set based on actual uses and uses that can be attained in the future. The criteria define the properties of the water that are needed to support a designated use, such as swimming. Many reaches of the Chicago River have been designated "aquatic life and secondary contact," two of the state's uses. (A river can have more than one use.) The only "secondary contact" streams in Illinois are in the Chicago River waterway system.

Type of Designated Uses Assigned to Illinois Streams
Source: Illinois Pollution Control Board

- ***Aquatic Life***: Native populations of fish and other aquatic life
- ***General Use:*** Water quality standards which must be met in waters of the State for which there is no specific designation.
- ***Public and Food Processing Water Supply***: Water use in which water is withdrawn from surface waters of the State for human consumption or for processing of food products intended for human consumption.
- ***Primary Contact***: Any recreational or other water use in which there is prolonged and intimate contact with the water involving considerable risk of ingesting water in quantities sufficient to pose a significant health hazard, such as swimming and water skiing.
- ***Secondary Contact***: Any recreational or other water use in which contact with the water is either incidental or accidental and in which the probability of ingesting appreciable quantities of water is minimal, such as fishing, commercial, and recreational boating and any limited contact incident to shoreline activity.

Figure 8 - Definitions of Designated Uses

[9] Clean Water Act, section 101 (a). This act established a goal of eliminating the discharge of pollutants into navigable waters of the nation. In addition, discussion in the Congressional Record of October 4, 1972 determines this to mean that "streams and rivers are no longer to be considered part of the waste treatment process."

Main Branch	Lake Michigan to Wolf Point	Primary Contact
South Branch	Wolf Point to Lockport	Secondary Contact and Indigenous Aquatic Life
Bubbly Creek	all	Secondary Contact and Indigenous Aquatic Life
North Branch and Lower North Shore Channel	Wolf Point to Howard Street	Secondary Contact and Indigenous Aquatic Life
Upper North Shore Channel	Howard to Wilmette Harbor	Primary Contact
Upper North Branch	Upstream of the "waterfall" near Argyle Street	Primary Contact
Cal-Sag Channel	all	Secondary Contact and Indigenous Aquatic Life

Figure 9 - Designated uses assigned to the Chicago River System

Water quality standards -- including the designated use and the water quality criteria -- set the bar for the quality of waterbody through narrative descriptions and by setting limits on pollutant concentrations. This in turn determines the level of pollutants that dischargers to the waterway, including the MWRD, are allowed to discharge. The secondary contact designation and its related water quality criteria allow MWRD to discharge a pollutant load that is higher than that which would be permitted in many other waterways with primary contact designations. These water quality standards are subject to a triennial review under the Clean Water Act.

Other significant regulatory issues are in the area of flood and stormwater management. The state of Illinois has delegated authority for activities such as stormwater management to county-wide stormwater committees. While stormwater management committees exist in Lake County and all other Chicago collar counties, no effective committee has been developed in Cook County, leaving gaps in the framework for effectively addressing the region's stormwater problems. MWRD is seeking state authority and a funding source to take on this role.

At the local level, municipalities have responsibility for maintaining their local sewers, as well as ordinances addressing flood plains, erosion control, and stream protection.

D. Visions for the River's Future

What the River can and should become can be inferred from several sources. The Clean Water Act objective is a call for *all* rivers and streams of the nation to be fishable and swimmable. A recent survey of 1,200 households near the River found that most people ranked improved water quality and increased habitat and vegetation for wildlife as priorities for improvement. As many as 74.5 percent of survey respondents ranked improvement of water quality as Very Important.[10]

The Chicago River Corridor Plan (1999) puts forth a more specific vision for the River. It lays out development of many kinds of activities on the River, including fishing, paddling, walking, and appreciation of nature. Specifically, its two major goals are to restore habitat and to develop the River as a recreational amenity. Among the goals cited for various reaches of the River are: creating fishing

[10] Resident Use and perception of the Chicago and Calumet Rivers, US Army Corps of Engineers.

access, providing for bank fishing, river edge overlooks, canoe and kayak launches, and boat houses. These activities are planned throughout the River -- in residential, downtown, and other areas that were formerly or are currently occupied by industrial and commercial river bank uses.

Location	*Proposed Improvement*
Bryn Mawr to Foster	Clear areas for bank fishing
Cicero to Lawrence	Increase access for canoeists
Foster to Lawrence	Improve access for fishing
Irving to Addison	Provide area for bank fishing at canoe launch site
Neighborhood overlooks (various sites)	Provide access for bank fishing, wildlife viewing, and river access
Erie Street	Provide area for bank fishing
Wolf Point	Provide fishing from floating dock
South branch Turning basin	build a canoe launch, develop water access, fishing access
Canalport	Install water edge landscaping, areas for bank fishing

Figure 10- Chicago River Corridor Plan, Examples of Planned Enhancements

V. The Metropolitan Water Reclamation District of Greater Chicago (MWRD)

The MWRD is an independent government and taxing body with boundaries roughly equivalent to those of Cook County. It was organized in 1889 (and at the time was called the Chicago Sanitary District) by an act of the Illinois General Assembly. It is Governed by an elected Board of Commissioners and is a municipal corporation with taxing and bonding powers. It is the major wastewater treatment agency of the Chicago region, and as such has had responsibility for the quality of the area's waterways and water supply for 108 years. The MWRD is also a large river-edge landowner. It collects, treats, and disposes of wastewater from an area of 872 square miles that includes almost all of Cook County. It serves a population equivalent of 10.1 million people: 5 million real people, the commercial and industrial equivalent of 4.5 million people, and a combined sewer overflow equivalent of .6 million people. About half of the sewage treated by the MWRD comes from outside the Chicago city limits.

A. Responsibilities and Authorities

According to its web site, the MWRD has six major responsibilities and activities: wastewater treatment, TARP, biosolids disposal and the Prairie Plan, waterways control, Sidestream Elevated Pool Aeration Stations, and industrial waste programs.

B. *Operations*

The MWRD operates seven wastewater treatment facilities in the region, including one of the world's largest at Stickney, Illinois. The MWRD's treatment plants receive household and industrial wastewater, and, during rains, stormwater as well. They treat approximately 1.5 billion gallons of wastewater a day. The MWRD's treatment plants clean wastewater (or "reclaim" it). However, like all such plants they are limited in their ability to handle many hazardous substances such as metals and other toxic chemicals. All of its plants provide what is termed primary and secondary stage treatment.

MAP OF COOK COUNTY
AND
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

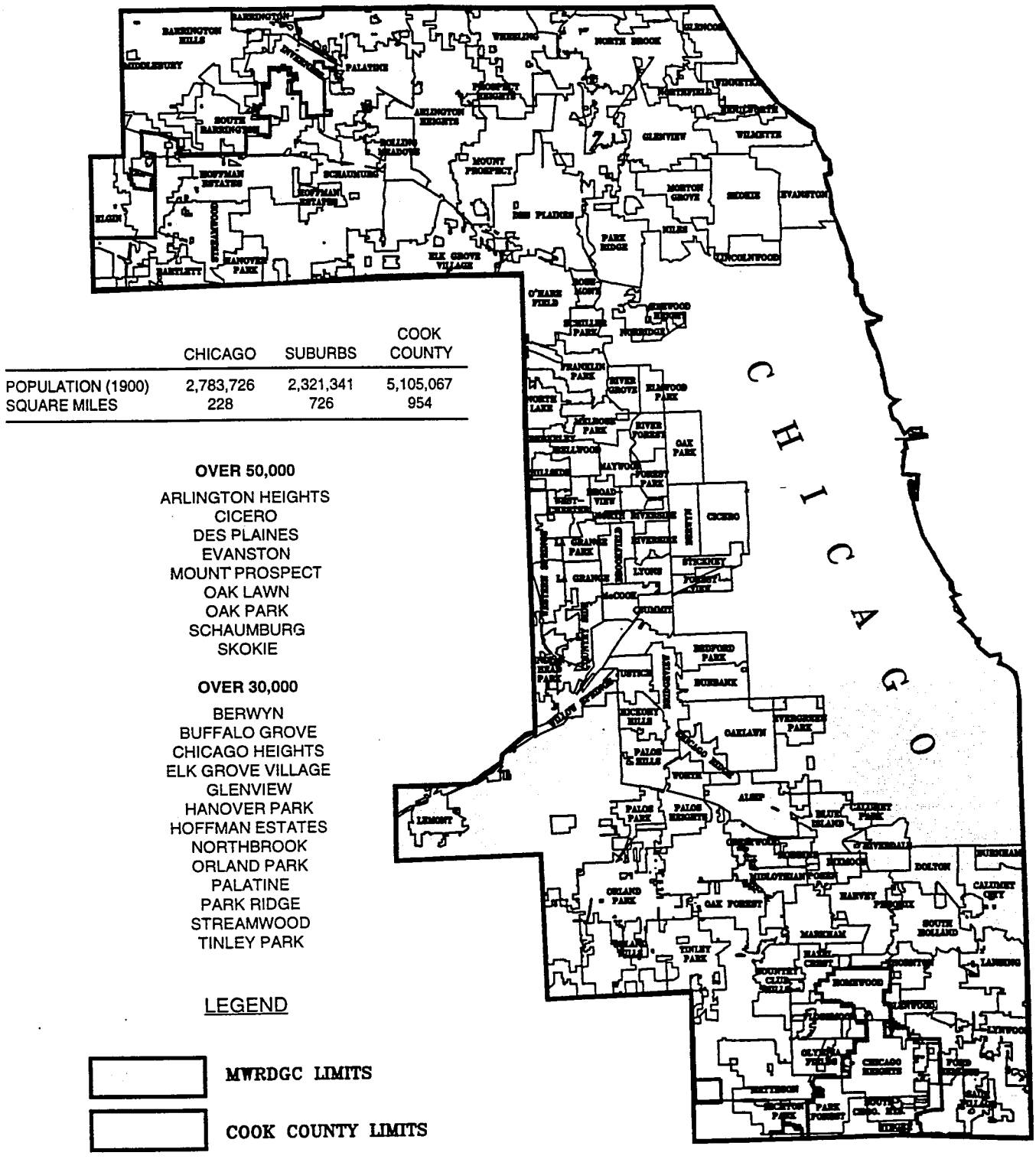


Figure 11 - Map of MWRD Service Area

These treatment processes remove conventional pollutants such as sand, leaves, human wastes, ground up foods and bath waters. Microbes are used to break down some pollutants that are not removed through settling and filtration. Higher levels of treatment designed to further filter out impurities (sometimes referred to as tertiary treatment) are provided at some of the MWRD's smaller suburban facilities.

Overview of MWRD Treatment Plants			
Plant Treatment	*Designated Flow (million gal/day)*	*Service Area Type*	*Highest Level*
Stickney	1200	Mod-heavy Industrial	Secondary
Calumet	354	Heavy Industrial	Secondary
North Side	333	Moderate Industrial	Secondary
O'Hare	72	Low Industrial	Tertiary
Egan	30	Low Industrial	Tertiary
Hanover Park	12	Low Industrial	Tertiary
Lemont	1.6	Domestic	Secondary

Figure 12- MWRD Treatment facilities

In addition, the MWRD monitors and works with some industries in its service area to minimize and prevent the discharge of hazardous substances such as metals and toxic organics into its sewers and treatment facilities.

The MWRD issues municipal sewer construction permits and provides trunk lines for collection of wastewater from local municipal systems. It also provides facilities to store, treat, and release combined sewage and stormwater runoff within its jurisdictions. These include a number of stormwater reservoirs, 547 miles of sewers and mains, as well as the TARP system. The MWRD also issues and enforces its ordinances related to the sewage system and waste control.

The TARP system was developed for the dual purposes of pollution and flood control. Project designs were developed and studied in the late 1970s. Construction began in the 1980s and the first stretches of the TARP tunnels came on line in the mid-80's. The 109-mile tunnel portion is nearly complete. The three TARP reservoirs, designed to hold a total of 16 billion gallons of stormwater mixed with sewage, have been planned and construction is underway. The reservoirs are scheduled to be finished in 2017.[11] The tunnel phase of TARP has cost approximately $3 billion. The reservoir phase is budgeted at approximately $660 million.

The MWRD controls the flow of 76 miles of navigable waterways. Flow is controlled largely by four lock and dam structures. It owns 15,000 acres of land in Fulton County, Illinois, which it uses for the recycling of biosolids (sludge removed during the sewage treatment process), as part of its "Prairie Plan."

In 2000 the MWRD has a budget of approximately $963 million and approximately 2,245 employees.

[11] MWRD letter 8/23/99.

VI. Comparison of NPDES Permits

A. *Introduction*

This section reviews the results of a comparison of National Pollutant Discharge Elimination System (NPDES) permits issued to operators of larger sewage treatment plants around the United States.

NPDES permits are the key mechanism for applying federal and state water pollution regulations to the operations of sewage treatment plants. Under the Federal Clean Water Act passed in 1972, all point source discharges of pollutants to U.S. waterways must be authorized by an NPDES permit. The definition of "point source" in this law is the discharge of polluting effluent from a "discrete conveyance"; the outlet pipe of a sewage treatment plant is an example of such a source.

NPDES permits regulate the composition of all effluents discharged into waterways, primarily by limiting the amounts of various substances which may be contained in the effluent. The limits found in NPDES permits are based either on minimum Federal standards or on more stringent standards which may be needed to minimize degradation of particular receiving water bodies. Essentially, NPDES permit limits are designed to maintain the quality of water bodies receiving effluent by restricting the amount of pollutants and other forms of contamination that may be released into them and degrade water quality.

Most NPDES permits are issued by state environmental protection agencies under authority delegated by the USEPA. The permits issued by state agencies must meet federal guidelines, and are subject to review and approval by the USEPA. In practice, most state issued permits are not reviewed in detail by USEPA.

Typically, a separate NPDES permit is issued for each individual sewage treatment plant, so that a regional sewage treatment authority will likely hold multiple permits if it operates several plants. In some cases, a single permit may be issued to cover more than one treatment plant -- this might occur where two separate plants share a common outlet or where two plants discharge under similar conditions into the same body of water. The MWRD now holds 7 permits for its 7 treatment plants.

As the study neared completion, IEPA released for public review a set of draft NPDES permits for the three large MWRD plants discharging into the Chicago River system. Existing permits were issued in the 1980s and expired 7-8 years ago. It is uncertain when the process of review for the draft permits will be concluded. Public hearings will be held in 2000. (See Appendix D for comments on the new permits.)

B. *Scope of Study*

The study includes review and comparison of 35 NPDES permits held by 23 sewage treatment agencies. All of the agencies are classified as "Major Dischargers" by USEPA; the capacity of the treatment plants included ranges from 15 to 1200 million gallons per day (mgd). For those municipal or regional authorities that operate multiple treatment facilities, we selected up to three of the largest plants from each authority. Generally, the study includes the largest plant operated by a given agency; in some systems with a relatively even distribution of capacity among multiple plants up to three plants were included.

Location	*Agency Name*	*Facility Name(s)*[1]
Detroit, Michigan	Detroit Department of Water - Wastewater Division	Detroit Wastewater Treatment Plant
Chicago, Illinois	Metropolitan Water Reclamation District of Greater Chicago	Stickney (West-Southwest), Northside, Calumet
City of Los Angeles, California	Los Angeles Bureau of Sanitation	Hyperion
Los Angeles County, California	Sanitation Districts of Los Angeles County	Carson, San Jose Creek
Orange County, California	Orange County Sanitation District	Reclamation Plant No.1 & Treatment Plant No. 2
Palo Alto, California	City of Palo Alto Public Works Department	Regional Water Quality Control Plant
New York City, New York	New York City Department of Environmental Protection	Newtown Creek, Ward's Island
Minneapolis / St. Paul, Minnesota	Metropolitan Council Environmental Services	Metro Wastewater Treatment Facility
Duluth, Minnesota	Western Lake Superior Sanitary District	Duluth Wastewater Treatment Facility
District of Columbia	District of Columbia Water and Sewer Authority	Blue Plains
Madison, Wisconsin	Madison Metropolitan Sewerage District	Nine Springs
Milwaukee, Wisconsin	Milwaukee Metropolitan Sewerage District	South Shore, Jones Island
Green Bay, Wisconsin	Green Bay Metropolitan Sewerage District	
Cincinnati, Ohio	Metropolitan Sewer District of Greater Cincinnati	Mill Creek, Little Miami, Muddy Creek
Cleveland, Ohio	Northeast Ohio Regional Sewer District	Southerly, Easterly, Westerly
Indianapolis, Indiana		Southport, Belmont
East Chicago, Indiana	East Chicago Sanitary District	Municipal Sewage Treatment Plant
Gary, Indiana	Gary Sanitary District	Wastewater Treatment Plant
Hammond, Indiana		Municipal Sewage Treatment Plant
Portland, Oregon	City of Portland Bureau of Environmental Services	Wastewater Treatment Plant
Albuquerque, New Mexico	City of Albuquerque Wastewater Utility Division	Southside Water Reclamation Plant
Louisville, Kentucky	Louisville & Jefferson County Metropolitan Sewer District	Morris Forman, West County
Philadelphia, Pennsylvania	City of Philadelphia Water Department	Northeast, Southwest, Southeast

[1] NPDES permit numbers for all treatment plants appear in Appendix F.

Figure 13 - Agencies Holding NPDES Permits Reviewed in Study

Of the seven MWRD wastewater treatment plants, three large plants discharge into the Chicago and Calumet River systems and account for approximately 95% of the wastewater treated by the MWRD. These three plants – West-Southwest, better known as Stickney, North Side, and Calumet – are the basis for the comparisons made here with other agencies. The map in Figure 11 shows the locations of the MWRD treatment facilities.

The selection of permits reviewed here was based on three factors. First, all of the agencies that the MWRD uses for comparison purposes in its budget presentation are included. This peer group, as specified by the MWRD, includes eight large-scale operations from seven metropolitan areas. A second group of agencies was included based on USEPA recommendations of treatment plants in the region that operate in similar situations to the MWRD, with a focus on treatment plants where effluent composes a large fraction of the flow in the waterways receiving the discharges. Additional agencies were included based on the recommendations of wastewater treatment experts to add diversity to the study.

The resulting collection of NPDES permits compared here includes large and medium scale operations from around the country. There is some focus on the Great Lakes region and an attempt to cover a variety of effluent discharge conditions. The collection is not intended to be exhaustive or to constitute a statistically random sample, however, permits were selected without any prior knowledge of their content and none of the permits reviewed were excluded from the comparison. Appendix G includes data from the permits for every agency whose policies and practices are discussed in this report.

C. *Typical Permit Features*

Although there are many rules and regulations governing the content of NPDES permits, there is no standard form or format by which the various rules and standards are implemented in a permit.

The permits we reviewed ranged from 10 to over 50 text pages in length, and typically included the following types of content:

Identification information, including the permitting agency and permit holder, contact information for the plant operator, facility description, and the dates of issue or effectiveness, and expiration of the permit.

Background information, including descriptions of the treatment plant facilities, treatment processes, and discharge water bodies. The amount and nature of background information found in permits is highly variable. Some permits include little information beyond basic identification of the permit holder and treatment plant. Others include extensive background information which may include relevant environmental history of the affected area, beneficial uses and water quality objectives for the affected waterways, references to regional watershed plans and pollution control initiatives, discussion of the treatment plant performance history, and summaries of relevant policies, rules, and regulations.

Effluent limits, generally a short list of specific parameters, the limits that apply to them, and how and when measurements of these parameters should be made. Basic wastewater treatment parameters such as suspended solids, biochemical oxygen demand, and pH appear in this list; other common limits are for bacteriological contamination, ammonia, and minimum standards for dissolved oxygen. Many permits include effluent limits for various metals, organic compounds and other substances that must be regulated to protect water quality. Effluent limits are often extensively footnoted; these notes often contain important details. In many cases, significant modifications, exceptions, or limitations are imposed by the terms of footnotes and special conditions in the permit.

Monitoring requirements, where monitoring is required for a larger set of parameters than those for which effluent limits are set. In the MWRD Stickney treatment plant permit, for example, there are 8 parameters listed as effluent limits, 18 additional substances that must be monitored weekly, and 111 substances from a category identified as "organic priority pollutants" by USEPA that must be monitored annually. Monitoring requirements may be applied to the influent, effluent, and biosolids, or sludge output, of a treatment plant. There may also be monitoring requirements for ambient, or receiving water body, quality in a permit. Permits may also specify, explicitly or via reference, acceptable analytical techniques and detection levels for each parameter to be reported on. The detection levels are particularly important for those parameters where the effluent limits are at or near minimum detectable levels, as is the case with mercury.

Biological monitoring requirements, most often in the form of specifications for conducting Whole Effluent Toxicity (WET) tests. WET tests measure water quality by assessing the ability of several types of aquatic organisms to survive or reproduce in treatment plant effluent, dilute effluent, or samples taken from the receiving water bodies. WET test regimes may appear as toxicity limits within the effluent limits listing, or as a component of the required monitoring program, or as a separate section or special condition. WET test frequencies are usually specified and may include contingent patterns which depend on the results achieved in prior periods. Test procedures often refer to, or include directly, several guidance documents that have been prepared by the USEPA or state environmental agencies.

Pretreatment program provisions, under which a sewage treatment agency is required to create and maintain programs for monitoring, setting limits, and enforcing sanctions when necessary to control the discharge of pollutants into its system from all significant industrial dischargers in its jurisdiction. Pretreatment restrictions are the key tool for meeting limits for metals and other trace toxic substances in wastewater, which cannot feasibly be removed by available wastewater treatment plant technology. All large sewage treatment plants administer pretreatment programs and are required to report periodically on the status and effectiveness of these efforts.

Wet weather operating policies, for sewage systems employing combined sewers, which carry both rainwater runoff and wastewater. During periods of substantial precipitation, a large inflow of rainwater runoff can exceed the capacity of the sewers or treatment system, and must be released directly into receiving waters via overflows or bypasses. The term Combined Sewer Overflow (CSO) is applied to this situation, and the NPDES permit often specifies how, where, and when such releases of untreated mixed runoff and wastewater shall be conducted. Some sewage treatment agencies have separate permits containing their CSO regulations.

D. *Dimensions of this Comparison*

For this study a number of items of interest were selected, and comparisons were made across the collection of permits. These include:

Limits for the basic measures of secondary wastewater treatment effectiveness: total suspended solids and biochemical oxygen demand.

Bacteria limits, most often measured by fecal coliform counts.

Residual chlorine, *i.e.* that chlorine not removed from the waste stream after disinfection by a chlorination process.

Ammonia nitrogen limits.

Minimum levels of dissolved oxygen.

Cyanide limits.

Selected limits for metals: Cadmium, Chromium, Copper, and Mercury.

Phosphorus limits.

Phenols (or phenolics) limits, applying to an important class of organic compounds.

Whole Effluent Toxicity (WET) testing regimes, the most common form of biological monitoring specified in a permit.

Timeliness of the permit: Is the permit current? NPDES permits are valid for a maximum period of five years. Some agencies are currently operating under expired permits.

Some highlights of these comparisons are described below, following some notes on insuring valid numerical comparisons between permits.

E. *Notes on Making Cross-permit Comparisons*

Although all permits use similar language and definitions, there are differences in terminology, technique, and detail that must be considered when attempting to make quantitative comparisons between permits issued by different agencies. Some of the important differences arise from:

Time periods used for measurements. The limits applied to multiple samples averaged over a period of time are usually significantly stricter than those applied to one-time samples. Some time periods are common to many permits, while some permits use less common time periods. Close reading reveals that seemingly simple designations such as "daily" in a table heading may denote different measurements such as an average of multiple daily samples, any single sample, a variety of 24-hour composite sample methods, or the daily maximum of a continuously sampled parameter.

Sampling technique. Samples may be taken continuously, may be composites assembled by collecting fractions of the sample at regular intervals, or one-time collections (usually referred to as "grab" samples). The type of sample taken can affect the measured parameters and limit comparability.

Sampling location. Effluent testing is usually designated to be done at the outlet or some other specific point in the treatment process containing pure effluent. However, some sampling is done in the receiving water body either before or after significant mixing has occurred.

Similar but not identical parameters. Similar parameters may address the same type of contaminant by measuring different forms or fractions of the substance of interest. This produces numeric limits that are not directly comparable. Examples include carbonaceous and total biochemical oxygen demand; counts of total coliform, fecal coliform and E. coli bacteria; total ammonia and unionized ammonia, or total and wet acid dissociable cyanide. In some cases, limits for different measures can be adjusted to make comparisons.

Seasonal variation. Some limits vary by time of year where climates are seasonal. For example,

bacteria limits may apply only in the warm season. Ammonia limits often have multiple values for different times of the year due to the varying toxicity of ammonia as a function of pH and a lesser extent on temperature. When this situation occurs, it is not possible to simply pick one number from the permit for purposes of comparison.

Limits which vary as a function of hardness or pH. Assumptions must be made about these chemical properties of the water in order to come up with a single numeric value for comparing these limits. It may not be reasonable to directly compare limits calculated on the basis of different pH and hardness assumptions.

Multiple sets of limits in permit. Several circumstances can lead to the inclusion of distinct sets of limits with different values for the same parameters in a single permit. One example of this is the inclusion of alternate limits as a function of stream flow, as is found in the St. Paul and Albuquerque permits. Another example is a permit which specifies different limits for different outfalls belonging to the same treatment plant. This occurs in Detroit and Madison, Wisconsin. Prospective changes to facilities, such as modernization or expansion, may also result in a permit with multiple limits for the periods before, during, and after planned changes.

California ocean outfalls . The Los Angeles County Carson plant and the City of Los Angeles Hyperion plant discharge effluent several miles offshore in deep ocean water through a manifold diffusion system. This arrangement is presumed to provide immediate, large scale dilution of the effluent, a condition that is reflected in the permit limits by scaling up the limit that would apply to freshwater discharge of the same pollutants with much lower immediate dilution. Since these dilution factors may exceed two orders of magnitude – the Carson plant limits are 166 times what the analogous freshwater limits would be – they need to be accounted for when making comparisons.

Examination of the complete data tables from the study will reveal that each NPDES permit contains limits for only some of the list of parameters reviewed. When there is a permit effluent limit, it can be assumed that there is some history or presumption of problems with that pollutant at that plant, or in the body of water to which it discharges. If there is no limit in the permit, the situation is less clear.

Having no permit limit can mean that there are no known problems with that pollutant in that location, and hence no need for a limit. It may also mean that there is no applicable water quality standard for that substance or parameter. For example, in Illinois there are no standards for phosphorus levels except in large lakes, and there are no standards for bacteria levels in much of the Chicago River and associated waterways, despite the presence of high levels of bacterial contamination in these waters. Hence these parameters are not regulated through NPDES permits.

F. *Summary of Comparisons by Parameter*

1. Total Suspended Solids

Total suspended solids (TSS) is an aggregate measure of the quantity of all kinds of particles found in water samples. TSS reflects the collective mass of the many tiny pieces of solid matter which are found suspended in the water column. Effective removal of TSS from wastewater is one of the basic indicators of a successful secondary level sewage treatment operation.

Treatment Plant	Daily Limit	Weekly Avg. Limit	Monthly Avg. Limit
Gary, IN[2]		9.9 / 14.4	6 / 9.6
Washington, DC		10.5	7
East Chicago, IN		12.8	8.5
Hammond, IN[3]		9.9 / 12.8	6.6 / 8.5
Palo Alto, CA	20		10
Southport, Indianapolis		15	10
Belmont, Indianapolis		15	10
Stickney, MWRD		25	12
San Jose Creek, Los Angeles	45	40	15
Southerly, Cleveland		24	16
Madison, WI		23	20
Easterly, Cleveland		30	20
Westerly, Cleveland		30	20
Muddy Creek, Cincinnati		34	23
Northside, MWRD		40	25
Calumet, MWRD		56	28
Northeast, Philadelphia		45	30
Southwest, Philadelphia		45	30
Southeast, Philadelphia		45	30
Detroit, MI		45	30
Metro Plant, St. Paul		45	30
Duluth, MN		45	30
Green Bay, WI		45	30
Milwaukee, WI		45	30
Portland, OR		45	30
Albuquerque, NM		45	30
Mill Creek, Cincinnati		45	30
Little Miami, Cincinnati		45	30
Morris Forman, Louisville, KY		45	30
West County, Louisville, KY		45	30
Hyperion, Los Angeles City		45	30
Ward's Island, NY		45	30
Newtown Creek, NY		53	35
Orange County, CA[2]		109	72
Carson, Los Angeles County[1]		135	90

[1] These limits are designated interim but apply for the entire permit period.
[2] These limits apply under a variance granted by USEPA Region 9 Administrator.
[3] These limits are different in summer and winter, the tighter limits apply in summer.

Figure 14 - Total Suspended Solids Limits, mg/L

All of the permits contained limits for TSS. Limits of 45 mg/l for a weekly average combined with a monthly average of 30 mg/l were most common. These widely established limits are based on the demonstrated capability of standard secondary sewage treatment technology.

The California permits which show much higher TSS limits than the rest of the group provide only primary stage treatment for some of their wastewater. They are currently operating under interim limits or special exceptions from state authorities and the USEPA.

The three plants in northern Indiana, the District of Columbia, and Palo Alto have TSS limits which are tighter than the average for the group.

The MWRD Stickney plant has TSS limits which are approximately half of the average level. The MWRD Northside plant limits, at 40-25 (weekly-monthly) are slightly tighter than the typical 45-30 combination. The MWRD Calumet plant has a relatively high TSS limit of 56 by the weekly average measure. This is the only TSS limit at a MWRD facility which is more lax than the technology based standard for this parameter. However, this high weekly limit is paired with a monthly average limit of 28 which is a bit tighter than the standard.

2. Biochemical (or Biological) Oxygen Demand (BOD)

BOD is a measure of the potential amount of oxygen which could be consumed by chemical and biological processes which occur in wastewater or which will occur instream, thereby depleting dissolved oxygen levels. Many waste materials found in effluent can serve as nutrients for bacteria and other microorganisms, and as reactants for chemical processes. Both of these mechanisms require, and therefore create, a "demand" for oxygen. The rate at which oxygen is taken up by a water sample can be measured and, expressed as BOD, be a useful indicator of the amount of waste present.

Contemporary wastewater treatment processes are capable of removing most BOD-producing substances from the discharged effluent. The standard performance for secondary level sewage treatment is 85% removal of BOD, but many plants do much better than this, with some exceeding 98% removal.

Some NPDES permits use a measure of Carbonaceous BOD, or CBOD, for quantifying oxygen demand. Carbonaceous BOD is a subcategory of BOD, it counts only that proportion of BOD derived from oxidation of carbon compounds in the waste. It is always less than or equal to a measure of BOD for the same effluent, so a limit expressed as CBOD would typically be lower than a comparable limit expressed as BOD.

Treatment Plant	Daily Limit	Weekly Avg. Limit	Monthly Avg. Limit
Palo Alto, CA	20		10
Southport, Indianapolis[1]		15[1]	10[1]
Belmont, Indianapolis[1]		15[1]	10[1]
Madison, WI		20	19
San Jose Creek, Los Angeles	45	30	20
Northeast, Philadelphia		45	30
Southwest, Philadelphia		45	30
Southeast, Philadelphia		45	30
Milwaukee, WI		45	30
Portland, OR		45	30
Morris Forman, Louisville, KY		45	30
West County, Louisville, KY		45	30
Hyperion, Los Angeles City		45	30
Ward's Island, NY		45	30
Newtown Creek, NY		68	45
Orange County, CA[4]		150	100[5]
Carson, Los Angeles County[3]		180	120

Carbonaceous Biochemical Oxygen Demand

Washington, DC		7.5	5
Gary, IN[6]		7.5 / 13.2	5 / 8.8
East Chicago, IN		10.7	7.1
Hammond, IN[6]		8.3 / 10.7	5.5 / 7.1
Southerly, Cleveland[1]		15[1]	10[1]
Stickney, MWRD		20	10
Westerly, Cleveland		20	15
Easterly, Cleveland		22.5	15
Northside, MWRD		24	12
Muddy Creek, Cincinnati		24	16
Metro Plant, St. Paul		40	24
Mill Creek, Cincinnati		40	25
Little Miami, Cincinnati		40	25
Detroit, MI		40	25
Duluth, MN		40	25
Green Bay, WI		40	25
Albuquerque, NM[2]		40[2]	25[2]
Calumet, MWRD		48	24

[1] Higher seasonal limits may apply.
[2] Lower limits apply during low flow periods.
[3] These limits are designated interim, but apply for entire permit period.
[4] These limits apply under a variance granted by USEPA Region 9 Administrator.
[5] This limit is for a ninety day average.
[6] These limits are different in summer and winter, the tighter limits apply in summer.

Figure 15 - Biochemical Oxygen Demand Limits, mg/L

All of the permits have limits for BOD or CBOD. Total BOD is the sum of CBOD and BOD arising from the oxidation of nitrogen compounds in the wastewater. Since CBOD typically makes up most of total BOD, the CBOD limits tend to be lower, but not dramatically so.

The most common limits are 45 mg/l weekly and 30 mg/l monthly averages for BOD and 40 mg/l weekly, 25 mg/l monthly averages for CBOD. Sixteen of the permits examined have these limits; fourteen have tighter limits. The Orange County and Carson plants in California have exceptionally high limits for BOD because they do not have the facilities needed to provide complete secondary treatment for the wastewater they process.

The MWRD Northside and Stickney plants have CBOD limits which are tighter than average. The MWRD Calumet plant has a slightly higher than average CBOD limit.

3. Bacteria

Bacterial contamination is one of the factors which can make a water resource dangerous to human health. Bacteria levels must be regulated in waters that receive extensive direct human contact or are used for drinking water supplies. Bacteria are present in all treatment plant influents, and some species form an important part of the useful biological processes within the plant. In order to reduce bacteria levels in the effluent, some kind of disinfection process is employed at the final stage of treatment.

Treatment Plant	Daily	Weekly Avg Limit	Monthly Avg Limit	Notes
Albuquerque, NM	200		100	
Palo Alto, CA	240	Limit is for total coliform. Median of 5 consecutive samples must be < 23		
Portland, OR	406		126	Limit is for E. coli.
Gary, IN		400	200	
Washington, DC		400	200	
East Chicago, IN		400	200	
Hammond, IN		400	200	
Southport, Indianapolis		400	200	
Belmont, Indianapolis		400	200	summer only
S. Jose Creek, Los Angeles			200	90% of samples < 400
Muddy Creek, Cincinnati		400	200	summer only
Northeast, Philadelphia			200	
Southwest, Philadelphia			200	
Southeast, Philadelphia			200	
Detroit, MI		400	200	
Metro Plant, St. Paul			200	
Duluth, MN			200	
Mill Creek, Cincinnati		400	200	summer only
Little Miami, Cincinnati		400	200	summer only
W. County, Louisville, KY		400	200	
Newtown Creek, NY		400	200	
Ward's Island, NY	2400	400	200	
M. Forman, Louisville, KY		400 / 2000	200 / 1000	summer / winter
Madison, WI			400	summer only
Green Bay, WI			400	summer only

Milwaukee, WI			400	
Southerly, Cleveland		2000	1000	summer only
Easterly, Cleveland		2000	1000	summer only
Westerly, Cleveland		2000	1000	summer only
Stickney, MWRD			no limit	
Northside, MWRD			no limit	
Calumet, MWRD			no limit	
Hyperion, Los Angeles				ambient limit
Orange County, CA				ambient limit
Carson, Los Angeles				ambient limit

Figure 16 - Bacterial Contamination Limits, Counts per 100 ml

The lack of any bacterial contamination limits at the MWRD treatment plants is a consequence of the Illinois secondary contact water quality standard, which has no limit for bacteria levels. (This is discussed in more detail later, in section VI.A, Effluent Disinfection). **Every permittee except the MWRD has limits for bacterial contamination.** The most common standard is a fecal coliform count with a monthly geometric mean of 200 per 100 ml, often paired with a weekly standard of 400 counts per 100 ml. This limit is found in more than one-half of the permits. The three California plants with offshore ocean outlets for their effluent each have detailed monitoring requirements and bacteriological limits which apply to samples taken from adjacent near-shore waters. In the permits for some northern locations, bacteria limits are often relaxed or dropped during the cold season on the assumption that there will be less human contact with the water then and that colder weather limits bacteria survival. Some permits regulate bacteria based on counts of E. coli or total coliform bacteria.

4. Dissolved Oxygen

With the exception of some types of bacteria, all aquatic animal life is dependent on sufficient dissolved oxygen (DO) being present in the water. Different species have different oxygen requirements, and these can differ markedly. A few fish species such as carp and catfish can survive at DO levels as low as 1-2 mg/l, making them the common fish found in poorly oxygenated waters. Many other fish species require minimum DO levels of 5-7 mg/l or more. The availability of sufficient DO is critical to the operation of numerous normal ecological processes in water bodies.

DO limits differ from other permit limits in that they are for required minimum levels, rather than upper limits for contamination. The limits are usually applied through daily measurements; averaging is not appropriate since a single occurrence of low DO can kill all of the sensitive aquatic life in a lake or stream.

Treatment Plant	Daily Minimum	Notes
Belmont, Indianapolis	8 / 6	seasonal
Southport, Indianapolis	8 / 4	seasonal
Metro Plant, St. Paul	7	
Stickney, MWRD	6	
East Chicago, IN	6	
Hammond, IN	6 / 5	seasonal
Gary, IN	6 / 5	seasonal
Madison, WI	5	
Little Miami, Cincinnati	5	
Southerly, Cleveland	5	
Washington, DC	4	daily average > 5
Northside, MWRD	4	measured in stream
Albuquerque, NM	4 / 2	low / high stream flow
Calumet, MWRD	3	measured in stream
West County, Louisville, KY	2	
Morris Forman, Louisville, KY	2	

Figure 17 - Dissolved Oxygen - Minimum Levels, mg/L

Approximately one half of the permits reviewed had DO limits. Treatment plants which discharge into the ocean, or large or fast moving rivers are not likely to significantly affect the ambient DO levels. Plants that discharge in situations where the effluent constitutes a significant proportion of the receiving water body inflow, or waterways with particularly slow flow such as those in greater Chicago, are most likely to require attention to maintaining adequate DO levels.

DO values fall in a low absolute value range, but the differences are very significant. A DO level of 6 mg/l means 50% more oxygen is available than at DO level of 4, and this difference will have a dramatic effect on the fish species that can live in such water.

The MWRD Stickney plant's minimum required DO is in the upper half of the range of values found in this group. The MWRD Northside and Calumet plants values fall near the low end for required DO. DO levels in the Northside and Calumet permits are specified to be measured in the receiving water rather than the effluent. However, in each case the receiving water is composed almost completely of effluent during dry weather.

To augment DO levels in the streams and help meet water quality standards, the MWRD developed award-winning SEPA (Sidestream Elevated Pool Aeration) stations.

5. Chlorine, total residual

The effluent from sewage treatment plants is usually disinfected before discharge in order to reduce bacteriological contamination. The most common disinfection process in use is a chlorination procedure. Chlorine's toxicity to pathogens makes it an effective disinfectant. However, when disinfection is done with chlorine, any significant chlorine residue remaining in the effluent itself becomes a dangerous pollutant. To prevent this, the effluent is usually dechlorinated by a process designed to remove harmful

chlorine residues prior to discharge. A total residual chlorine limit in an NPDES permit restricts the amount of chlorine that may remain in the effluent when discharged.

Treatment Plant	Instantaneous Max.	Daily Maximum	Monthly Average
Palo Alto, CA	0.0[1]		
Albuquerque, NM	0.011		
Hyperion, Los Angeles City[2]	0.06	0.008	0.002
Carson, Los Angeles County[2]		0.06	0.002
Portland, OR	1.0		
Morris Forman, Louisville, KY		0.019	0.019
West County, Louisville, KY		0.019	
Southerly, Cleveland		0.021	
Metro Plant, St. Paul			0.026
Green Bay, WI		0.037	
Milwaukee, WI		0.037	
Easterly, Cleveland		0.038	
Westerly, Cleveland		0.038	
Little Miami, Cincinnati		0.038	
Gary, IN		0.04	.02
Hammond, IN		0.02	.01
Duluth, MN		0.1	
Detroit, MI		0.11	
Mill Creek, Cincinnati		0.33	
Muddy Creek, Cincinnati		0.5	
East Chicago, IN		1.0	
Newtown Creek, NY		2.0	
Ward's Island, NY		2.0	
MWRD			no limit, n/a

[1] The permit lists a value of zero, in practice this would be equivalent to nondetectable.
[2] Limits adjusted for comparability by removing ocean dilution factors.

Figure 18 - Total Residual Chlorine Limits, mg/L

Most of the permitted plants chlorinate their effluent and have residual chlorine limits. Some of the plants use other disinfection methods and do not require chlorine monitoring or limits. The MWRD treatment process does not include chlorination, or any other disinfection procedure, and its permits therefore contain no limits for residual chlorine. There is no Illinois general effluent standard for residual chlorine to use for comparison, however some information can be obtained from the permits for three small MWRD plants not included in the study group which disinfect their effluent. The permits for these plants all have a 0.05 mg/L daily maximum limit for total residual chlorine.

6. Ammonia

Ammonia is a nitrogen-containing compound found at high levels in human and animal waste. High levels of ammonia are toxic to fish and other aquatic life. Permitted levels of ammonia are usually lower during the warmer parts of the year, because ammonia exhibits higher toxicity at higher temperatures. The bacterial processes used in secondary wastewater treatment can convert ammonia into less toxic and

non-toxic nitrogen compounds. These other compounds, however, become nutrients in the stream that, when excessive, cause other problems.

Treatment Plant	Daily	Weekly Avg. Limit	Monthly Avg. Limit
Hyperion, Los Angeles City[5]	2.4		0.6
Washington, DC[1]		1.5 / 9.8	1 / 6.5
East Chicago, IN		6	1.5
Southerly, Cleveland[1]		2.6 / 7.5 / 12	1.7 / 5 / 8
Albuquerque, NM[2]		4 / 2	2 / 1
Gary, IN[1]		3 / 3.6	2 / 2.4
Hammond, IN[1]		3.8 / 7.5	2.5 / 5
Stickney, MWRD[1]			2.5 / 4.0
Northside, MWRD[1]			2.5 / 4.0
Madison, WI[1,3]		3.2 / 6.0 | 2 / 1.5 / 5.2	2.7 / 5 |
Palo Alto, CA	8		3
Belmont, Indianapolis[1]		5.1 / 10.5	3.4 / 7.0
Southport, Indianapolis[1]		6 / 10.5	4 / 7
Green Bay, WI[1]		16 / 8 / 3 / 5	
Metro Plant, St. Paul[1]		13 / 12 / 7.5 / 13.5 / 31.5	13 / 8 / 5 / 9 / 21
Milwaukee, WI[4]		16.7-13.1 / 11.3-6.8 / 11.1-6.7 / 12.7-10	
Calumet, MWRD			13
West County, Louisville, KY		30	20

[1] Multiple seasonal limits apply.
[2] Limits for High / Low stream flow apply.
[3] Two sets of weekly limits for different discharge points.
[4] Multiple seasonal limits are also determined by pH.
[5] Limits adjusted for comparability by removing ocean dilution factors.

Figure 19 - Nitrogen Ammonia Limits, mg/L

As the above table shows, ammonia limit regimes can be complicated. This is because the proportion of ammonia occurring in its most toxic form, known as unionized ammonia, varies as a function of water temperature and pH (acidity or alkalinity). Most of the permits with ammonia limits have multiple limits applying to different parts of the year, based on expected temperatures. The Milwaukee limits also vary as a function of pH, as measured in the effluent. The Albuquerque permit has different ammonia limits for high and low levels of flow in the Rio Grande River.

The permit limits for the Northside and Stickney MWRD plants are toward the low end of the range shown for ammonia limits, while the MWRD Calumet plant has one of the highest permitted ammonia levels in its effluent. The Illinois Pollution Control Board has created a specific exclusion of the Calumet plant effluent from meeting Illinois general effluent standards (Section 304.201(a) of Title 35, Environmental Protection). The special standard applied to MWRD Calumet effluent is five times the general effluent standard for summer and three times the general standard for winter.

7. Cyanide

Cyanide is a chemical combination of carbon and nitrogen which is extremely toxic. It occurs in a number of compounds such as hydrogen-, sodium-, and potassium cyanide. Cyanide is added to wastewater in discharges from organic chemical and metal processing industries, especially electroplating. Cyanide compounds are volatile and biodegradable when released to water. Most do not bioaccumulate in aquatic organisms, although some insoluble cyanide-metal salts may have a potential to bioaccumulate.

Treatment Plant	Daily Limit	Monthly Average Limit
Hyperion, Los Angeles City[2]	0.004	0.001
Palo Alto, CA	0.005	
Carson, Los Angeles County[2]	0.010	0.001
Hammond, IN	0.009	0.004
Gary, IN	0.019	0.008
Southport, Indianapolis	0.027	
Belmont, Indianapolis	0.027	
East Chicago, IN	0.05	
Northside, MWRD	0.1	0.1[1]
Calumet, MWRD	0.11	0.1[1]
Stickney, MWRD	0.12	0.1
Free Cyanide Limits		
San Jose Creek, Los Angeles		0.0052
Mill Creek, Cincinnati	0.033	0.029
Southerly, Cleveland	0.061	0.014
Westerly, Cleveland	0.092	

[1] From Illinois General Effluent Standards, no specific listing in NPDES permit.
[2] Limits adjusted for comparability by removing ocean dilution factors.

Figure 20 - Cyanide Effluent Limits, mg/L

There are a number of methods for measuring the cyanide content of effluent. Most of the permits reviewed refer to total cyanide. In the mid-1990s, USEPA approved a method of cyanide testing believed to better assess the forms of cyanide most toxic to aquatic life. The results of this testing technique are variously labeled weak acid dissociable (WAD)-, amenable-, or free cyanide. Three plants regulated by the Ohio Environmental Protection Agency regulate cyanide in the form free cyanide; the San Jose Creek, California permit specifies amenable cyanide. Generally, a weak acid dissociable cyanide limit would be lower than a comparable total cyanide limit. In Illinois, for a time, general use water quality standards were specified for both types of testing; at that point the WAD cyanide limit was 12% lower than the contemporaneous total cyanide limit.

Currently, in Illinois, the secondary contact water quality standard is for total cyanide while the general use standard specifies WAD cyanide. In late 1999 USEPA approved a new method for measuring total cyanide which may become a standard in new discharge permits and other regulations.

The MWRD plants have daily maximum limits of .12, .11, and .10 mg/L for cyanide. The Stickney plant also has a monthly average limit of .10 mg/L, which is the same value as the Illinois general effluent

limit. Illinois water quality standards include an site-specific exception for the Calumet plant which allows cyanide discharges to be 50% higher than the secondary contact standard (Title 35, Subtitle C, Part 304, Section 304.201a). **Comparing the average of the three MWRD values for daily cyanide limits to the other limits in the group shows that MWRD daily limits are two to 25 times higher than those for the other plants.**

8. Cadmium

Cadmium is a heavy metal that is toxic at low levels and that bioaccumulates in living organisms.

Treatment Plant	Daily Limit	Monthly Average Limit
Hyperion, Los Angeles City[2]	0.004	0.001
San Jose Creek, Los Angeles		0.005
Detroit, MI		0.005
Carson, Los Angeles County[2]	0.01	0.001
Hammond, IN	0.0044	0.0019
Gary, IN	0.0143	0.0061
Easterly, Cleveland	0.016	0.013
Westerly, Cleveland	0.016	0.013
East Chicago, IN	0.02	
Indianapolis Southport	0.02	
Indianapolis Belmont	0.02	
Southerly, Cleveland	0.022	0.01
MWRD, all plants[1]	0.30	0.15

[1] From Illinois General Effluent Standards, no specific listing in NPDES permit.
[2] Limits adjusted for comparability by removing ocean dilution factors.

Figure 21 - Cadmium Effluent Limits, mg/L

Twelve of the permits specify cadmium limits. There are no cadmium limits listed in the permits for MWRD plants. The Illinois general effluent cadmium standards shown in the table apply to all MWRD discharges. This general standard allows cadmium effluent levels fifteen times higher than the next highest permit limit in the group.

9. Chromium

Chromium is another toxic heavy metal known to bioaccumulate in the environment. Some permits specify this parameter using hexavalent chromium, the chemical form of chromium considered most toxic to aquatic life. Since the hexavalent form of chromium usually accounts for only a small fraction of the total chromium detected in wastewater, the total chromium limit would be expected to be much higher than the hexavalent chromium limit.

Treatment Plant	Daily Limit	Monthly Average Limit
Total Chromium		
Hammond, IN	0.025	0.0125
East Chicago, IN	0.025	
Gary, IN	0.025	0.0125
Southport, Indianapolis	0.25	
Belmont, Indianapolis	0.25	
Northside, MWRD	1.3	1.0
Calumet, MWRD	1.4	1.0
Stickney, MWRD[1]	2.0[1]	1.0[1]
Hexavalent Chromium		
Hyperion, Los Angeles City[2]	0.008	0.002
Carson, Los Angeles County[2]	0.020	0.002
Mill Creek, Cincinnati	0.022	
Gary, IN	0.032	0.014
San Jose Creek, Los Angeles		0.05
MWRD, all plants[1]	0.3[1]	0.1[1]

[1] From Illinois General Effluent Standards, no specific listing in NPDES permit
[2] Limits adjusted for comparability by removing ocean dilution factors.

Figure 16 - Chromium Effluent Limits, mg/L

Eleven of the permits have limits for chromium. The MWRD North Side and Calumet treatment plants have a monthly average effluent limit for chromium of 1.0 mg/L, which is equal to the Illinois general standard. The daily limits at North Side and Calumet are slightly lower than the general effluent daily standard, which appears in Figure 16 above on the line for the MWRD Stickney plant. Illinois has general effluent limits for both hexavalent and total chromium, so it is possible to compare directly with both of these limits that appear in the other permits. **The MWRD limits are more than five times as high as the limits for the two Indianapolis plants, and at least ten times as high as any of the other limits.**

10. Copper

Copper is a metal which is an essential trace nutrient for humans but which has deleterious health effects at high doses, including causing stomach, liver, and kidney damage. In water copper usually occurs as a salt, in combination with chloride, nitrate, or sulfate,

Treatment Plant	Daily Limit	Monthly Average Limit
Carson, Los Angeles County[2]	0.01	.001
Hyperion, Los Angeles County[2]	0.01	.001
Palo Alto, CA	0.012	
Gary, IN	0.023	0.01
East Chicago, IN	0.03	
Little Miami, Cincinnati	0.031	
Hammond, IN	0.04	0.02
Easterly, Cleveland	0.05	
Westerly, Cleveland	0.05	

Southerly, Cleveland	0.056	0.033
Southport, Indianapolis	0.1	0.04
Belmont, Indianapolis	0.1	0.04
Detroit	0.18	
Northside, MWRD	1.0	0.5
Stickney, MWRD	1.0[1]	0.5[1]
Calumet, MWRD	1.0	0.5

[1] From Illinois General Effluent Standards, no specific listing in NPDES permit
[2] Limits adjusted for comparability by removing ocean dilution factors.

Figure 17- Copper Effluent Limits, mg/L

Fifteen permits had limits for copper. The MWRD Northside and Calumet plants have a permit-specified limit which is identical to the Illinois general effluent limit applying to all dischargers. **MWRD limits allow the highest effluent levels of copper in the group: they are more than five times as high as the next weakest limit and 500 times the value of the tightest monthly average limit.**

11. Mercury

Mercury is a highly toxic metal. It is dangerous to human health in trace amounts, causing brain and other nervous system damage and birth defects. Mercury is especially harmful as a water pollutant because fish convert mercury salts into a chemical compound called methyl mercury, a substance more toxic to humans and one which accumulates in fish tissue and then in other animals that eat the fish and so on, increasing with each step up the food chain. Through bioaccumulation, mercury increases in concentration above the levels found in the surrounding water. For these reasons, mercury contamination is often a cause of fish consumption advisories. In 1999 the Illinois EPA issued fish consumption advisories for the Chicago and Calumet waterways.

Treatment Plant	Daily Limit	Monthly Average Limit
Metro Plant, St. Paul, MN	0.000038	0.000017
Hyperion, Los Angeles County[2]	0.000052	0.000013
Duluth, MN	0.000059	0.000033
Hammond, IN	0.0005	0.00001
Carson, Los Angeles City[2]	0.0004	0.00004
Southport, Indianapolis	0.0005	
Belmont, Indianapolis	0.0005	
Gary, IN	0.0005	0.0006
East Chicago, IN	0.0005	
Westerly, Cleveland	0.0011	0.000012
Southerly, Cleveland	0.0011	0.000012
Mill Creek, Cincinnati	0.0016	0.0002
Palo Alto, CA	0.0021	0.000025
Detroit		0.0002
San Jose Creek, Los Angeles		0.002
MWRD, all plants[1]	0.006	0.003

[1] From Illinois General Effluent Standards, no specific listing in NPDES permit
[2] Limits adjusted for comparability by removing ocean dilution factors.

Figure 18 - Mercury Effluent Limits, mg/L

As is apparent in the table, mercury limits are very stringent across the board. This is due to its high toxicity and tendency to bioaccumulate. Many of the mercury limits are near or below the amounts that can be readily detected by standard test methods. In some cases, permits set lower limits than current testing technology can support, with an interim exception or special condition acknowledging that the desired limit cannot feasibly be tested for at the time of permit issuance. As new methods and equipment become available, it is expected that the limits will become functional. This practice reflects the importance placed on reducing mercury pollution as much as practicable.

The MWRD permits contain no specific mercury limits apart from the Illinois General Effluent Standard applying to all dischargers. The Illinois effluent standard for most dischargers is a monthly average less than 0.0005 mg/l, but an exception applying to publicly owned sewage treatment works raises this mercury effluent limit six-fold, to 0.003 mg/l, with a special 30% rate of allowed violations of the 0.006 mg/l daily limit. **These limits are the least protective mercury levels allowed by any of the NPDES permits examined.**

12. Phosphorus

The main impact of phosphorous in wastewater is through its role as a plant nutrient. Phosphorus can promote eutrophication by stimulating growth of algae and other aquatic plants which is detrimental in excess.

Treatment Plant	Weekly Average Limit	Monthly Average Limit
East Chicago, IN		0.1
Washington, DC	0.27	0.18
Gary, IN	0.4	0.3
Hammond, IN	0.4 daily	0.3
Westerly, Cleveland	1.5	1.0
Southerly, Cleveland	1.5	1.0
Easterly, Cleveland	1.5	1.0
Duluth, MN		1.0
Green Bay, WI		1.0
Milwaukee		1.0
Detroit		1.0
Madison, WI		1.5
Metro Plant, St. Paul, MN		4.0
MWRD, all plants	no limit	no limit

Figure 19 - Phosphorus Effluent Limits, mg/L

Thirteen permits have phosphorus limits; 1 mg/l is the most frequent value. Two of the three plants with exceptionally low phosphorus limits discharge into Lake Michigan, an oligotrophic lake containing low levels of plant nutrients. Most of the treatment plants with phosphorus limits discharge into one of the Great Lakes.

Illinois has no water quality standard or effluent limit for phosphorus except for discharges into Lake Michigan or lakes which have more than 20 acres of surface area. Since the MWRD effluent enters the Illinois River drainage, and not Lake Michigan except in extreme wet weather circumstances, there are no phosphorus limits in these permits. The Chicago area has been documented as a major source of

phosphorous inputs contributing to the hypoxia (or Dead Zone) in the Gulf of Mexico.[12]

13. Phenols / Phenolics

Phenols are a family of cyclic aromatic organic chemical compounds. They have some similarity to alcohols, but are less volatile and less soluble in water. Phenols are important industrial chemicals used in a variety of manufacturing processes for many products including drugs and plastics.

Treatment Plant	Daily Maximum	Monthly Average Limit
Phenols / Phenolics		
East Chicago, IN	0.01	
Hammond, IN	0.107	0.046
Gary, IN	0.118	0.051
Northside, MWRD	0.3	
Calumet, MWRD	0.3	
Stickney, MWRD[1]	0.6[1]	0.3[1]
Chlorinated Phenolics		
Carson, Los Angeles County[2]	0.001	0.004
Hyperion, Los Angeles City[2]	0.001	0.004

[1] From Illinois General Effluent Standards, no specific listing in NPDES permit.
[2] Limits adjusted for comparability by removing ocean dilution factor.

Figure 20 - Phenols / Phenolics Limits, mg/L

In our study, phenol limits were found in three northern Indiana plant permits and in permits for two of the three MWRD plants. Illinois has a general effluent standard for phenols that applies to all dischargers and is listed on the Stickney plant line in the above table. **The MWRD Calumet and Northside permits specify a limit equal to one-half of the general effluent standard. The MWRD permit limits are at least three times higher than those for any of the Indiana permits.**

The two large Los Angeles area plants have limits for chlorinated phenolics, a subcategory referring to phenol compounds that contain chlorine.

14. Whole Effluent Toxicity (WET) Testing

WET testing is the most common form of biological monitoring of wastewater quality. It is designed to assess the toxicity of treatment plant effluent by observing the ability of living organisms to survive and reproduce in various concentrations of effluent. WET testing is discussed at more length in section VI-B of this report; here we compare the presence of WET test requirements in NPDES permits and the frequency of WET testing, if specified.

[12] Goolsby, Donald, "Flux and Sources of Nutrients in the Mississippi-Atchafalaya River Basin," USGS Report May 1999, p. 36 and p. 77.

Treatment Plant	Acute	Chronic
Hyperion, Los Angeles City	monthly	monthly
Orange County, CA	monthly	monthly
Carson, Los Angeles County	monthly	monthly
Gary, IN	yes	yes
Washington, DC		yes
East Chicago, IN	yes	yes
Hammond, IN	quarterly	quarterly
Palo Alto, CA	monthly	yes
San Jose Creek, Los Angeles	yes	yes
Southerly, Cleveland	quarterly	quarterly
Newtown Creek, NY	quarterly	quarterly
Madison, WI	yes	yes
Easterly, Cleveland		quarterly
Westerly, Cleveland	quarterly for 1 year	quarterly for 1 year
Metro Plant, St. Paul, MN		quarterly 1st year, then annual
Northeast, Philadelphia		yes
Southwest, Philadelphia		yes
Southeast, Philadelphia		yes
Duluth, MN		3 tests in 5 years
Green Bay, WI	yes	yes
Milwaukee, WI	yes	yes
Portland, OR	yes	yes
Albuquerque, NM		yes
Morris Forman, Louisville, KY	monthly then quarterly	
West County, Louisville, KY	monthly then quarterly	
Little Miami, Cincinnati	monthly for 1 year	
Northside, MWRD	monthly for 6 months	
Calumet, MWRD	quarterly	
Stickney, MWRD	quarterly	
Detroit, MI	quarterly	
Mill Creek, Cincinnati	quarterly	
Muddy Creek, Cincinnati	annual	

Figure 21 - Whole Effluent Toxicity Testing Regime Specified in Permit

Thirty-one of 35 permits have specifications for WET testing, 23 require chronic tests. The frequency of testing ranges from monthly up to less than annually. Some permits specify a fixed number or schedule of tests over the life of the permit. In this case, it is not clear what occurs when plant operations continue under an expired permit. A common pattern is to require frequent tests during an initial period which is followed by a less intensive schedule when successful results, meaning a low observed level of toxicity, are obtained.

The three southern California plants have the most rigorous WET testing programs of all of the permits, requiring both chronic and acute tests monthly for the life of the permit.

All three MWRD plants fall in the minority group that do acute tests only. The MWRD permits reserve

several characteristics of the WET testing program for subsequent determination by ILEPA; they are not specified in the permit. The quarterly testing frequency at MWRD plants is typical of that group doing only acute testing.

G. *NPDES Permits and Illinois Water Quality Standards*

In order to better understand the range of observed values for various parameters in NPDES permits, it is useful to take a brief look at the development of water quality standards and the system now in place in Illinois. NPDES discharge permits are determined based on a procedure intended to protect water quality. The relevant definition of water quality is contained in standards specific to each state, prepared by state agencies and approved by the USEPA. Many of the distinctive features found in the MWRD permits appearing in this section are a consequence of the applicable Illinois water quality standards.

Under the Clean Water Act, each state must survey its water resources and assign "designated uses," such as swimming, fishing, boating, habitat for indigenous aquatic life, drinking water, etc. to every waterway. Then, a system of categories for classifying designated uses is drawn up and for each category appropriate water quality standards are determined. The water quality standards may include quantitative specifications, such as numeric limits, or narrative specifications such as "no visible oil" or both. A state may create as many categories and water quality standards as it sees a need for, based on the existing range of designated uses.

Illinois has several water quality standards which have been enacted by the Illinois Pollution Control Board. One set of standards, called general use, applies to the majority of waterways in the state. There are two other categories of standards requiring higher levels of water quality, one applying to Lake Michigan and one applying to all water bodies used for public drinking water supplies or food preparation. Another category, labeled secondary contact, applies only to a collection of interconnected waterways in the Chicago area, including parts of the Chicago and Calumet Rivers, the Cal-Sag Channel, and the Sanitary and Ship Canal. The MWRD has regularly played a role in the establishment of standards; the application of those standards to MWRD NPDES permits appears to be a negotiated process in which the MWRD participates.

All of the secondary contact waters in Illinois are located in the MWRD service area, and MWRD treatment plant effluent is a principal contributor of water inflow to these streams and canals. Thus, the secondary contact water quality standards are in practice a unique category applied solely to MWRD receiving waters.

The secondary contact category has the lowest water quality standards permitted within Illinois, often by a significant margin. Some contaminants whose levels are limited in general use waters are not regulated in secondary contact waters, bacteria being perhaps the most significant example. The majority of pollutants are permitted at significantly higher levels, up to 220 times higher, in secondary contact waters than in general use waters. The following table summarizes some of the differences between the general use and secondary contact water quality standards. A more detailed comparison of the standards is included as Appendix E of this report.

Parameter	Units	Secondary contact limit	General use - limit for single sample	General use - limit for average of 4 or more samples
Bacteria	#/100 ml	NO LIMIT	400	200 (5 sample avg.)
Dissolved Oxygen	mg/l	4.0, 3.0 in Cal-Sag Channel	5.0, 6.0 any 16 out of 24 hours	NA

Total Dissolved Solids	mg/l	1,500	1,000	NA
Cyanide	ugh/l	100.0	22.0[2]	5.2[2]
Cadmium	ugh/l	150.0	21.0[1]	2.0[1]
Copper	ugh/l	1,000.0	34.0[1]	21.0[1]
Chromium (hexavalent)	ug/l	300.0	16	11

[1] Hardness value of 200 used to calculate these limits.
[2] General use limit specifies WAD cyanide, see section VI.F.7 for more information.

Figure 22 - Selected differences between general use and secondary contact water quality standards

The weak character of the Illinois secondary contact water quality standards is the key to understanding some of the distinctive features of MWRD discharge permits. The lack of limits for bacterial contamination and high permitted levels of toxic metals, for example, are direct consequences of the secondary contact standards.

A problem arises at points where secondary contact waters flow into general use waters. At these points a the tighter standard must be met by waters treated and managed for the lower secondary contact standard. During the course of this study it was learned that according to USEPA the portion of the DesPlaines River that receives secondary contact waters fed by MWRD effluent, fails to meet assigned general use standards. It is on this basis that USEPA has objected in the past to some proposed MWRD NPDES discharge permits.[13]

H. Permits versus Performance

MWRD compliance with its permits is very good and its actual pollutant discharges are well under permit limits. The following table compares actual levels of discharge at the three major MWRD treatment plants with the applicable NPDES permit limits. None of the actual discharge levels exceed listed permit limits or applicable Illinois general effluent limits; in most cases the measured discharges are well below the limits.

This presentation, for illustrative purposes, compares the highest measured monthly average effluent levels in 1998 for a number of parameters monitored by MWRD (*i.e.*, the month showing the worst performance) with the corresponding monthly average permit limits. It is possible that violations of permitted discharge levels occurred over shorter time periods. However, the MWRD generally reports few violations of any permit limits over any time periods.

Actual MWRD Effluent Levels vs. Permit Limits

- Permit limits are for monthly averages, actual effluent levels are the highest 1998 monthly averages reported by MWRD, with reported zero values corrected to reflect minimum detection limits.
- Limits are applicable Illinois general effluent limits when not specifically listed in permit.
- Unit of measurement is mg/l except where otherwise specified.

[13] Correspondence from Dale Bryson of USEPA to James B. Park of ILEPA, WQP-16J, July 6, 1993.

	Northside Plant		Stickney Plant		Calumet Plant	
Parameter	Permit	Actual	Permit	Actual	Permit	Actual
Suspended Solids	25	10	12	8	28	6
CBOD	12	11	10	9	24	8
Ammonia N	2.5-4	0.94	2.5-4	1.46	13	1.84[1]
Cyanide	0.1	0.01	0.1	0.011	0.11[2]	0.014
Cadmium	0.15	0.002	0.15	<0.005	0.15	<0.01
Chromium	1.0	0.005	1.0	0.007	1.0	<0.02
Copper	0.5	0.02	0.5	0.036	0.5	0.04
Mercury (ug/l)	3.0	0.24	3.0	0.09	3.0	<0.04
Phenols (ug/l)	300	2	300	<4	300	6
Arsenic	0.25	<0.02	0.25	<0.2	0.25	<0.2
Barium	2.0	0.03	2.0	0.027	2.0	0.029
Iron	2.0	0.12	2.0	0.14	2.0	0.25
Lead	0.2	<0.03	0.2	<0.07	0.2	<0.05
Manganese	1.0	0.012	1.0	0.018	1.0	0.055
Nickel	1.0	0.02	1.0	<0.02	1.0	<0.02
Zinc	15.0	0.08	15.0	0.06	15.0	0.101

[1] 1997 data.

[2] Daily average limit from permit, the monthly average limit from effluent standard is higher (0.15 mg/l).

Figure 23 - Actual MWRD Effluent Levels vs. Permit Limits

MWRD data show that the Chicago area secondary contact waters meet some of the general use water quality standards, as does pure MWRD effluent discharged to these waters. **This suggests that some significant improvements could be made to the secondary contact water quality standard and that permit limits could be significantly tightened with no impact on MWRD operations or costs.** Figure 24 compares average annual MWRD effluent levels of various pollutants with the general use water quality standards.

Average annual effluent levels vs. general use water standards

Plant	Cyanide	Mercury	Copper	Bacteria	Nine items	Nine other items
Stickney	violates	violates	OK	violates	no data	OK
Northside	violates	violates	OK	violates	no data	OK
Calumet	violates	violates	violates	violates	no data	OK

- All data are from MWRD reports for 1997.
- Nine parameters appearing as general use standards are within limits: arsenic, barium, cadmium, chromium, iron, lead, manganese, phenols, selenium, nickel, and zinc.
- Ammonia nitrogen effluent levels are less than, or close to, the general use standards, however the complexity of the ammonia limits does not allow definitive comparisons based on this data. They are not included in the table above.
- Nine parameters in general use standards are not tested for and cannot be checked.
- Four parameters would violate general use standards, as detailed above.

Figure 24 -Average annual effluent levels vs. general use water standards

The following table compares annual means of monthly samples taken in secondary contact waters of the Chicago River system with the general use water quality standards.

Observed Quality of Secondary Contact Waters vs. General Use Standards

- Data are from MWRD for 16 parameters from general use standards; data is not available from secondary contact waters for the other general use parameters.

Parameter	Locations Compliant	Locations with Data	Percent Compliant
Minimum Dissolved Oxygen	9	11	82
Total Dissolved Solids	11	11	100
Fecal Coliform Bacteria	1	10	10
Manganese	11	11	100
pH	11	11	100
Beta Radioactivity	5	5	100
Phenols	11	11	100
Cyanide	5	10	50
Fluoride	11	11	100
Zinc	11	11	100
Soluble iron	11	11	100
Nickel	11	11	100
Mercury	0	11	0
Arsenic	11	11	100
Selenium	11	11	100
Barium	11	11	100

Figure 25 -Observed Quality of Secondary Contact Waters vs. General Use Standards

The preceding analysis shows that many of the standards applied to general use waters in Illinois are in fact now met by the Chicago area water bodies that are regulated by the markedly weaker secondary contact standards. Further, the effluent itself now being discharged by MWRD into these waterways meets many of the general use standards. **Thus, it would be possible to upgrade many elements of the secondary contact standard to general use levels without requiring major changes in MWRD activities or existing Chicago River system water quality.** Addressing fecal coliform would probably require some changes in activities. Duluth has extensive programs to address toxics such as mercury which might be useful to MWRD.

I. Permit Timeliness

NPDES permits generally run for 5 years; application for a new permit is expected in sufficient time for the renewal to be processed. Operating under an expired permit is not a legal violation, providing that an application for a new permit has been filed in a timely fashion. However, lengthy periods of operation under an expired permit are indicative of failure of the required regulatory process to arrive at new agreement.

A out-dated permit means that all recent developments in testing, technology and the science of limit-setting are likely to be missing. Many new EPA policies are implemented by being introduced to permits as they are reissued; the application of these policies to treatment plants with overdue permit renewals is delayed unless the responsible regulatory agency takes special action.

Eleven of the permits reviewed cover large treatment plants operated by the agencies with which the MWRD chooses to compare itself. Of this peer group, 6 permits are current, 2 expired in 1999, and three in 1998. The MWRD major plant permits are the most out of date by a wide margin, as they expired in 1992 and 1993.

The following table summarizes the distribution of expiration dates of permits for the entire group of permits studied. Those agencies with the most out-of-date permits are identified here; the exact expiration dates for all permits appear in Appendix A.

Total permits reviewed in study	35	
Current permits - expire after 12/1/99	16	
Expired permits expired on or before 12/1/99	19	
Year Permit Expired	Number Expired	Includes:
1999	5	
1998	7	
1997	1	Cincinnati
1996-1994	none	
1993	2	MWRD (2)
1992	2	MWRD, East Chicago
1990	2	Indianapolis (2)

Figure 26 - Expiration Dates of NPDES Permits Reviewed in Study

Since permit timeliness reflects the operations of state and federal regulatory agencies, as well as the conduct of a treatment plant operator, we took an additional look at NPDES permit timeliness throughout USEPA Region 5, which includes Illinois. The results are summarized here:

Total permits USEPA Region 5	1238	
Current permits - expire after 12/1/99	1044	
Expired permits expired on or before 12/1/99	194	
Year Permit Expired	Number Expired	Includes:
1998 - 1999	152	
1997	8	
1996	7	
1995	6	
1994	2	
1993	7	MWRD (2)
1992	3	MWRD, East Chicago
1991	3	
1990	6	Indianapolis (2)

Figure 27 - Expiration Dates of USEPA Region 5 NPDES Permits

Includes all sewage treatment plants classified as major dischargers; other NPDES permit holders not included

The following table focuses on permit timeliness in Illinois only, eliminating any effects from differences in state regulatory agency performance.

Total Illinois permits	186	
Current permits - expire after 12/1/99	150	
Expired permits expire on or before 12/1/99	36	
Year Permit Expired	Number Expired	Includes:
1998 - 1999	31	
1997	1	
1996	0	
1995	0	
1994	0	
1993	2	MWRD (2)
1992	1	MWRD
1991	0	
1990	1	Streator

Figure 28 - Expiration Dates of Illinois NPDES Permits

Includes all sewage treatment plants classified as major dischargers; other NPDES permit holders not included

The comprehensive data for Illinois and U.S.EPA Region 5 show a similar pattern: the majority of permits are current, and the overwhelming majority of expired permits are less than two years overdue. Only 4% of EPA Region 5 permits are more than two years out of date, as are less than 3% of Illinois permits. Permits in the study group demonstrate poorer timeliness than the larger group measures: they show a higher fraction of expired permits (19/35) and permits more than two years out of date (7, including the three MWRD plants).

There were 186 sewage treatment operations classified as major dischargers in late 1999 in Illinois. Of these, 150 had current permits with expiration dates after November 1999. Of the 36 permits out of date as of November, 1999, 32 had expired in the last three years - between 1997 and 1999. The permit for the largest MWRD plant expired in 1992, while the permits for the other two large MWRD plants expired in 1993. Thus, all of the MWRD's major permits have been expired for at least six years, a length of time that exceeds the maximum lifetime for any permit (five years). **Only one other permit in Illinois is more than three years out of date.**

Draft permits for the three large MWRD treatment plants prepared in 1993 were reviewed and rejected by USEPA, which stated, summarizing various specific grounds for objecting to the proposed permits, that the limits and conditions in the permits would not assure attainment of Illinois water quality standards. Specifically, USEPA objected on the grounds that "the general use designation for the Lower DesPlaines River is not being protected at that juncture where the secondary contact waters into which MWRD discharges meet the primary contact waters of the DesPlaines.[14]

J. *Summary and Discussion*

A review of the permit parameter comparisons suggests several conclusions concerning MWRD NPDES permits for the three major treatment plants:

[14] Correspondence, USEPA to IEPA July 6, 1993.

- *MWRD achieves almost 100% compliance with existing permits. MWRD successfully meets its permit limits for toxic pollutants such as mercury, cadmium and cyanide; however, these are the weakest limits for toxics found in any study group permit. (See Figure 29.) MWRD has no limits for bacteria or phosphorus in its permits. Every other permit in the study group has bacteria limits. More than one-third of the permits studied have phosphorus limits.*

Parameter	MWRD limits	Ratio of MWRD to other limits
Cyanide	highest	2.2 - 100 times higher
Cadmium	highest	13.6 - 75 times higher
Chromium	highest	5.2 - 80 times higher
Copper	highest	5.5 - 500 times higher
Mercury	highest	1.5 - 176 times higher
Phenols	highest	2.5 - 60 times higher

Figure 29 -MWRD vs. All Other Permit Limits for Toxic Substances

- *Waterways downstream of MWRD discharges fail to meet water quality standards. Downstream uses of the waterways receiving MWRD effluent discharges are not fully protected.*

- *MWRD discharge permits are extraordinarily out of date and are joined in this regard by only a tiny minority of all sewage treatment plants operating in the region.*

- *For many parameters, the MWRD effluent and the Chicago River itself meet the more stringent standards applied to most other Illinois waterbodies.*

K. *Recommendations*

Under the law, determining the content of NPDES permits is a fundamental responsibility of the Illinois EPA and USEPA. These regulatory agencies are to interpret and apply the relevant laws and policies, and issue appropriate permits which support the goals of the Clean Water Act. The permit applicant is obligated to observe all of the permit stipulations as a condition of being allowed to discharge.

In view of this system, the following ideas for improving MWRD NPDES permits should not be directed solely to the MWRD but also to the state and federal regulatory agencies involved. Since the regulatory process involves dialogue and negotiation between USEPA, IEPA, the MWRD and the public, these recommendations are directed to all of those parties.

- *New MWRD wastewater treatment plant permits should be promptly issued and should reflect the latest US and IL EPA requirements for other similar agencies.*

The following features are suggested:

- Application of the most current technology, scientific studies and concepts.
- Use of pollutant analytical methods with the lowest possible detection levels.
- Protection for uses in all downstream reaches of receiving waters.
- Effluent limits for toxic substances that are comparable to those in permits for other major facilities across the country (e.g. "industry standards").
- Orientation toward attainment of additional beneficial uses of regional water resources.

- Chronic and acute WET testing requirements, with clear specifications for testing frequency, sample timing, and follow-up of failed tests.
- Complete compliance with all provisions of USEPA CSO guidance, including implementation of the Nine Minimum CSO Controls.
- Adequate limits for bacterial contamination to support all current and anticipated human usage of the Chicago River system.
- Adequate wet weather monitoring requirements for both quantity and quality of overflows and receiving waters.

- *MWRD should evaluate its wastewater treatment practices, in particular those related to effluent disinfection and toxic substances, in relation to evolving regional goals and uses for water resources; such an evaluation should be done in conjunction with other agencies and should address the water quality standards applied to the Chicago River.*

There are several possibilities for improvements to the current standards:

- The existing secondary contact waters could be considered for reclassification as general use on a reach-by-reach basis.
- The secondary contact water quality standard could be upgraded to reflect actual water quality attained in the Chicago area waterways.
- A new category of water quality standards could be created to reflect current conditions and uses of the Chicago area waterways.

VII. Best Practices

A. Effluent Disinfection

1. Background

Contamination by bacteria and other micro-organisms is a significant limiting factor for a variety of waterway uses, including recreational activities that involve direct human contact with the water.

Sewage treatment plant effluent generally contains high levels of bacteria and other pathogens. Many such organisms are present in plant influent. Biological wastewater treatment processes work by promoting rapid growth of microbial species which consume and digest waste products found in the water. The final process at most large sewage treatment plants involves killing off as many undesirable bacteria and other pathogens as possible.

In order to avoid contaminating the receiving water with these high levels of bacteria and other pathogens, the wastewater stream must be disinfected by some means. However, some common methods of disinfection, such as chlorination, can adversely affect fish and other aquatic life.

Effluent disinfection is one area within the sewerage treatment industry where significant new advances are being made. These have been stimulated in part by new understanding of the deleterious ecosystem effects that can arise from chlorination, the most widely applied disinfection method.

2. Findings

- *MWRD is the only agency in the study group that does not disinfect its effluent or otherwise meet bacterial contamination standards or limits.*

All eleven agencies responding disinfect their effluent, using a variety of processes. The Western Lake Superior Sanitary District (WLSSD) in Duluth, for example, has chlorination capability available on a standby basis. Their effluent is chlorinated when fecal coliform bacteria levels in the receiving harbor waters exceed 200 counts per 100 ml of water, a common standard for bacterial contamination, or when certain indicators of treatment plant malfunction are present, such as unusually high levels of suspended solids in the effluent. Some agencies seasonally disinfect, probably reflecting different stream uses that occur at different times of year. Others have special devices for disinfecting combined sewer overflows when they occur.

Agencies such as WLSSD attempt to minimize the amount of chlorination because of evidence that chlorination of the effluent leads to increased levels of harmful organic compounds released into Lake Superior, compounds which are formed as undesirable by-products of the disinfection process.

In addition to minimizing chlorine use, most treatment plants that use chlorine also follow a dechlorination process to remove chlorine from the effluent after disinfection.

The limitations of chlorine have prompted continued research and development in alternate technologies for effluent disinfection. The alternatives which are now available include ultraviolet light (UV) and ozonation, or disinfection using ozone, to destroy pathogens. The Madison, Wisconsin plant successfully employs a UV disinfection process. Treatment plants in Windsor, Canada, and East Chicago, IN systems are also using UV disinfection.

The MWRD is the only agency surveyed that does not disinfect its effluent.[15] It ceased disinfecting its effluent in 1985 when the state standards for the Chicago River were amended to remove all limits on bacteria. Before 1985, when the Chicago River system plants did chlorinate effluent, they did not dechlorinate as most other plants that use chlorine do today. Current bacterial levels in effluent, as reported by MWRD, are high. (See Figure 30.) The disparity between the MWRD and the other agencies surveyed most likely arises from differences in state standards for the rivers where these agencies discharge effluent.

Fecal Coliform Bacteria in MWRDGC Effluent, counts /100 ml

The 1997 values are omitted as they appear to be incorrect as printed

Treatment Plant	1998 average	1996 average	Typical NPDES permit limit
Stickney	13,904	18,847	<200
Northside	10,773	19,534	<200
Calumet	9,825	15,552	<200

Figure 30 - Fecal Coliform in MWRD effluent, counts/100 ml

Interestingly, in Massachusetts, the Charles River has secondary contact status like the Chicago River. However, unlike the Chicago, the Charles has a bacterial contamination standard for fecal coliform. As a result, disinfection is done of some CSOs which reduces the fecal coliform contamination problem. The wastewater treatment facilities use seasonal disinfection, and the largest CSO has some separate treatment facilities. This most likely reflects the fact that there is a lot of rowing and recreational use of the Charles. Rowers frequently find themselves splashed, sometimes tip, and frequently have blistered hands - exposing them to the pathogens in the River. To notify rowers and other river users of water quality

[15] The MWRDGC does currently disinfect the effluent from its four other facilities, where this is required due to the standards set by the state for those streams receiving MWRD effluent.

conditions, flags are posted at boat houses along the River. These flags serve as a warning to rowers, for example, not to throw the coxswain in the water-- a tradition after a race.[16]

3. Best Practices and Benchmarks

- Use a disinfecting process that minimizes threats to human health and detrimental environmental impacts, and maximizes beneficial uses of receiving water bodies.
- Notify the public of recreational use limitations and water quality.
- Regularly keep abreast of and evaluate new disinfection technology.

4. Discussion

On the Chicago River, fish populations began to improve when chlorination of MWRD effluent was ceased in 1985[17]. However, in exchange, fecal coliform levels are now high.

At issue here are fundamental questions that need to drive the regulations affecting and activities of the MWRD: how clean do we want our river and for what uses? What uses are existent, expected and desired? While the lack of a current state standard for bacteria in the Chicago River, and the resultant lack of a requirement for disinfection, are presumed appropriate for non-contact recreation such as rowing, an investigation into whether or not the River can be made even better and safer for such uses would be timely. Shall it be assumed that a canoeist, for example, will experience no contact at all? Or, shall standards be based more realistically on canoeists that fall in the River occasionally or get splashed, or eat their lunch in their canoe? What about the fisherman who sticks his hands in the water regularly to haul out a fish, or untangle a line? The challenge lies in determining appropriate levels of protection for these activities.

5. Recommendation

- *MWRD should evaluate its wastewater treatment practices, in particular those related to effluent disinfection, in relation to evolving regional goals and uses for water resources; such an evaluation should be done in conjunction with other agencies and should address water quality standards applied to the Chicago River.*

B. Whole Effluent Toxicity Testing

1. Background

Whole effluent toxicity (WET) tests are the most prevalent form of biological monitoring applied to wastewater treatment. WET tests have been designed to serve as a proxy for longer term evidence of toxicity.

In WET tests, organisms are exposed to various treatments for a specific time period. Test treatments consist of different solutions containing different proportions of effluent and water from the receiving water body. A control treatment - exposure of the test organisms to dilution water with no effluent added - is used to measure the validity of the test by demonstrating the health of the test organisms and the suitability of the dilution water, test conditions, and handling procedures. The most commonly used

[16] Conversation with Kathy Baskin, Charles River Watershed Association.
[17] This cessation of chlorination coincided with the beginning implementation of Deep Tunnel, so it is hard to separate the effects of the tunnel operation from the effects of changes in chlorination practices.

organisms for these tests in this region are the fathead minnow (*Pimiphales promelas*) and *Ceriodaphnia dubia*, a water flea.

There are typically two types of WET tests – acute and chronic. Acute tests last 48 to 96 hours. The objective of an acute test is to determine the concentration of test material that produces a harmful effect during a short-term exposure under controlled conditions. Because death is an easily detected harmful response, the endpoint for most acute tests is lethality.

The second type of WET test is the chronic test. Chronic tests predict the concentrations that interfere with normal growth, development, and reproductive potential of aquatic organisms. During a chronic test several life stages of the organism are continuously exposed to the test material at various concentrations. Tests last about 7 days and the response measured for fathead minnows is growth and survival and for *C. dubia* is reproduction and survival. The *C. dubia* test encompasses the entire life cycle of the organism and therefore the most sensitive life stages of the organism. The fathead minnow test, which targets the <24 hour old fish, seeks to also use the most sensitive life stage of the organism.

Both acute and chronic WET tests are designed to provide estimates of toxicity that can only be accurately measured by following multiple species over much longer time periods. The full USEPA title for the chronic test is "short term chronic", showing that the longer duration WET test is seen as an estimate of effects which are best observed over the entire life cycles of a variety of aquatic organisms.

There is an art to WET testing. Experience has shown that it can be tricky to achieve valid, consistent results. The use of live organisms guarantees variability in the results which must be accommodated by sufficient replication and statistical analysis of data. Some practitioners have opposed the use of WET testing due to these difficulties, but USEPA remains committed to the unique contribution they make to effective monitoring. On-going studies have been designed to evaluate and improve WET test procedures.

2. Findings

- *Both chronic and acute Whole Effluent Toxicity (WET) testing are conducted by most agencies; MWRD does only acute testing at its three largest facilities.*

Nine of the eleven survey respondents do WET testing at their facilities. Seven of the nine doing WET testing do chronic tests. A review of NPDES permits earlier in this report found that 31/35 plants are required to do WET testing, with 23/31 required to do chronic tests. Several NPDES permits had especially clear and detailed WET specifications; Milwaukee is a good example of this. Minneapolis-St. Paul does additional WET testing beyond that required by its permits as a self -screening technique to identify problems.

Many agencies offered suggestions for conducting successful WET testing programs. The most frequent advice offered by survey respondents focused on operating an effective pretreatment program for metals and other toxic pollutants. One agency recommended attention to influent monitoring of toxics. The Duluth agency detailed the importance of sector-specific pollution prevention programs with good enforcement. The agency is pursuing a goal of zero discharge of all toxic pollutants which are known to bioaccumulate.

Some suggestions focused on testing procedures including:

- Careful adherence to USEPA methods.

- Maintenance and monitoring of healthy test organisms.
- Use of organisms of consistent age.
- Adjustment of pH for acute tests to prevent "artificial ammonia toxicity".
- Investigation of causes of failures.
- Repeating tests after failures.

Other suggestions for successful WET testing focused on treatment plant operations. These included:

- Maintain consistent plant operation, investigate changes in performance.
- Use nitrification to reduce ammonia levels in effluent.
- Maintain effective dechlorination process.
- Study pre-chlorination levels of toxicity.

MWRD performs acute WET tests only (no chronic) at its three major treatment plants. These tests occasionally show toxicity.[18] All acute WET tests for which detailed documentation is available were done using single effluent samples taken early on a Monday morning. This is a time period when industrial discharge to the system is at its lowest point, rendering the effluent samples unrepresentative of typical operating conditions for the treatment plants. This testing has been done quarterly for more than ten years. At one of the four small MWRD treatment plants, chronic WET testing is done quarterly as required by the permit. Some tests showing toxicity have been repeated three weeks to six months later.

Chronic WET testing has not been done by MWRD at any of its major plants for many years. Chronic WET testing is not required by the permits for these plants. Chronic WET testing performed by ILEPA and USEPA at these plants in 1991, 1993, and 1995 produced evidence of toxicity. No subsequent chronic tests have been done by MWRD or the state or federal agencies.

MWRD follows the latest USEPA WET test procedures. MWRD laboratories are collaborating with USEPA on studies of WET testing methods. Documentation is good for those tests which must be reported to ILEPA, but it is not made available for others except in extremely abbreviated summary form in the annual R&D report. No detailed reports were available from any tests at any of three large plants when requested from MWRD.

3. Best Practices and Benchmarks

- Regularly perform both acute and chronic WET tests, at least until a long-term pattern of non-toxicity is established.

- Follow latest recommended testing procedures in USEPA or other guidance documents.
- Optimize plant operations and industrial pre-treatment program to prevent toxicity.
- Follow-up toxicity findings with appropriate procedures including re-testing, Toxicity Identification Evaluations, and Toxicity Reduction Evaluations.

4. Recommendation

- *MWRD should conduct both chronic and acute wet testing at its three largest facilities.*

C. Combined Sewer Overflow (CSO) Abatement

[18] Summary results are published in MWRD Research and Development Department annual reports.

1. Background

Some developed areas, particularly older and larger cities, have combined sewer systems in which stormwater runoff and sanitary sewage enter the same wastewater collection system. This creates problems during periods of substantial precipitation, when the amount of runoff can easily exceed the processing capacity of the treatment plants or the collection capacity of the sewer system. When system capacity is exceeded, the mixture of wastewater and storm runoff is released directly into local waterways, receiving little or no treatment. This is known as a combined sewer overflow (CSO).

CSOs are recognized as a major source of water pollution. They are also difficult and expensive to control. Their control usually requires that a number of techniques be implemented by the responsible wastewater agency at different locations and processing stages within its system.

Recognizing the need for CSO control, and the difficulty of achieving it, USEPA promulgated policies in the mid-1990s requiring systems where CSOs took place to take several immediate steps to reduce their impact. These steps are known as the "Nine Minimum Controls," and were intended to be in place in all systems by January 1, 1997. The Nine Minimum Controls are:

- Proper operation and regular maintenance programs for the sewer system and the CSOs.
- Maximum use of the collection system for storage.
- Review and modification of pretreatment requirements to assure CSO impacts are minimized.
- Maximization of flow to the POTW for treatment.
- Prohibition of CSOs during dry weather.
- Control of solids and floatable materials in CSOs.
- Pollution prevention.
- Public notification to ensure that the public receives adequate notification of CSO occurrences and CSO impacts.
- Monitoring to effectively characterize CSO impacts and the efficacy of CSO controls.

When the Nine Minimum Controls for CSOs were announced, the USEPA also stipulated that each system where CSOs occurred must begin work on a long-term plan that would lead to elimination of the CSO impact on water quality. Many sewage treatment agencies are now in the process of implementing their long-term CSO control plans developed in accordance with this policy. CSO abatement is not a problem for cities that have separate sanitary and storm sewers.

2. Findings

- *The "Nine Minimum Controls," federal guidance for control of combined sewer overflows, have never been incorporated into MWRD permits; whether or not these controls are being fully implemented is debatable. In particular, provisions for addressing floatables, timely public notification, and monitoring (controls 6, 8, and 9) need review.*

Six of the eleven survey respondents have CSOs; five have separated sewer systems. For the four agencies reporting frequency data, the number of CSO events ranged from "10-20" to "over 100". All of the agencies with CSOs have long-term control plans. Louisville issues comprehensive and non-technical reports on its CSO projects and progress toward implementation of USEPA mandated policies.

MWRD's answer to the CSO problem is the Tunnel and Reservoir Plan (TARP). The concept behind TARP is simple: construct tunnels to capture and convey overflow, and send it to a huge storage reservoir (actually, several), then pump it out slowly during dry weather and run it through the wastewater

treatment process. Capturing CSO flows in TARP is a recognized approach to CSO abatement, one that is being implemented by cities in addition to Chicago, such as Milwaukee.

TARP is expected to eliminate virtually all CSOs. Now that the first phase of TARP is near completion, monitoring is particularly important to evaluate the extent of overflows and success of the program. Overflows have occurred an average of 46 times a year for the last three years (approximately once every 8 days).

The nine Minimum Controls for CSOs were never explicitly applied to MWRD operations. This was due in part to timing: MWRD NPDES discharge permits issued in 1987 and 1988 were never reissued as scheduled in the 1990s. Whether the Nine Minimum Controls have in fact been implemented by MWRD is debatable. MWRD does not notify the public of overflows and does no monitoring of quantity of overflows. Public awareness of CSOs is part of the MWRD's public information office's activities: a speakers program, seminars for industrial users, etc. MWRD deems these strategies adequate for public notification, based on presumed lack of public access to the River, a situation which is clearly changing.[19]

3. Best Practices and Benchmarks

- Implement the "Nine Minimum Controls" outlined in USEPA CSO policy.
- Prepare and adopt an effective, USEPA and state agency approved long term CSO control plan that makes optimal use of all possible strategies to minimize CSO impacts on water quality.

4. Discussion

TARP was originally developed in the 1960s and 70's, and it has evolved through the implementation process. Since TARP's beginnings, new programs for CSO abatement and stormwater management related and unrelated to TARP have been developed, as have new regulations. The challenge that remains is how to incorporate these new developments into TARP. In addition, the 17 years still needed to complete TARP raises the question of whether interim measures are needed to minimize ongoing pollution.

Many communities without tunnel-based systems have adopted other programs. A Scottish wastewater agency has a public education strategy now being tested: a "Think Before You Flush" program, aimed at addressing "floatables," floatable debris such as condoms and sanitary products carried through the sewage system. (These are a problem in the Chicago River.) In Toronto, rain barrels are being used to capture roof runoff from homes; the captured water can subsequently be used for lawn watering. Perhaps the most traditional alternative is the separation of storm sewers from septic sewers, which communities such as Atlanta and Boston have adopted. These cities selected this option once they determined that their sewer infrastructure was in need of repair; if they were going to dig up the pipes to repair them they might as well separate them. The broken sewer pipes and water mains recently reported in Chicago and the latest leakage problems with Milwaukee's tunnel system raise questions regarding the applicability of this reasoning in Chicago.

5. Recommendation

[19] MWRD correspondence to IEPA, October 31, 1996.

- *The MWRD's new permits should be revised to include the "Nine Minimum Controls."* IEPA and MWRD should jointly evaluate MWRD operations to ensure that all 9 regulations are fully implemented, and have been fully applied to, or implemented by, MWRD.

D. Pollution Prevention

1. Background

During the last ten years, pollution prevention has increasingly been integrated into the operations of wastewater management agencies and facilities. Wastewater agencies are in the unique position of being able to incorporate pollution prevention into their own facility operations and maintenance, as well as promote pollution prevention principles and techniques to the dischargers to their wastewater systems.

Several different definitions of pollution prevention have been proffered, including one by the USEPA: *the use of processes, practices or products that reduce or eliminate the generation of pollutants and waste at the source, including those that protect natural resources through conservation or more efficient utilization.* There are also several other terms that are sometimes used interchangeably with pollution prevention, including waste reduction, waste minimization and source reduction.

Pollution prevention has become an important tool for wastewater management agencies in enhancing pretreatment program activities, reducing costs of treatment plant operations, targeting problem pollutants and forming partnerships with dischargers, other units of government and others in the community. It is particularly important in addressing those toxic or hazardous pollutants that sewage treatment plants are not designed to treat. Many agencies have also found that implementing pollution prevention solutions for their own facilities allows them to model appropriate corporate behavior for their dischargers.

2. Findings

- *MWRD has developed partnerships to implement a pollution prevention program with significant innovative features.*

Ten of the 11 agencies that responded to the survey indicated that they have implemented pollution prevention activities at their own facilities. This includes 8 that have incorporated process changes or material substitutions, 6 that have applied pollution prevention to building or grounds maintenance, 7 that have modified laboratory operations and 2 that have undertaken other pollution prevention related activities.

Specific "internal" pollution prevention activities mentioned by respondents include:
- Replacement of mercury and PVC in plant equipment;
- Replacement of dewatering and oxygen production process chemicals with less toxic alternatives;
- Implementation of best management practices for solvents and other hazardous material storage; and
- Minimizing toxic reagent use in the laboratory.

In addition, the 1992 "Survey of Sewerage Districts on Pollution Prevention Activities," by the Milwaukee Metropolitan Sewerage District in cooperation with the Association of Metropolitan Sewerage Agencies, identified the following additional "internal" pollution prevention practices:
- In-house recycling programs for paper, scrap metal, motor oil, antifreeze and batteries;
- Waste minimization audits for wastewater treatment facilities;
- Reduction in the number of laboratory tests which generate pollutants;
- Ordering chemicals in smaller amounts to reduce excess chemicals left over for disposal; and

- Coordination between purchasing and environmental staffs on bid specifications.

Our survey respondents also described their most successful pollution prevention initiatives that they have taken with the dischargers to their wastewater systems. Some of the highlights included:

- Encourage industry to reduce or substitute for solvents, acids or caustics (Duluth, Orange County, Hammond)
- Industrial Pollution Prevention Partnership Program to work with permittees on pollution prevention plans and measure results (St. Paul)
- Encourage water conservation for industrial and residential customers (St. Paul)
- Newsletter or brochures on pollution prevention and other issues for industrial or residential customers (St. Paul, Duluth)
- Extensive mercury education and outreach efforts (Madison, Green Bay, Duluth)
- Operate or assist a household hazardous waste collection facility (Duluth, Green Bay)
- Involvement in USEPA's Project Excel, Common Sense Initiative or other pollution prevention partnerships (New York, Louisville, Duluth)
- Extensive pollution prevention outreach programs for medical facilities and laboratories (Palo Alto, Duluth)
- Work with restaurants on grease management program (Louisville)

It should also be noted that wastewater management agencies around the country have also initiated pollution prevention award programs for businesses or organizations in their service areas that provide stellar examples for the rest of their communities (e.g. Milwaukee's "Gathering of Waters" Award).

During the last several years, the MWRD has been active in promoting pollution prevention to its dischargers. In part this has been accomplished through a partnership with the Illinois Waste Management and Research Center, which has supplied a staff person to work with individual significant industrial users of the MWRD system. MWRD does not target specific industries for pollution prevention.

In 1997, the MWRD initiated its Annual Pollution Prevention Awards to "honor industrial and/or commercial dischargers for outstanding multimedia pollution prevention efforts." These have included an overall pollution prevention award, certificates of commendation, special recognition for continuous improvement and special recognition for outreach efforts.

The MWRD has also participated in regional efforts to reduce the use and release of mercury and to reduce pollution from the metal finishing industry (as a part of the USEPA's Common Sense Initiative). In addition, the MWRD has sponsored, with ILEPA, household hazardous waste collection events in the metro area.

3. Best Practices and Benchmarks

Based on our survey results, literature review and discussions with experts, we have identified the following pollution prevention best practices for wastewater management agencies:

- Make the agency's own facilities and practices role models for pollution prevention techniques.
- Provide technical assistance or referrals to technical assistance to industrial and commercial users of wastewater treatment system.
- Provide public education on pollution prevention.
- Provide or support opportunities for household hazardous waste collection and disposal.
- Identify sources of problem pollutants in the system and target specific pollution prevention programs to the responsible sectors.

- Provide awards and/or other positive incentives for businesses and other organizations that implement effective, innovative pollution prevention programs.

4. Recommendation

- *MWRD should evaluate the full range of potential pollution prevention strategies; include strategies for expanded household hazardous waste reduction and collection.*

E. Monitoring

1. Background

All wastewater treatment facilities conduct some monitoring of the quantity and quality of their effluents. They do monitoring as required by their NPDES permits, or they may do more than is required. This section focuses on two other kinds of monitoring which are important to the conservation of water resources: ambient water quality monitoring and wet-weather water quality monitoring. Routine ambient monitoring refers to on-going, regular efforts to measure the quality of the streams, rivers, lakes, or oceans in an area. Wet weather monitoring refers to monitoring during periods of substantial precipitation and runoff, when flows into water bodies are temporarily elevated. Disproportionate amounts of water pollution can occur during high-runoff events when sewer overflows are most likely to occur and when polluted stormwater earned by separated sewers enters the waterway.

Since the passage of the federal Clean Water Act in 1972, the need for effective water quality monitoring programs at the state, regional, and local levels has been emphasized. Discharges from regional wastewater treatment plants are often among the most significant impacts on local waterways. Thus, it is a critical function for wastewater management agencies to monitor the health of the waterways in their service areas and beyond.

Many wastewater management agencies maintain ongoing water quality monitoring programs to assess the impacts of their discharges, as well as the overall vitality of both receiving streams and other area water bodies. These programs usually include sampling and analysis for a variety of chemical parameters and water quality indicators and may include biological evaluations on a less frequent basis. The effectiveness of a water quality monitoring program can be assessed based on the extent of its geographic coverage, variety of parameters and indicators included and the frequency of sampling.

Many agencies also focus their monitoring programs on wet weather conditions, especially those that experience separated sewer overflows, combined sewer overflows or both from their collection systems. It is important to understand the quantity and quality of these overflows and their impacts on receiving water bodies. This information is critical to designing and implementing successful overflow remediation programs.

2. Findings

- *Most agencies do monitoring of stream conditions during wet weather, when pollution is likely to be highest, as well as monitoring of sewage overflows; MWRD does not do stream quality monitoring during wet weather and its sewage overflow monitoring program is limited.*

Our survey included questions about both ambient monitoring programs and wet weather monitoring efforts. Nine of eleven respondents indicated that they run ambient water quality monitoring programs and about 2/3 also perform some sort of wet weather monitoring, including all of those with combined

sewers in their systems. Of those with wet weather monitoring programs, about 1/2 monitor both receiving waters and the overflows themselves.

Some ambient monitoring programs focus only on receiving water bodies while others include all significant water bodies in their service areas. Some even sample outside their service areas to determine any impacts beyond their boundaries, for instance the Milwaukee Metropolitan Service District monitors the near shore area of Lake Michigan north to Port Washington and south to Racine.

The number of sites in the monitoring network and the frequency of sampling vary significantly among survey respondents—from approximately 100 sites sampled "almost daily" in the Portland, OR area to 19 sites sampled monthly in the Madison, WI area. Sampling technology is rapidly evolving and new equipment and techniques are now available to provide much greater frequency of data almost instantaneously, via deployment of data sondes. Hammond, IN is now utilizing this new approach in the Grand Calumet River.

MWRD operates an ambient monitoring program which includes 47 sites in their service area sampled monthly for either 27 or 24 different water quality parameters per site, depending on whether the stream reach is classified as general use or secondary contact use. The number of sites and frequency of sampling are both in the middle of the ranges reported in our survey of other agencies. They also monitor Lake Michigan and public beaches.

Extensive surveys of fish and other biota are performed less frequently. The MWRD is also employing special monitoring equipment in a study of oxygen levels near its SEPA (sidestream elevated pool aeration) systems. MWRD conducts testing on Lake Michigan after CSOs but has no ongoing wet weather monitoring program for the River. MWRD has conducted river monitoring programs for fixed time periods during warm seasons of four different years. These programs are not currently taking place.

MWRD does some monitoring of the quality of sewage overflowing into the River. This data is gathered for the purposes of designing TARP and not to give a representative picture of stream health, the contributions of TARP, or the impacts of overflows. The US Geological Survey, in a 1994 report, recommended water quality sampling during storms for the purposes of better understanding the impacts of TARP on stream quality.[20]

3. Best Practices and Benchmarks

- Operate an ongoing, comprehensive ambient water quality program to assess the health of all significant area water resources.
- Conduct wet weather monitoring of both overflows and receiving waters if there are combined sewer overflows, sanitary sewer overflows or both. Overflow monitoring should include both quantity and quality at representative sites.
- Keep abreast of and incorporate state of the art sampling and analytical techniques and equipment.

4. Recommendation

- *MWRD should expand its wet weather monitoring of sewer overflows and stream conditions.*

[20] USGS Report 93-4188, page 52.

VIII. Appendices

A. *Description of Natural Quality of River Reaches and River Map*

Overview of Natural Quality of the Chicago River in MWRD Service Area Nature and the River: US Fish and Wildlife Services, 1994			
Reach Number	*Ranking/Classification*	*Significant species/wildlife habitat/ natural features*	*Fish Populations*
4	• class D stream (1991) • State-designated primary contact stream	• State-listed endangered species: egrets, black-crowned night herons • 132 bird species (1974 to 1991) • MWRD owns land on each side of the four-mile corridor	• (1978) 12 species and two hybrids at three sites • (1991) 25 species at four sites
5A	• class D stream (1989) • State-designated primary contact stream	• fish and other aquatic life abundant • undercut banks, summered tree roots, brush jams, submerged logs, and terrestrial vegetation • approximately 75 percent of the total length of the River in this reach is within forest preserves • one dedicated nature preserve and six Illinois Natural Area Inventory sites • nine Site-listed threatened or endangered plant species and one federally listed species	• (1978) no species found for three sampling attempts • (1980) carp, pumpkinseeds, and fathered minnows at two sites • (1981) 7 species • (1990) 4 species
5B	• State-designated secondary contact stream	• entirely within the limits of the City of Chicago • has the smallest variety of in-stream cover compared to other situations on the upper reaches • several city parks comprise the only open space within this reach	• (1976) 4 species and carp/goldfish hybrid collected at one station • (1991) 16 species and 3 hybrids collected at two stations
6	• class C stream near the lake and class D stream away from the lake • State-designated primary contact stream	• situated entirely within downtown Chicago • the higher water quality at the sampling station nearest Lake Michigan due to the diversion of lake water	• (1976) 19 species found at two stations • (1991) 23 species and two hybrid combinations at two stations
7	• class C stream (1991) • State-designated second contact stream	• South Branch and Bubbly Creek • near peregrine falcon nesting area • steep channelized banks • vegetation on channel fringes	• (1976) 5 species and one hybrid at one station • (1991) 17 species and one hybrid found at two stations • (1993) 12 species and one hybrid at three stations
8	• class D stream (1991) • State-designated second contact stream	• only two percent of the total corridor in this reach is dedicated natural open space • land adjacent to banks entirely owned by MWRD	• (1976) 4 species and one hybrid collected at one station • (1991) 18 species and one hybrid found at three different stations
9A	• class E stream (1991) • State-designated secondary contact stream	• sixteen State and Federally listed threatened and endangered species • forest preserve lands extend well beyond the limits of 1-mile-wide study corridor; about 25 percent dedicated natural open space	• (1976) 7 species at two different stations • (1991) 9 species and one hybrid

9B	• class D stream (1991) • State-designated secondary contact stream	• approximately 25 percent of the corridor is dedicated to open space • contains some of the most unique biological communities in the study corridor and in the entire northeastern Illinois region	• (1976) 4 species and one hybrid were collected at one station
10A	• class D stream (1991) • State-designated secondary contact stream	• State-listed threatened birds: Yellow Headed Blackbird, Pied-billed Grebe, and Moorhen • large forest preserve area and water on its boundaries • nine State and Federally listed endangered and threatened species	• (1976) 15 species and two hybrids • (1986) 6 species • (1991) 14 species and two hybrids
10B	• class D and C streams (1991) • State-designated secondary contact	• State-listed species: Common Moorhen, Black-crowned Hero, Least Bittern	• (1976) 11 species and 1 hybrid found at two stations • (1991) 15 species and two hybrids

STUDY REACHES[1]

Designation Number	Waterway ("common" name)	Length (nautical miles)
1	West Fork of the North Branch of the Chicago River ("West Fork")	14
2A/B	Middle Fork of the North Branch of the Chicago River ("North Branch" or "Middle Fork")	24
3	Skokie River ("East Fork")	17
4	North Shore Channel ("Channel")	17.6
5A/B	North Branch of the Chicago River ("North Branch")	17.2
6	Chicago River ("Main Branch" or "Mainstem")	1.4
7	South Branch of the Chicago River ("South Branch") and South Fork of the South Branch of the Chicago River ("Bubbly Creek")	3.9
8	Chicago Sanitary and Ship Canal ("San-Ship" or "Canal")	8.2
9A/B	Chicago Sanitary and Ship Canal ("San-Ship" or "Canal")	22.5
10A/B/C	Calumet River, Little Calumet River ("Little Calumet") and Calumet-Sag Channel ("Cal-Sag"), collectively known as the Calumet Waterway System	29.8

[1] The waterways included in the ChicagoRivers Demonstration Project were divided into 10 reaches (sections) to facilitate resource assessment and to establish common waterway sections for reporting study findings. For those investigations which required more specific study area delineation, subreaches were established and identified by a letter.

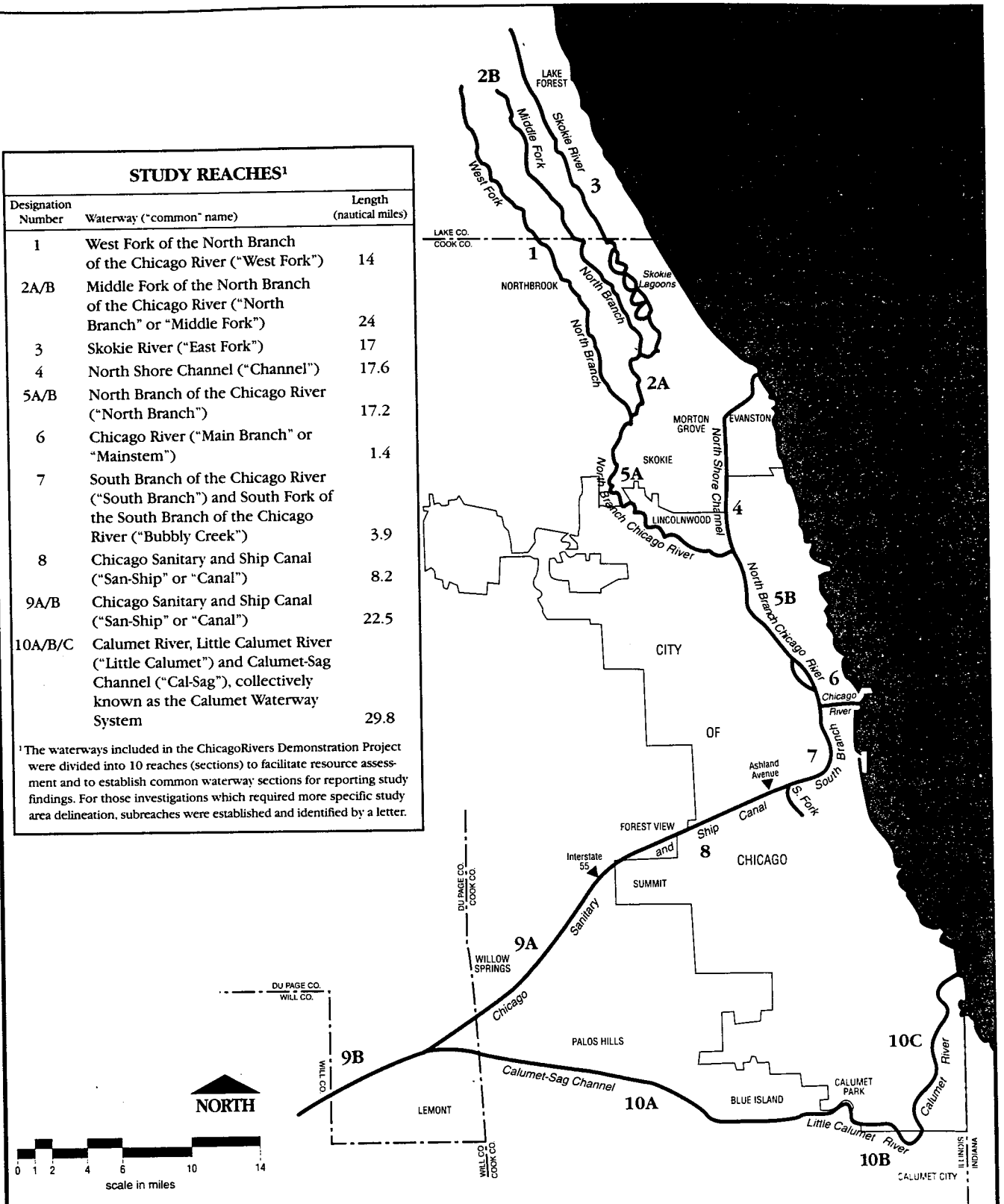


FIGURE 1
Map of Study Reaches

B. Fish Population Changes

Source: MWRD materials for TARP funding, 1999

Location	Number of Species 1977	Number of Species 1993
North Shore Channel/North Branch	2	17
Sanitary and Ship Canal	2	11
Little Calumet River/Cal Sag Channel	7	14

Location	Number of Fish 1977	Number of Fish 1993
North Shore Channel/North Branch	4	961
Sanitary and Ship Canal	25	658
Little Calumet River/Cal Sag Channel	25	334

C. *Support of Designated Uses*

Support of Uses, Illinois Environmental Protection Agency. *Illinois Water Quality Report, vol. II,* 1996			
location	**How well does this reach "support" its designated uses?**	**Causes for non-support**	**Sources of non-support**
Chicago Sanitary & Ship Canal.	Partial support/ moderate impairment	--high alterations of other habitat --moderate metal, ammonia, nutrients, and organic enrichment/DO --slight pH	--high contaminated sediments --moderate municipal point source, and urban runoff/storm sewers --slight industrial point sources, hydrologic/habitat modification, channelization, and flow regulation/modification
South Branch of the Chicago River	partial support/ moderate impairment	--high metals, and other habitat alterations --moderate ammonia, nutrients, organic enrichment/DO, and flow alteration --slight pH	--high contaminated sediments --moderate municipal point sources, urban runoff/storm sewers, and other sources --slight hydrologic/habitat modification, channelization, and flow regulation/modification
Chicago River (Main Branch)	partial support/ moderate impairment	--high habitats alterations --moderate metals --slight of nutrients	--high hydrologic/habitat modification and channelization --moderate urban runoff/storm sewers, flow regulation modification, and contaminated sediments
South Fork of the South Branch of the Chicago River	nonsupport	--high metals and ammonia --moderate flow alterations and other habitat alterations	--high contaminated sediments --moderate combined sewer overflows, urban runoff/storm sewers, hydrological/ habitat modification, channelization, and flow regulation
Lower North Branch of the Chicago River	partial support/ moderate impairment	--high nutrients and pathogens --moderate metals, siltation, and organic enrichment/DO	--moderate urban runoff/storm sewers --slight municipal point sources, hydrologic/habitat modification, channelization, and highway maintenance and runoff
Upper North Branch of the Chicago River	partial support/ moderate impairment	--high nutrients and pathogens --moderate metals, siltation, organic enrichment/DO, oil, and grease	--moderate combined sewer overflows and urban runoff/storm sewers --slight municipal point source, hydrologic/habitat modification, channelization, and highway maintenance and runoff
Lower North Shore Channel	partial support/ moderate impairment	--high siltation and pathogens --moderate metal, ammonia, chlorine, flow alteration and other habitat alteration --slight organic enrichment/DO	--high municipal point sources --moderate combined sewer overflows, urban runoff/storm sewers, hydrologic/habitat modification, channelization, flow regulation/modification, and highway maintenance and runoff
Upper North Shore Channel	partial support/ minor impairment	--moderate metal, nutrients, flow alteration and other habitat alterations -- slight saltation, organic enrichment/DO	--moderate urban runoff/storm sewer, hydrologic/habitat modification, channelization, and flow regulation/modification
West Fork of the North Branch of the Chicago River	partial support/ moderate impairment	--high nutrients and other habitats alterations --moderate chlorine, siltaion, organic enrichment/DO, and pathogens	--high hydrologic/habitat modification and channelization --moderate municipal point sources, constriction, land development, and urban runoff/storm sewers --slight removal of riparian vegetation and highway maintenance and runoff
Middle Fork of the North Branch of the Chicago River	partial support/ moderate impairment	--high nutrient --moderate organic enrichment/DO, other habitats alterations, pathogens, and suspended solids --slight metal	--moderate municipal point sources, urban runoff/storm sewers, hydrological/habitat modification, channelization, removal of riparian vegetation, and streambank modification/destabilization --slight construction and land development
Skokie River	partial support/ minor impairment	--high nutrients, organic enrichment/DO, flow alteration and other habitat alteration --moderate siltation --slight metal	--high hydrologic/habitat modification, channelization, and flow regulation/modification --moderate municipal point sources, combined sewer overflow, urban runoff/storm sewers, dam construction, and upstream impoundment --slight construction, land development, and streambank modification/destabilization

D. Comments on new Draft NPDES permits for MWRD large plants

Background

As this study neared completion, IEPA released for public review a set of draft NPDES permits for the three large MWRD plants discharging into the Chicago River system. Existing permits were issued in the 1980s and expired 7 - 8 years ago. It is uncertain when the process of review for the draft permits will be concluded. Public hearings will be held in 2000.

The information contained in this study and this section of the study in particular can be of value to those interested in participating in the permit reissuance process. In order to facilitate that process, we include the following brief analysis of the newly released draft permits for the MWRD Stickney, North Side, and Calumet treatment plants. This does not constitute a full evaluation of the draft permits; rather it is written to enhance the findings of this study. Many, if not most, of the findings and recommendations of this study remain relevant despite the changes proposed in the new draft permits.

Findings:

- Proposed limits for conventional pollutants are the same or more protective than the earlier permits; limits for toxic substances previously included in the permits either remain the same or are now less stringent.

- CSO program requirements in the proposed permits reference the Nine Minimum Controls included in the USEPA CSO Policy; however, whether or not required public notification and monitoring controls are adequately addressed in these permits is questionable.

- Proposed WET program requirements do not include chronic toxicity testing.

The following table lists the effluent limits that would change under the new permits:

Comparison of Existing and Proposed Effluent Limits

Parameter	Time Period	Current Limit (mg/l)	Proposed Limit (mg/l)	Change
Stickney Treatment Plant				
CBOD[1]	weekly average	20	15	-25%
Suspended Solids	weekly average	25	20	-20%
Ammonia Nitrogen	daily maximum	none	5.0 / 8.0 (seasonal)	
Cyanide	daily maximum	0.12	0.2[2]	+67%
Lead	daily maximum	0.1	0.4[2]	+400%
Northside Treatment Plant				
CBOD[1]	weekly	24	12	-50%
	monthly	12	10	-17%
Suspended Solids	weekly	40	18	-55%
	monthly	20	12	-40%

Ammonia Nitrogen	daily maximum	none	5.0 / 8.0 (seasonal)	
Cyanide	daily maximum	0.1	0.2[2]	+100%
Lead	daily maximum	0.1	0.4[2]	+400%
Chromium	daily maximum	1.3	2.0[2]	+54%
Zinc	daily maximum	1.0	2.0[2]	+100%
Phenols	daily maximum	0.3	0.6[2]	+100%
Calumet Treatment Plant				
CBOD[1]	monthly average	24	10	-58%
	weekly average	48	20	-58%
Suspended Solids	monthly average	28	15	-46%
	weekly average	56	25	-55%
Ammonia Nitrogen	monthly average	13.0	8.0	-38%
Cyanide	daily maximum	0.11	0.3	+173%
Lead	daily maximum	0.1	0.4[2]	+400%
Chromium	daily maximum	1.4	2.0[2]	+43%
Zinc	daily maximum	1.1	2.0[2]	+82%
Phenols	daily maximum	0.3	0.6[2]	100%

[1] CBOD = Carbonaceous Biochemical Oxygen Demand
[2] Illinois general effluent standard from Title 35, Subtitle C, Chapter I, Part 304

The limits for CBOD and Total Suspended Solids (TSS) are more stringent in all of the draft permits. CBOD and TSS limits are cut in half at Calumet. At the Northside plant, monthly average CBOD and TSS are cut by 17% and 40% respectively, while the weekly averages are cut in half. At Stickney plant the monthly limits for CBOD and TSS are unchanged, but the weekly averages are cut by 33% and 20% respectively.

Most of the limits for toxic pollutants that appear in the existing permits are not listed explicitly in the draft permits. The only toxic limit appearing in a draft permit is cyanide at the Calumet plant. All other limits for toxic substances are incorporated by reference to Illinois general standards as Special Condition 5 of each permit. The effect of this is that the daily maximum limits for these toxic pollutants would be 43 - 400% higher than in the existing permits; while the monthly average limits would remain unchanged.

A glance at the actual levels of pollutants in MWRD effluent in recent years indicates that the actual effluent levels are currently below the limits appearing in the draft permits, based on long term averages. Therefore, it is reasonable to assume that the draft permit limits would not require any operational changes by MWRD.

MWRD effluent limits for toxic pollutants continue to be based on the secondary contact (less protective) water quality standards that apply to Chicago area waterways. Actual performance is well under these limits in most cases.

Our review of other permits revealed that other agencies are subject to performance-based goals in their permits. Pending review of the state water quality standards, it makes sense to consider the application of performance-based goals in new permits for MWRD discharges. Performance-based goals set effluent limits at levels tighter than or equal to levels previously attained. This approach has been implemented in other jurisdictions where the achievable effluent levels for pollutants are

significantly below legally mandated limits. Performance based goals can promote the continuous pursuit of superior treatment performance.

A brief review of the special conditions in the draft permits shows:

- Pretreatment program regulations are more numerous and explicit. The list of substances for periodic monitoring has expanded by several parameters and minimum detection limits for each substance are specified. However, the detection limit for mercury is approximately100 times higher than that which is achieved by some other plants (Green Bay, Madison, and Milwaukee, for example) using the new approved EPA analytical method.

- CSO requirements have been substantially revised from those in the existing permits. There has been an attempt to address the USEPA Nine Minimum Controls. Though the Nine Minimum Controls are not listed or mentioned within the permits, they are addressed in part in Special Conditions 7 and 10. The USEPA NMC guidance on public notification and wet weather monitoring appear to be the least well satisfied by the draft permits. The provisions for public notification of CSOs includes only notification of agencies that provide drinking water from Lake Michigan. Provisions for monitoring impacts of CSOs on stream quality are covered only by estimates of combined sewer overflows; there is no real in-stream monitoring requirement.

- Biomonitoring requirements in the draft permits require acute WET testing at all three treatment plants for at least one year. None of the three MWRD plants are currently required by permit to do any WET testing. If chronic testing is done outside of the scope of the permit, then acute testing may be discontinued. However, no chronic WET testing is required in the permit at any of the plants.

More comprehensive recommendations on suggested changes to the draft permit will be provided as part of the public hearing process.

E. Comparison of Illinois General Use and Secondary Contact Water Quality Standards

Comparison of Illinois Pollution Control Board Water Quality Standards
based on IL Title 35: Environmental Protection, Subtitle C: Water Pollution
Note that all "Secondary Contact" waters in Illinois are located within MWRD boundaries.
Standards are upper limits except for dissolved oxygen, which is a minimum.

	Units	Secondary contact standard	General use single sample standard a.k.a. "acute"	Notes	Secondary contact as percent of acute general use standard	General use standard for average of 4 or more samples a.k.a. "chronic"	Secondary contact as percent of chronic general use standard
Parameters with no standard applying to secondary contact waters							
Fecal Coliform Bacteria	#/100 ml	none	400.0	May-Oct		200 (5 samples)	
Sulfate	mg/L	none	500.0				
Boron	mg/L	none	1.0				
Beta Radioactivity	pCi/L	none	100.0				
Parameters with different standard applying to secondary contact waters							
Dissolved Oxygen (minimum)	mg/L	4.0 or 3.0	5.0		20-40% lower		
any 16 / 24 hrs	mg/L	5.0	6.0		17% lower		
pH	standard	6.0-9.0	6.5-9.0				
Ammonia - unionized, Apr-Oct	mg/L	0.1	0.33		30%	0.057	175%
Nov-Mar	mg/L	0.1	0.14		71%	0.025	400%
Total Dissolved Solids	mg/L	1500.0	1000.0		150%		
Phenols	ug/L	300.0	100.0		300%		
Cadmium[2]	ug/L	150.0	2 - 50	f(Hardness)	704%	0.4 - 3.4	7500%
Copper[2]	ug/L	1000.0	4.8 - 65.4	f(Hardness)	2933%	3.6 - 38.2	4717%
Chromium - Trivalent[2]	mg/L	1.0	.56 - 5.4	f(Hardness)	33%	.065 - .644	274%
Chromium - Hexavalent	mg/L	0.3	0.016		1875%	0.011	2727%
Cyanide	mg/L	0.1	0.022		455%	0.0052	1923%
Iron - dissolved	mg/L	0.5	1.0		50%		
Lead[2]	ug/L	100.0	16.4 - 559	f(Hardness)	43%	3.4 - 117.2	206%
Mercury	ug/L	0.5	0.012 / 0.5[1]			0.012 (8 samples)	4167%
Arsenic	mg/L	1.0	0.36		278%	0.19	526%
Silver	mg/L	1.1	0.005		22000%		
Fluoride	mg/L	15.0	1.4		1071%		
Parameters with same standard applying to secondary contact waters							
Zinc	mg/L	1.0	1.0				
Nickel	mg/L	1.0	1.0				
Selenium	mg/L	1.0	1.0				
Barium	mg/L	5.0	5.0				
Manganese	mg/L	1.0	1.0				
Parameters with no standard for general use waters							
Iron - total	mg/L	2.0	none				
Oil & grease	mg/L	15.0	none				

[1] Higher limit applies to low flow conditions.

[2] Hardness range of 25 -400 mg/L used to calculate variable limits, 200 mg/L used for percentage comparisons from ranges.

F. Study Questions and Responses from MWRD

Friends of the Chicago River

407 S DEARBORN • SUITE 1580 • CHICAGO ILLINOIS 60605 • (312) 939-0490
FAX (312) 939-093'

September 23, 1999

Mr. Hugh McMillan
General Superintendent
Metropolitan Water Reclamation District
of Greater Chicago
100 E. Erie
Chicago, IL 60611

Dear Mr. McMillan:

In your correspondence of August 4, 1999, you reject the request from the members of the Waterways for Our Future Study Team for a meeting with you. Rather, you ask that in lieu of a meeting, we present specific questions in writing. In response to this request, we submit the following list of questions:

1. a) What is the relationship between the Board of Commissioners and the General Superintendent?
   b) How do you interact with commissioners for board meetings?
   c) What is your official role in setting the agenda for board meetings?
   d) How frequently do you meet with or speak to commissioners on policy matters (e.g. daily, weekly, monthly) ?

2. How are executive responsibilities divided between the President of the District and the General Superintendent of the District?

3. a) How is policy-making conducted in the District?
   b) Explain the relationship between the board of commissioners as the policy-makers and your office as the policy implementor?
   c) Which is the source of most policy initiatives, the board or the general superintendent and staff?
   d) Which entity develops the many technical (e.g., engineering) and fiscal policies for the District?

4. a) How does the District facilitate public input to its policy-making processes?
   b) How is the public informed of District hearings and meetings?

5. a) Explain the budget-making process for the District and the role played by the General Superintendent in this process.
   b) Have you made changes in the budget-making process during your current term as General Superintendent?
   c) How is the public included in the budget-making process?
   d) How do you collect public opinion on District decisions?

6. a) Have you reorganized the District during your current term as General Superintendent?
   b) What changes were made to benefit the District's management?
   c) Are changes needed in the current organization to improve the District's operations?
   d) If changes are needed, how would you implement those changes?

7. In your view, what are the qualifications and skills needed to be successful General Superintendent of the District?

8. What are your most significant accomplishments as General Superintendent of the District?

9. What are the MWRD's goals for the waterways and adjacent lands in terms of environmental quality?

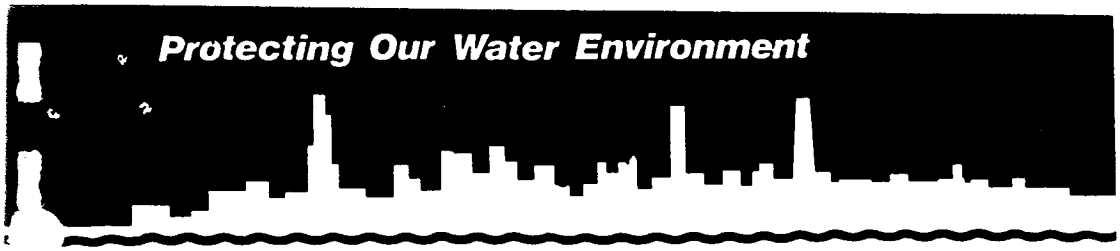
10. How does your role as General Superintendent enable you to achieve the goals of the District?

Thank you in advance for your time. Please contact me at (312) 939-0490 if you have any questions regarding the above list.

Sincerely,

Laurene von Klan
Executive Director

cc: Terrence O'Brien
Lance Pressl, Ph.D.
Joyce O'Keefe



Metropolitan Water Reclamation District of Greater Chicago

100 EAST ERIE STREET CHICAGO, ILLINOIS 60611-2803 312 / 751-5600

Terrence J. O'Brien
President

312 / 751-5700 *FAX 312 / 751-5670*

October 22, 1999

Ms. Laurene Von Klan
Executive Director, Friends of the
Chicago River
407 S. Dearborn
Suite 1580
Chicago, IL 60605

Dear Ms. Von Klan

This letter is in response to your letter of September 23, 1999 which included a series of questions concerning various aspects of the District's activities.

In reviewing the questions posed, it appears that more than a few of them are directed toward an evaluation of my performance in the position of General Superintendent. I consider this approach to be presumptive and unrelated to a determination of policy initiatives, administrative structure and programs of the District.

Evaluation of my performance is properly the responsibility of the Board of Commissioners as representatives of the citizens of the District. Inasmuch as I serve at their pleasure, their collective opinion of my performance in implementing their policies and conforming to statutory and regulatory mandates in administering the day-to-day operations of the District determines my tenure.

In that context, I am limiting my response to questions dealing with the functions of the District and the position of the General Superintendent which are generic and would apply to any person holding the position of General Superintendent. Where I feel that a question is personalized, I will so state. I will follow the alpha/numerical identification used in your letter for the purpose of relating my responses to the related question.

1. a)The General Superintendent (GS) is selected by, and serves at the pleasure of the Board of Commissioners (BOC) as established by statute. The language of the statute concerning the GS's responsibilities and authority is as follows: "The general superintendent, in addition to all other powers specified in this Act, shall manage and control all the affairs and property of the sanitary district and shall regularly report to the Board of Commissioners on the activities of the sanitary district in executing the policies and goals established by the board.".

   b)Board letters are distributed to the BOC on the Friday preceding the Board Meeting. Commissioners then present questions, requests for further information, or clarification on any of the items to the GS if they so choose.

   c)Departments provide agenda items related to their functions for review and approval by me. If a policy matter requires determination by the Board, a letter requesting such is prepared. Letters are for matters requiring BOC approval; to provide information to the BOC and the public; to seek guidance or a policy decision; or to report on matters which do not require authority from the BOC but are in keeping with the statutory requirements and/or policy requirements for reporting certain matters to the BOC. During the course of a Board Meeting, any Commissioner may, without discussion, defer any agenda item until the next regular Board Meeting. In the subsequent meeting, deferral of that item may be continued with the approval of a majority.
   d)The GS should respond to any request for discussion by members of the BOC. The GS may not meet with more than 2 members at any time or a violation of the Open Meetings Act would occur. The number of contacts depends upon Commissioner's requests or the need of the GS to discuss a particular matter with a Commissioner or Committee Chair. Meetings with outside individuals or groups – again with no more than 2 Commissioners in attendance, may include attendance by the GS if the Commissioner(s) so requests.

2. The duties, according to statute, are described in 1a) above. Essentially, the GS is responsible for the direction of all District employees with the exception of the Commissioners and their staffs, and the Treasurer who is directly appointed by the Board.

   The President may be said to represent the Board in exercising executive responsibilities concerning the GS, the Treasurer and the Director of Finance, the latter in matters when the Director of Finance functions as Clerk of the Board. He may also serve as the BOC's contact or spokesperson for the media and other elected officials.

3. a) The Board is provided with an issue for which no policy or regulatory, judicial or legislative mandates exists, or were a policy modification may be indicated. The issue may be presented to the Board by outside interests or from the GS who may determine the need for policy guidance as a result of internal requirements

that may arise from public input, or regulatory or statutory changes. Other sources include determinations by the Civil Service Board, the judiciary and others.

b) The Board develops and adopts policies and the GS's responsibility is to manage and administer the day-to-day affairs of the District in conformity with those policies and applicable statutory, regulatory or judicial requirements.

c) Any answer to this question would be misleading. It is difficult to determine who "initiates" a policy question when it is required by a mandate of the regulators, legislators or judiciary. Requests for policy decisions from the public may be directed to the GS's office or to the office of a Commissioner who generally forwards the matter to the GS for action or a recommendation.

d) In general , it may be said that the staff generates technical (engineering), policy if such a term is even appropriate. Fiscal policy is an amalgam of statutory provisions, BOC action, generally accepted accounting practices, and in some contexts, market conditions. The GS advises the BOC of the fiscal condition and needs of the agency and may make recommendations for adjustment of the condition or provisions for filling the needs.

4. a) A number of avenues are provided for public input to all activities of the District, including policymaking. All meetings of the BOC are public, in keeping with the Open Meetings Act (with the exception of a meeting or portion of a meeting dealing with personnel, purchase of real estate, or judicial matters requiring decisions on settlements or legal strategies that are exempted from the Act).

   b) Primarily by advertising in widely circulated publications as well as specific notification to a wide range of governmental and organizational offices. Where a particular segment of the public, e.g. a commercial trade group, may be impacted by a particular policy discussion, they are provided with specific notification of the meeting. All notices of meetings are identified as to the purpose of the meeting. Where extensive input to a policy matter is anticipated, or requested, the BOC may conduct a Study Session chaired by the person who chairs the relevant committee. Public notification as described above is made.

   All MWRD public meetings are recorded and transcripts of those meeting records are available for review at the District's offices.

   The MWRD maintains a Web Page that is regularly updated and will include many topics and presentations of interest to the general public.

5. a) The GS and his staff determine the resources–financial and human- needed to operate the District in the following year. Further, the staff determines resource availability and Department requests are reviewed by the GS and the Budget Office staff to determine their necessity, their compliance with resource constraints, and for prioritization. Upon completion of departmental reviews and

any modifications to initial requests, the GS's Budget is formatted, printed and provided to the BOC. In addition to requested amounts, information concerning the source of funds, appropriation levels, and levy impacts are provided.

The BOC subsequently holds Hearings with the staff to discuss the budget for the purpose of obtaining additional information concerning the requests or other matters; to suggest revisions; and perhaps to inquire as to the staff philosophies which may be represented by priorities established in the budget.

Upon incorporation of any changes in the GS's Budget, occasioned by the Budget Hearings, a Tentative Budget of the BOC is prepared and made available to the public through distribution to libraries, governmental offices, and information concerning a Public Hearing is provided at this time.

The Public Hearing is intended to provide all parties the opportunity to seek information; make suggestions; and generally critique the proposed budget.

Matters presented at the Public Hearing are generally addressed by the BOC at that time. Where appropriate, direction may be given to staff to modify the Tentative Budget based upon inputs received at the Hearing. A transcript of the record of these meetings is prepared and, as is the case with all meetings of the BOC, is available to the public.

The Tentative Budget is modified as deemed necessary and a Final Budget is produced. This Budget is then adopted by the BOC at the first regular Board Meeting in December. The Final Budget may be subsequently amended at the final, regular Board Meeting of the year.

The Budget, as adopted, is again provided to the public as described above.

The basic processes are prescribed by statute or by Board policy. The internal mechanics of developing the GS's Budget are constantly changing but results provided to the Board and the public remain essentially the same.

b) My actions in modifying the budget-making process, if any, are not relevant to the discussion, in my opinion.

c) See 4a) and 5a) above.

d) See 4a) above.

6. a) This question deals with my performance and therefore, in my opinion, is unwarranted in the context of the Study Outline provided to me.

b) See 6a) above

c). See 6a) above.

d). For any GS, organizational changes represented by an adding or deleting a department would require statutory changes inasmuch as the department heads are defined in the Statute. Obviously, approval of the BOC would precede a request for legislative action.

7. I do not believe my views are relevant. The statute states that the GS "...must be selected solely upon his administrative and technical qualifications and

without regard to his political affiliations." Inasmuch as the BOC selects and appoints the GS, their determination as to a candidate's administrative and technical qualifications is more germane.

8. See 6a) above.

9 The District's statutory mandate is to protect the drinking water supply of the Chicagoland area. It is axiomatic that such efforts should not result in the degradation of the environment, particularly the total water environment within its jurisdictional boundaries. As it has been in the past, it is the District's goal to continue to protect that environment in the most cost-effective and optimal manner, recognizing that all citizen's of the District should benefit from the expenditures of the funds provided by its users and from the resources the District has acquired during the conduct of its statutory responsibilities.

   While the District has met and exceeded regulatory requirements for discharges to the waterways and, to a large degree the water quality objectives for the waterways, completion of those projects which will result in total achievement and likely exceeding of water quality standards is our objective. Additionally, completion of those projects will significantly result in reduction of flooding in the area, providing benefits that will accrue to the citizens of the area.

   The term "environmental quality" in the context of the question is not well defined. Opinions as what constitutes environmental quality can and do vary and may have various degrees of merit depending on one's point of view. Satisfying all viewpoints is rarely possible so the decisions on policies dealing with this topic must attempt to prevent disenfranchisement of any taxpayer.

10. I consider that the wisdom displayed by the state legislature when it redefined the role of the GS and the BOC to have been a proper response to the abuses that had occurred prior to the legislative initiative in redefining those roles. The GS has specific responsibilities and controls which can and are used to carry out the policies and goals established by the BOC. If the BOC determines that the GS is not satisfactorily meeting the requirements of the position, they may exercise their prerogative of replacement.

    A comparison with the organization and management of private sector corporations would show that the structure defined by the legislature provides the CEO/COO with the authority necessary to achievement of the agency's purposes while providing oversight from persons elected by those who rely upon the services to protect the health and welfare of the community.

While you have identified my desire to have these questions submitted in writing as a "rejection", I believe that this is a more effective way of communicating. In this way, we can refer to written material if any clarification is required.

Finally, my response to your questions may not be construed as acceptance of the legitimacy of your project, your methodolgy, the qualifications and associations of those who will constitute the "peer review group"; or conclusions you may publish. The District has long been judged by the public, its peers, and those who officially oversee its operations. In that regard, in its recent history, the District has, by all reasonable

benchmarks, merited its international reputation as an outstanding example of the desirable political, technical, organizational, and managerial attributes of a governmental agency dealing with the water environment. The many awards and honors received from a wide spectrum of civic, peer, and professional organizations with expertise in this industry for its financial, technical, human resource, water quality, and general institutional excellence are, in my and many other's opinion, the best, most unassailable, competitive and critical determinations of the District's accomplishments and effectiveness in dealing with the nation's efforts to clean up our waters.

Hugh H. McMillan, P.E., DEE
General Superintendent

c: Board of Commissioners w/attachment

Friends of the Chicago River

407 S. DEARBORN • SUITE 1580 • CHICAGO ILLINOIS 60605 • (312) 939-0490
FAX (312) 939-7934

Sent Via Messenger

January 21, 2000

Mr. Terrence O'Brien
MWRDGC
100 E. Erie
Chicago, IL 60611-2803

Dear President O'Brien:

Friends of the Chicago River, Openlands, and the Civic Federation are conducting the study Waterways for Our Future which we have discussed and provided information on over the last several months. As part of this study we have submitted a survey to sewerage agencies around the country in order to develop information on best practices in the sewerage industry. Attached please find a version of that survey which we respectfully request be completed so that we have a better understanding of the work of the MWRDGC. The items in this survey were not covered in our previous meetings or in our previous questionnaire to Mr. McMillan. We expect that this largely completes the information gathering portion of our work and appreciate your cooperation and that of District staff.

Please feel free to contact us with any questions or clarification.

Thank you very much.

Sincerely,

Laurene von Klan
Executive Director

cc: Hugh McMillan

Questions for the Metropolitan Water Reclamation District of Greater Chicago

1) Does the MWRDGC have a mission statement? ___ yes ___ no
(If so, please provide a copy)

2) Does the MWRDGC have a strategic plan? ___ yes ___ no
(If so, please provide a copy)

3) Has the MWRDGC ever received or applied for public or private grant funding for:
_____ Non-point source pollution programs
_____ Household hazardous waste reduction
_____ Stream maintenance or restoration
_____ Public involvement and education

4) Does the MWRDGC participate in cooperative watershed planning efforts within its service area?
___ yes ___ no

If yes, please list the projects participated in:

Which role(s) does the MWRDGC play?

_____ coordination _____ staffing _____ providing funding
_____ applying for funding _____ attending meetings _____ leadership role
_____ other: _____

5) Does the MWRDGC conduct programs to protect, restore, or manage aquatic or terrestrial wildlife habitat?___ yes ___ no

If yes, please describe:

6) How does the MWRDGC solicit and incorporate public input into its decision making processes?

7) Does the MWRDGC conduct public education programs? ___ yes ___ no
If yes, briefly list the topics covered and techniques used.

Are there any public education programs designed to affect citizen behavior so as to promote water quality or environmental stewardship? ___ yes ___ no
If yes, please describe:

Please enclose copies of any recent educational materials that you have developed or found to be especially effective.

8) Has the MWRDGC implemented waste reduction or pollution prevention activities at its facilities?
___ yes ___ no

If yes, which areas have the waste reduction or pollution prevention activities targeted?
_____ treatment process changes or material substitutions
_____ building or grounds maintenance
_____ laboratory operations
_____ other: _____

9) Has the MWRDGC targeted specific industrial sectors in its pollution prevention program?
___ yes ___ no

If so, which ones:

10) Describe the MWRDGC's most successful pollution prevention initiative(s).

11) What is the frequency of WET testing conducted by the MWRDGC?
Acute:_____ Chronic:_____

On which dates were WET tests conducted in the last two years?

What protocols or other guidance are followed for the MWRDGC's WET tests?

What actions are taken to help prevent failure of a WET test?

Has the MWRDGC followed up a WET test with a TIE or TRE? ___ yes ___ no
(please provide report or results if available)

12) Does the MWRDGC have a CSO long term control plan? ___ yes ___ no
(if yes, please provide a copy)

13) What is the frequency of CSO events in the MWRDGC service area?
(please attach documentation if available)

Briefly describe what the MWRDGC is doing in response to these overflows.

What public notification is done of CSO events?

What reporting of CSO volume is done?
(please provide a sample if available)

Has the MWRDGC ever done studies on optimizing its operations during wet weather periods?
___ yes ___ no

What monitoring techniques are employed by the MWRDGC to characterize CSO impacts and the effectiveness of CSO controls?

Does the MWRDGC require separate storm sewers in new construction? ___ yes ___ no

14) Does the MWRDGC perform any wet weather monitoring? ___ yes ___ no

If yes, are receiving water bodies or overflows monitored?

How many events per year are monitored, and at how many sites?

15) Please describe any awards or honors that the MWRDGC has received in the last three years.

16) Which of the following activities does the MWRDGC engage in?

Activity	yes/no
Stormwater management (beyond your own properties)	
Flood control	
Water course debris removal	
Streambank restoration	
Public access to your property	
Stream bank erosion control	
Citizen stream monitoring	
Removal of illegal hook-ups	
Non-point pollution reduction	

17) Has the MWRDGC ever done a benchmarking or best practices analysis of its operations or programs? ___ yes ___ no

18) Please describe any resolutions, directives or policies promulgated by the MWRDGC Board which contain goals for the uses or quality of area waterways:

19) Please mention any highlights of MWRDGC operations that are not included listed in previous responses which you feel should be considered by this study:

20) What are the criteria that the MWRDGC follows when determining whether to:
(a) lease vacant parcels?

(b) sell vacant parcels?

21) Does the MWRDGC proactively seek to lease its vacant parcels? If so, why?

22) Is it the practice of the MWRDGC to give first priority to governmental and/or recreational uses when selling or making MWRDGC lands otherwise available for non-corporate purposes?
___ yes ___ no
How is this practice carried out (i.e., via public notice, rights of first refusal, etc.)?

23) What is the practice of the MWRDGC in enforcing the Criteria established for the Waterway Strategy Resolution with regard to new leases? Does the MWRDGC consistently seek to enforce all of the Criteria when entering into new leases? How does the MWRDGC determine when to allow for exceptions to any of the requirements of the Criteria?

24) Does the MWRDGC attempt to establish the 250-foot Corporate Use Reserve Area and the 60-foot greenway easement on properties already under lease when those leases come up for renewal, even though they were not subject to such requirements under the initial leases?

25) Does the MWRDGC require any land use practices, other than the 60-foot setback, to benefit wildlife and/or enhance the aesthetics of the land? If so, what are they?

26) Does the public have access to the 60 foot setback (either from the water or the land)?

27) Can the lessee make improvements (without concern that they will be removed by the MWRDGC) that:

(a) Enhance habitat?

(b) Enhance public access to the property or to the waterway (such as a canoe access or a trail through the 60 foot setback)?

28) By statute the MWRD has the authority to enter into leases with third parties to lease its surplus land for up to 99 years, however, the Real Estate Operations Policy Manual states that the "practice has established a maximum term for most uses from twenty to twenty-five years." References are also made regarding approval of lease terms of up to fifty years, and last July the MWRDGC established a policy which will allow leases to run for 60 years. What is the standard policy regarding length of leases for surplus property? Does the standard differ for leases to private entities versus governmental or public entities?

29) Please explain/describe what "Channel Maintenance" means when used in the Marks' List. What sort of activities take place in order to "maintain" the channel? Is there any opportunity for recreational use of these lands?

Protecting Our Water Environment

Metropolitan Water Reclamation District of Greater Chicago

100 EAST ERIE STREET CHICAGO, ILLINOIS 60611-2803 312 / 751-5600

Hugh H. McMillan, P.E., DEE
General Superintendent

(312) 751-7900 FAX (312) 751-5681

March 6, 2000

Ms. Laurene von Klan, Executive Director
Friends of the Chicago River
407 S. Dearborn – Suite 1580
Chicago, Illinois 60605

Dear Ms. von Klan:

Per your request to President O'Brien of January 21, 2000, I am providing responses to the items contained in the questionnaire provided to his office.

The responses will utilize the same numbering system as was used on the questionnaire.

1) The District does have a mission statement which is incorporated in the Budget document for the year 2000 and preceding years. I understand that you have a copy of that document and therefore it is not provided with this response, but I am providing an excerpt from that document as an attachment. (Attachment #1)

2) The District does have a strategic plan represented by the Facility Planning Study which is updated every two years if required by funding mechanisms. (Attachment #2).

3) The District has received public funding for all of the activities noted in the question.

4) The District does participate in cooperative watershed planning efforts. A list of those projects which have been part of our efforts in the past is attached. (Attachment #3a) The roles played by the District in these activities are all of those listed in the questionnaire. Also attached is a list of entities with which the District has cooperated (Attachment #3b) and a summary of retention capacity attributable to District ordinances within the District. (Attachment #3c)

5) Yes, the District protects and contributes to the restoration of aquatic habitats by providing high quality wastewater treatment to the wastewater within its jurisdiction. The Discharge of high quality effluents contributes to improvements in water quality in the Chicagoland waterways, which has a beneficial effect on aquatic life. In 1999, each of the District's seven water reclamation plants met all NPDES permit effluent

limits and conditions 100% of the time. The District also provides for capture and treatment of combined sewer overflows, which would otherwise pollute the waterways. The District also operates artificial aeration stations in the waterways to enrich the dissolved oxygen content of the Chicago and Calumet River Systems.

The above items have resulted in substantial improvement in the abundance and diversity of aquatic organisms in the Chicagoland waterways over the past 25 years.

6) The response to this question is incorporated in the response provided to you on October 22, 1999 which, under question 4, that response provides those activities used for obtaining public input. Additionally, the response to question 7 further expands upon these mechanisms and provides an attachment of reports, publications, etc. relative to the topic.

7) The District does conduct public education programs and a brief description of each o of the two parts of the question are as follows:
Part 1 – The District has had a full-time Community Education Specialist since 1989. This person arranges tours so that members of the public can see first-hand how the District facilities function to reclaim wastewater. In 1999, 234 groups toured one or more plants, for a total of 5,302 visitors. Senior citizen and school groups are frequent visitors to the plants in their respective areas of Cook County.

The Community Education Specialist visits a group or school about once a week. In 1999, she made 48 visits to schools, community groups, science fairs or teacher seminars, and spoke to a total audience of more than 46,000 people (including a large group in March at the Chicago Wilderness Program at the Field Museum). A school visit would typically consist of a slide or video presentation, followed by questions and answers and distribution of printed materials. If the children are in fifth-grade or older, a follow-up visit to the local water reclamation plant will often take place.

The District recognizes students who do outstanding environment-related projects in the Chicago Public and Non-Public Science Fairs. The District participates in the judging process, furnishes a speaker for the Science Fair Awards Ceremony and invites winners and their families to attend a Board Meeting and tour the District's Stickney Plant and Mainstream Pumping Station.

Attached are materials produced by the District (coloring book, worksheets) or purchased through the Water Environment Federation (Attachment #4a) and Channing Bete Publishers to assist teachers in their presentation of lessons on the environment.

The District has worked with the Illinois Association of Wastewater Agencies to produce a 10-Day Curriculum, used in junior high and high school level science classes. (Attachment #4b)

To promote environmental stewardship, the District co-sponsors one or two Household Hazardous Waste Collection Days in Cook County each year. The District uses its good relationship with local schools to help get the message out to citizens to participate in these events. On the day of the collection event, District Staff members distribute materials from the Illinois Environmental Protection Agency to educate the public on keeping hazardous materials out of the environment. Approximately 2,000 participants, bringing waste from 3,500 household, attend these events.

Part 2 – The District promotes responsible citizen behavior in helping to protect the water environment by inviting participation in the Household Hazardous Waste Collection Days; by recognition of industries that have successful pretreatment programs with the annual Greater Chicago Pollution Prevention Program; and by encouraging teachers to incorporate wastewater treatment as part of their science curriculum.

8) Yes to the posed question and all of the items noted in the question are areas in which the District has participated. In addition, under the "other" category, the District is deeply involved in energy conservation, particularly electrical energy conservation, and has achieved significant reductions in power consumption and a further reduction of demand, particularly during high demand periods.

9) The Greater Chicago Pollution Prevention Program does not target specific industries for pollution prevention. Technical assistance is available to all and is provided to companies requesting assistance. Awards are presented to companies for notable reductions in water consumption; waste strength and quantity; waste generation and energy matters.

10) In the presumed context of the question, the Greater Chicago Pollution Prevention Program Report for 1999 is provided as Attachment #5a and the Household Hazardous Waste Day Report for May 1, 1999 is included as Attachment #5b.

11) **Acute:** Acute fish and Ceriodphnia WET tests were conducted once per year on effluent samples from the James C. Kirie WRP for the past two years in compliance with the NPDES permit for the James C. Kirie WRP.

No acute WET testing was required in other District NPDES permits during the past two years.

Although not required in NPDES Permits, the District also conducted acute fish and Ceriodaphnia WET tests four times in 1998 on effluent samples from all seven of its WRPs.

Chronic: Chronic fish and Ceriodaphnia WET tests were conducted once per year on effluent samples from the Hanover Park WRP for the past two years in compliance with the NPDES permit for the Hanover Park WRP.

No chronic WET testing was required in other District NPDES permits during the past two years.

On what dates were WET tests conducted in the last two years.

WRP	Date (Permit Required Tests
James C. Kirie	January 5, 1998 January 26, 1998 June 14, 1999
Hanover Park	March 29-April 3, 1998 June 20-25, 1999 December 5-10, 1999

What protocols or other guidance are followed for the MWRDGC's WET tests?

Static, Renewal, 96-hour Acute Toxicity Test Using the Fathead Minnow (Pimephales promelas), (EPA/600/4-90/027F, Fourth Edition, August 1993).

Static, Nonrenewal 48-hour Acute Toxicity Test Using the Water Flea (Ceriodaphnia dubia), (EPA/600/4-90/027F, Fourth Edition, August 1993).

Fathead Minnow (Pimephales promelas) Larval Survival and Growth Test, (EPA/600/4-91/002, Third Edition, July 1994).

Cladoceran (Ceriodaphnia dubia) Survival and Reproduction Test, (EPA/600/4-91/002, Third Edition, July 1994).

What actions are taken to prevent failure of a WET test?

We are not certain as to the intent of this question. Therefore, we are providing two responses.

1) District WRPs are operated to efficiently remove pollutants from the incoming wastwater.

2) A Quality Assurance/Quality Control Plan based upon information contained in the above referenced USEPA documents is in place in the District's Biomonitoring Laboratory. In addition, test organisms are cultured in-house to ensure that the highest quality organisms are available for the WET tests.

Has the MWRDGC followed up a WET test with a TIE or TRE?

No. This has never been necessary, because WET test results conducted on District effluent have never indicated that there was sufficient toxicity to necessitate a TIE or TRE.

12) The District does have a long-term control plan and it is defined in the description of the TARP project. A most recent description of TARP is included in Attachment #6.

13) The frequency of CSO events and the District service area is best identified by operations of pumping stations on interceptors within the Combined Sewer Area. Operating records of the District indicate the following frequency of operations of one or more of these facilities for the indicated years.

1997	1998	1999
41 Events	48 Events	46 Events

Documentation is provided in the facility operating sheets for the five pumping stations identified and, while we could provide those sheets where operations occurred, a review of operating sheets for each day in each of those years would be required to ascertain the validity of the above information.

Briefly, the District is proceeding with construction of TARP and its associated reservoirs at the maximum possible rate. In addition, the District monitors climatic conditions and operates its system to maximize storage capability dependent upon an analysis of potential precipitation impacts on its various facilities. Real time evaluation of precipitation provided from an array of District owned rain gauges throughout the metropolitan area permits identification of actual precipitation rates and amounts to provide further operating information to optimize capture and transportation of combined sewer flows.

Real time public notification of CSO events is not practiced. CSO discharges that are attributable to a pumping station that have discharged to a waterway, are provided in the District's routine reporting to the IEPA.

As stated above, the District is continually reviewing operations with an eye to optimizing capture of CSOs and reducing impacts attributable thereto. We are, of course, cognizant of the effectiveness of CSO controls as manifested by improvements in water quality, reduction of releases to Lake Michigan, and the overall reduction in pumping station operations since the first portion of TARP went on line in 1985. As a stand-alone system, the O'Hare TARP system has, after completion of the reservoir, essentially eliminated CSOs from sewers tributary to that system. For the most part, those that still occur periodically are attributable to a lack of local system capacity for transporting combined sewer flows to TARP inlets.

Question #14 provides a response to the question on monitoring techniques relative to CSOs. The effectiveness of CSO control can best be summarized by the cumulative total of flows captured in TARP and subsequently treated at our water reclamation plants. Since 1982, 492.3 billion gallons have been so captured and treated. The range of yearly flows is from 2.5 billion gallons in 1982 to 47.9 billion gallons in 1998. From that data, it is easily seen that TARP, as the primary mechanism for CSO control, has been highly effective in reduction of quantities of pollutants introduced into waterways from CSO sources. A copy of a TARP System Storm Synopsis is an example of reports available and provides information relative to TARP operations both on a cumulative basis and for a specific storm being reported. (Attachment #7).

The District does require separate storm area systems in all developing areas with the exception of those which are in combined sewered areas and which would not have access to a separate storm sewer for release of storm waters. Since the 1930's, the District has required separate sewer systems in developing areas outside of the combined sewer area and, since the 1970's, has required detention provisions in the separate sewered areas. Where it is feasible, newly developed areas within the combined sewered areas are urged to separate sewers.

14) Part A – combined sewer overflows and bypasses to Lake Michigan are monitored. Part B – there are eight monitored sites; the number of times monitored is dependent upon precipitation rates and quantities. Attachments describing wet weather monitoring are provided as Attached #8.

15) Provided in Attachment #9 is a list of major awards won by the District over the past three years. In addition, although not an award specifically presented to the District, in 1998 the USEPA selected the Chicago River System as one of the 25 outstanding success stories attributable to the 1972 Clean Water Act. As the only entity in this area which has pursued any actions for which improvement in the water quality of the Chicago River System may be attributed, it is essentially an award to the District.

Aside from those awards specifically presented to the District, District employees at many levels have been recipients of awards from peer groups and various organizations based upon their contributions to the industry and governments in general. Many of these individual awards represent the highest awards which these prestigious organizations bestow upon individuals.

The number of such awards is too numerous to provide a listing herein.

16) With the exception of citizen stream monitoring, the District engages in all of the activities listed on the questionnaire. For those activities related to individual streams, the activity is limited to those stream reaches belonging to the District or for which the District has assumed such a responsibility as part of a funding agreement with State and/or Federal agencies.

17) The District, on a regular basis, participates in benchmarking surveys undertaken by the Association of Metropolitan Sewerage Agencies. In addition, appropriate staff members review the literature for evolving operational technologies and participate significantly in various forums which address operational problems and/or evolving technology. The District performs in-house studies with pilot projects for determining the effectiveness and economics of various alternative treatment practices.

Through regular internal and external audits, the District evaluates various programs and operations to determine that practices and procedures are performed according to requirements of internal, regulatory, and legislative requirements. When it is determined that any activities or practices of the District are best reviewed by a peer group or institutional or educational organizations which have specific expertise in that area, such expertise is solicited and results of such studies are given consideration in modifying practices and programs.

The most obvious benchmark are the standards promulgated by the state and federal environmental agencies and to which the District must adhere. Failure to achieve those standards may subject the District to warnings, penalties, fines, and other sanctions prescribed in the applicable regulations. However, the District does not limit itself to merely achieving the standards required by regulations. The District operates to maximize the pollutant reduction in wastewater and the results of such effort is manifested in effluent discharges which are, frequently, a fraction of the required standard.

18) The response to this question is contained variously in responses to questions 20 through 29, such responses are provided below.

19) Following is a brief list of highlights of District operations which we feel are somewhat unique to an organization which is primarily involved in collection and/or treatment of wastewaters:

a) Operation of waterways to minimize flooding.
b) Providing, through improved water quality, access to Lake Michigan water as a potable water supply for 1.25 million persons. Reductions already achieved by water quality improvements have made available such waters for approximately 360,000 persons to date.
c) Made available for public recreational purposes approximately 2,500 acres of District lands. We believe this may be the most land provided for such uses by any government entity within the District except for the Cook County Forest Preserve District and the State. The District has been the major demonstrator of the beneficial utilization of biosolids and, in particular, reclamation of strip-mined wastelands. Many of the practices by wastewater treatment agencies today with regard to utilization of biosolids are the result of studies and projects performed by the District.
d) The District uniquely operates, maintains and receives revenues from power generation utilizing renewable resources. The District's hydroelectric power station at Lockport and a gas turbine fueled by biogas provide significant electrical generation.

20) a) (1) Has a request to lease the property been made?

(2) Does a corporate need for the vacant land exist?

(3) Are there any technical objections from the District engineering and operations departments with respect to the leasing request?

(4) Has any known request for public recreational use been made?

(5) Has any request for public proprietary use been made?

(6) Is the requested private commercial use of the vacant property lawful and appropriate.

(7) Does sufficient income potential exist to justify commercial leasing activities?

(8) Has the General Superintendent approved the leasing request in principle?

(9) Has the Board of Commissioners authorized and approved the leasing transaction?

b) (1) Has a request to purchase land been made?

(2) Is the land requested to be purchased non-waterway land? (On November 5, 1998 a motion was passed to the effect that the stated General policy of the Metropolitan Water Reclamation District is to sell only isolated tracts of land not contiguous to any waterway).

(3) Are there any technical objections from the District's engineering and operations departments with respect to the sale request?

(4) Has any known request for public recreational use been made?

(5) Has any request for public proprietary use been made?

(6) Is the requested private commercial use of the vacant property lawful and appropriate?

(7) Does sufficient income potential exist to justify commercial sale activities?

(8) Has the General Superintendent approved the sale request in principle?

(9) Has the Board of Commissioners authorized and approved the sale transaction?

21) Not presently. Historically, the practice of the District has been to respond to inquiries made by third persons to the District who seek to leases its vacant real estate. The vacant lands remaining generally are not commercially attractive. Most of the District's commercially attractive real estate which is not presently needed for the District's corporate purposes is already leased and developed by tenants. As those leases expire the existing tenants actively seek to re-lease those lands. The District has undertaken a program to remove spoil material on potential commercial/industrial sites.

22) Generally, yes. As was stated previously, the District generally responds to the first party who inquires as to the availability of land. If a governmental entity has need for District land, presumably it would have been first to make the inquiry. Since the

District does not proactively market its lands, its negotiations for a governmental lease are done with little or no publicity until the transaction is ready for presentation to the District's Board of Commissioners for formal authorization and approval. In some cases, completing governmental and private entity interests might arise concerning the same real estate. In that event, the District generally tries to accommodate both requests. Until a few years ago, the District universally favored governmental leasing requests. However, with the onset of tax cap legislation and the

District's constant search for non-tax revenues, in some cases a substantial commercial interest may have to take priority over public recreational activities.

23) All of the enactments of the District's Board of Commissioners relating to the leasing of its surplus lands, including the Waterway Strategy Resolution and Implementation Criteria have been incorporated into the standard language of the District's lease form. All of the Waterway Strategy Resolution and Implementation Criteria are enforced in new leases. Any deviation from the standard language of the lease which reflects all of the Board's enactments and policies relating to leasehold activities first must be approved by the General Superintendent and the Board before deviation will be allowed. Accommodations or deviations from those fixed terms are carefully considered on a case-by-case basis.

24) Yes. The 250-foot corporate use reserve and 60-foot greenway easement are both real estate administered by procedures which have been adopted by the District's Board of Commissioners and incorporated into the standard lease form. Leases coming up for renewal are not simply extended but are re-advertised and re-bid. The form of lease which is used for such renewal transaction is the latest form of lease which includes language implementing all of the Board's current policies and enactments, including the 250-foot corporate use reserve and the 60-foot greenway easement.

25) All uses of District leased land must comply with local zoning, building and health laws. Certain activities constituting a public nuisance are expressly prohibited by the language of the lease document. These activities include such things as slaughterhouses, rendering plants and the like. Furthermore, the leasehold document expressly prohibits hunting and the discharge of firearms on the leased property.

26) Public access to the 60-foot setback is allowed if the tenant permits public access to its leased lands. The 60-foot setback is intended primarily to provide an esthetically pleasing view of the channel bank from the water. Many tenants voluntarily use this 60-foot setback for public accommodation.

a) Yes, if it is consistent with permitted leasehold use and applicable law. Additionally, plans and specifications for construction of any improvements on the leasehold premises must be reviewed and approved by the District prior to commencing construction.

(b) Where water-edge access is part of the leasehold estate, such improvements are encouraged. On the North Shore Channel such encouragement is a matter of Board policy. All such improvements must comply with applicable law and the plans and specifications for construction thereof must be reviewed and approved by the District prior to commencement of construction.

28. The statutory maximum for commercial leases is 99 years. The Policy Manual is in the process of revision. The Board recently adopted Orders changing its policy to routinely consider commercial lease requests of up to sixty (60) years' duration. The lease term generally is requested by the lease applicant and a term of less than ten years will not usually be considered. By law, the District may negotiate leases with governmental entities for public or public recreational purposes or institutions of higher learning for recreational or physical education activities. However, the term of such leases may not exceed fifty (50) years and each lese so negotiated must contain a one-year notice of termination provision if the leased land is required for the District's corporate purposes.

29. "Channel Maintenance" means the land is held in reserve to facilitate present and future channel and bank maintenance activities at that location, such as accessing the waterway, storage of machinery and equipment used in channel maintenance and improvement, offloading and removing debris taken from the channel, or using the land as a site for a channel improvement or other corporate purpose. Land designated for a "Channel Maintenance" would be considered for recreational use if statutory leasing procedures are followed.

I believe that the responses to the questionnaire provided herein, and the responses provided to the previous questionnaire, appropriately and fully provide answers to questions posed to me in October and are adequate to perform judgements as to the District's performance.

The effort to provide these responses has required commitment of significant resources within the District and we request that all information provided, if used in your report, be placed in the proper context.

Sincerely yours,

Hugh H. McMillan
General Superintendent

HHM/mc
Attachments

C: Board of Commissioners w/o att.
Department Heads
Mr. Cook
Ms. Crowe
Mr. Dencek
Mrs. Peters

G. Summary of NPDES Permits in Survey

NPDES PERMIT COMPARISONS

State		IL	IL	IL	MI			CA
Authority		MWRDGC	MWRDGC	MWRDGC	Detroit			Orange County
Facility		Stickney	Calumet	Northside	DWWTP			Plants 1 & 2
Capacity	mgd	1200	354	333	1200			295
Outfall		San & Ship Canal	Cal Sag Ch	NS Channel	DET + Rouge R.			Pacific Ocean
NPDES #		IL0028053	IL0028061	IL0028088	MI0022802			CA0110604
Permit expires		10/1/92	6/1/93	6/1/93	10/1/02	>930 mgd	<930 mgd	6/8/03
LIMIT	**PERIOD**				Outfall 49F	Outfalll 49A	Outfall 49B	
TSS	mon avg	12	28	20		100	30	72
	wkly avg	25	56	40			45	109
	daily max							
	yr avg							60
BOD5	mon avg							
	wkly avg							150
	daily max							
	90 day avg							100
CBOD5	mon avg	10	24	12		100	25	
	wkly avg	20	48	24			40	
Diss. Oxygen	daily min	6		4.0 in river				
	daily avg							
	wkly avg							
	mon avg							
Fecal Coliform	mon avg				200			ambient limit
	wkly avg				400			ambient limit
	daily max							
E. coli	mon avg							
	daily max							

NPDES PERMIT COMPARISONS

State		IL	IL	IL	MI			CA
Authority		MWRDGC	MWRDGC	MWRDGC	Detroit			Orange County
Facility		Stickney	Calumet	Northside	DWWTP			Plants 1 & 2
Capacity	mgd	1200	354	333	1200			295
Outfall		San & Ship Canal	Cal Sag Ch	NS Channel	DET + Rouge R.			Pacific Ocean
NPDES #		IL0028053	IL0028061	IL0028088	MI0022802			CA0110604
Permit expires		10/1/92	6/1/93	6/1/93	10/1/02	>930 mgd	<930 mgd	6/8/03
LIMIT	**PERIOD**				Outfall 49F	Outfalll 49A	Outfall 49B	
Ammonia N	mon avg	S 2.5 W 4	13	S 2.5 W 4				
	wkly avg							
	daily max							
Cadmium	mon avg				5 ug/l			
	wkly avg							
	daily max							
Chlorine, residual	instant							
	daily max				0.11 mg/l			
	wkly avg							
	mon avg							
Chromium	mon avg		1	1				
	wkly avg							
	daily max		1.4	1.3				
Chromium, Hex.	mon							
	daily max							
Copper	mon avg		0.5	0.5				
	wkly avg							
	1 day avg							
	daily max		1	1	180 ug/l			

NPDES PERMIT COMPARISONS

State		IL	IL	IL	MI			CA
Authority		MWRDGC	MWRDGC	MWRDGC	Detroit			Orange County
Facility		Stickney	Calumet	Northside	DWWTP			Plants 1 & 2
Capacity	mgd	1200	354	333	1200			295
Outfall		San & Ship Canal	Cal Sag Ch	NS Channel	DET + Rouge R.			Pacific Ocean
NPDES #		IL0028053	IL0028061	IL0028088	MI0022802			CA0110604
Permit expires		10/1/92	6/1/93	6/1/93	10/1/02	>930 mgd	<930 mgd	6/8/03
LIMIT	**PERIOD**				Outfall 49F	Outfalll 49A	Outfall 49B	
Cyanide	mon avg	0.1						
	wkly avg							
	1 day avg							
	daily max	0.12	0.11	0.1				
Cyanide, Free	mon avg							
	daily max							
Mercury	1 day avg							
	wkly avg							
	mon avg				0.0002			
Phenols	daily max			0.3				
Phenolics	mon avg							
	daily max		0.3					
Phosphorus	mon avg					2.5	1	
	wkly avg							
Phosphorus, diss.	mon avg							
WET - Acute					quarterly			monthly
WET - Chronic								monthly

NPDES PERMIT COMPARISONS

State		MN			MN	WI	WI	
Authority		Metro Council Env Ser			WLSSD	Green Bay	Madison	
Facility		Metro WWT Facility			Duluth WTF			
Capacity	mgd	251			44	49	50	
Outfall		Mississippi R.			L. Superior	Fox River to Green Bay	Badfish Creek	Badger Mill Creek
NPDES #		MN0029815			MN0049786	WI0020991	WI0024597	
Permit expires		12/31/03			6/30/01	6/30/99	3/31/04	
LIMIT	**PERIOD**		river >5000 cfs	river <5000 cfs				
TSS	mon avg	30			30	30	20	May-Oct 10 Nov-Apr 16
	wkly avg	45			45	45	23	
	daily max							
	yr avg							
BOD5	mon avg						19	
	wkly avg						20	May-Oct 7 Nov-Apr 16
	daily max							
	90 day avg							
CBOD5	mon avg	24		Jun 14 Jul-Sep 10	25	25		
	wkly avg	40	Jul-Sep 15	Jun 21 Jul-Sep 15	40	40		
Diss. Oxygen	daily min	7*					5	5
	daily avg							
	wkly avg	7*						
	mon avg							
Fecal Coliform	mon avg	200			200	400 May-Sep	400 4/15-10/15	400 4/15-10/15
	wkly avg							
	daily max							
E. coli	mon avg							
	daily max							

NPDES PERMIT COMPARISONS

State		MN			MN	WI	WI	
Authority		Metro Council Env Ser			WLSSD	Green Bay	Madison	
Facility		Metro WWT Facility			Duluth WTF			
Capacity	mgd	251			44	49	50	
Outfall		Mississippi R.			L. Superior	Fox River to Green Bay	Badfish Creek	Badger Mill Creek
NPDES #		MN0029815			MN0049786	WI0020991	WI0024597	
Permit expires		12/31/03			6/30/01	6/30/99	3/31/04	
LIMIT	**PERIOD**		river >5000 cfs	river <5000 cfs				
Ammonia N	mon avg		May 13 Jun 8 Jul-Sep 5 Oct 9 Nov 21	May 13 Jun 8 Jul-Sep 5 Oct 9 Nov 21			Jun-Oct 2.7 Nov-May 5.0	
	wkly avg		May 13 Jun 12 Jul-Sep 7.5 Oct 13.5 Nov 31.5	May 13 Jun 12 Jul-Sep 7.5 Oct 9 Nov 21		Nov-Apr 16 May-Jun 8 Jul-Aug 3 Sep-Oct 5	Jun-Oct 3.2 Nov-May 6.0	May 2 Jun-Oct 1.5 Nov-Apr 5.2
	daily max							
Cadmium	mon avg							
	wkly avg							
	daily max							
Chlorine, residual	instant							
	daily max				0.1	37 ug/l		
	wkly avg							
	mon avg	0.026						
Chromium	mon avg							
	wkly avg							
	daily max							
Chromium, Hex.	mon							
	daily max							
Copper	mon avg							
	wkly avg							
	1 day avg							
	daily max							

NPDES PERMIT COMPARISONS

State		MN			MN	WI	WI	
Authority		Metro Council Env Ser			WLSSD	Green Bay	Madison	
Facility		Metro WWT Facility			Duluth WTF			
Capacity	mgd	251			44	49	50	
Outfall		Mississippi R.			L. Superior	Fox River to Green Bay	Badfish Creek	Badger Mill Creek
NPDES #		MN0029815			MN0049786	WI0020991	WI0024597	
Permit expires		12/31/03			6/30/01	6/30/99	3/31/04	
LIMIT	**PERIOD**		river >5000 cfs	river <5000 cfs				
Cyanide	mon avg							
	wkly avg							
	1 day avg							
	daily max							
Cyanide, Free	mon avg							
	daily max							
Mercury	1 day avg	.038 ug/l			.059 ug/l			
	wkly avg							
	mon avg	0.017ug/l			.033 ug/l			
Phenols	daily max							
Phenolics	mon avg							
	daily max							
Phosphorus	mon avg	4			1	1	1.5	1.5
	wkly avg							
Phosphorus, diss.	mon avg							
WET - Acute						yes	yes	yes
WET - Chronic		quarterly			3 in 5 yrs	yes	yes	yes

NPDES PERMIT COMPARISONS

State		WI		OR	NM				DC
Authority		Milwaukee		Portland	Albuquerque				WASA
Facility		South Shore	Jones Island						Blue Plains
Capacity	mgd	184	208	100	76				
Outfall		L. Michigan	L. Michigan	Columbia R	Rio Grande				Potomac R Anacostia R Piney R
NPDES #		WI0036820		OR0026905	NM0022250	"Seasonal 4Q3 Flows"			DC0021199
Permit expires		3/31/02		10/31/02	5/31/98	July-Oct	Nov-Jun		7/1/99
LIMIT	**PERIOD**				flow >162.5	flow 16 mgd	flow 162.5	low flow	
TSS	mon avg	30	30	30	30	30	30	30	7
	wkly avg	45	45	45	45	45	45	45	10.5
	daily max								
	yr avg								
BOD5	mon avg	30	30	30				Jul-Oct 8 Nov-Jun 10	
	wkly avg	45	45	45				Jul-Oct 12 Nov-Jun 15	
	daily max								
	90 day avg								
CBOD5	mon avg				25	10	25		5
	wkly avg				40	15	40		7.5
Diss. Oxygen	daily min								4
	daily avg								5
	wkly avg								
	mon avg				2	4	2	4	
Fecal Coliform	mon avg	400	400		100	100	100	100	200
	wkly avg								400
	daily max				200	200	200	200	
E. coli	mon avg			126					
	daily max			406					

NPDES PERMIT COMPARISONS

State		WI		OR	NM				DC
Authority		Milwaukee		Portland	Albuquerque				WASA
Facility		South Shore	Jones Island						Blue Plains
Capacity	mgd	184	208	100	76				
Outfall		L. Michigan	L. Michigan	Columbia R	Rio Grande				Potomac R Anacostia R Piney R
NPDES #		WI0036820		OR0026905	NM0022250	"Seasonal 4Q3 Flows"			DC0021199
Permit expires		3/31/02		10/31/02	5/31/98	July-Oct	Nov-Jun		7/1/99
LIMIT	**PERIOD**				flow >162.5	flow 16 mgd	flow 162.5	low flow	
Ammonia N	mon avg				2	1		1	1 S2 6.5
	wkly avg	as f(pH) Jun 16.7 13.1 Jul 11.3-6.8 Aug 11.1-6.7 Sep 12.7-10			4	2		2	1.5 S2 9.8
	daily max								
Cadmium	mon avg								
	wkly avg								
	daily max								
Chlorine, residual	instant			1	0.011	0.011	0.011	0.011	
	daily max	37 ug/l	37 ug/l						
	wkly avg		35 ug/l						
	mon avg								
Chromium	mon avg								
	wkly avg								
	daily max								
Chromium, Hex.	mon								
	daily max								
Copper	mon avg								
	wkly avg								
	1 day avg								
	daily max								

NPDES PERMIT COMPARISONS

State		WI		OR	NM				DC
Authority		Milwaukee		Portland	Albuquerque				WASA
Facility		South Shore	Jones Island						Blue Plains
Capacity	mgd	184	208	100	76				
Outfall		L. Michigan	L. Michigan	Columbia R	Rio Grande				Potomac R Anacostia R Piney R
NPDES #		WI0036820		OR0026905	NM0022250	"Seasonal 4Q3 Flows"			DC0021199
Permit expires		3/31/02		10/31/02	5/31/98	July-Oct	Nov-Jun		7/1/99
LIMIT	**PERIOD**				flow >162.5	flow 16 mgd	flow 162.5	low flow	
Cyanide	mon avg								
	wkly avg								
	1 day avg								
	daily max								
Cyanide, Free	mon avg								
	daily max								
Mercury	1 day avg								
	wkly avg								
	mon avg								
Phenols	daily max								
Phenolics	mon avg								
	daily max								
Phosphorus	mon avg	1	1						0.18
	wkly avg								0.27
Phosphorus, diss.	mon avg								
WET - Acute		yes	yes	yes					
WET - Chronic		yes	yes	yes	yes	yes	yes	yes	yes

NPDES PERMIT COMPARISONS

State		OH			OH			IN	
Authority		Cincinnati			Cleveland			Indianapolis	
Facility		Mill Creek	Little Miami	Muddy Cr	Southerly	Easterly	Westerly	Southport	Belmont
Capacity	mgd	170	55	15	175	155	35	125	120
Outfall		Ohio River	Ohio River	Ohio River	Cuyahoga R.	Lake Erie	Lake Erie	White River	White River
NPDES #		OH0025461	OH0025453	OH0025470	OH0024651	OH0024643	OH0024660	IN0031950	IN0023183
Permit expires		10/1/97	10/31/02	10/31/02	4/1/98	10/31/98	10/1/98	8/31/90	8/31/90
LIMIT	**PERIOD**								
TSS	mon avg	30	30	23	16	20	20	S 10 W 30	S 10 W 20
	wkly avg	45	45	34	24	30	30	S 15 W 45	S 15 W 30
	daily max								
	yr avg								
BOD5	mon avg							S 10 W 30	S 10 W 20
	wkly avg							S 15 W 45	S 15 W 30
	daily max								
	90 day avg								
CBOD5	mon avg	25	25	16	sum 10 win 16	15	15		
	wkly avg	40	40	24	sum 15 win 24	22.5	20		
Diss. Oxygen	daily min		5		5			S 8 W 2 4	S 8 W 6
	daily avg								
	wkly avg								
	mon avg								
Fecal Coliform	mon avg	200 Summer 1000 Winter	200 Summer 1000 Winter	200 Summer 1000 Winter	1000 Summer	1000 Summer	1000 Summer	200	summer 200
	wkly avg	400 Summer 2000 Winter	400 Summer 2000 Winter	400 Summer 2000 Winter	2000 Summer	2000 Summer	2000 Summer	400	summer 400
	daily max								
E. coli	mon avg								
	daily max								

NPDES PERMIT COMPARISONS

State		OH			OH			IN	
Authority		Cincinnati			Cleveland			Indianapolis	
Facility		Mill Creek	Little Miami	Muddy Cr	Southerly	Easterly	Westerly	Southport	Belmont
Capacity	mgd	170	55	15	175	155	35	125	120
Outfall		Ohio River	Ohio River	Ohio River	Cuyahoga R.	Lake Erie	Lake Erie	White River	White River
NPDES #		OH0025461	OH0025453	OH0025470	OH0024651	OH0024643	OH0024660	IN0031950	IN0023183
Permit expires		10/1/97	10/31/02	10/31/02	4/1/98	10/31/98	10/1/98	8/31/90	8/31/90
LIMIT	**PERIOD**								
Ammonia N	mon avg				summer 1.7 Nov,Mar,Apr 5 Dec-Feb 8			4 S2 7	3.4 S2 7.0
	wkly avg				summer 2.6 Nov,Mar,Apr 7.5 Dec-Feb 12			6 S2 10.5	5.1 S2 10.5
	daily max								
Cadmium	mon avg				10 ug/l	13 ug/l	13 ug/l		
	wkly avg								
	daily max				22 ug/l	16 ug/l	16 ug/l	0.02	0.02
Chlorine, residual	instant								
	daily max	0.33	0.038	0.5	0.021	0.038	0.038		
	wkly avg								
	mon avg								
Chromium	mon avg								
	wkly avg								
	daily max							0.25	0.25
Chromium, Hex.	mon								
	daily max	22 ug/l							
Copper	mon avg				33 ug/l			0.04	0.04
	wkly avg								
	1 day avg								
	daily max		31 ug/l		56 ug/l	50 ug/l	50 ug/l	0.1	0.1

NPDES PERMIT COMPARISONS

State		OH			OH			IN	
Authority		Cincinnati			Cleveland			Indianapolis	
Facility		Mill Creek	Little Miami	Muddy Cr	Southerly	Easterly	Westerly	Southport	Belmont
Capacity	mgd	170	55	15	175	155	35	125	120
Outfall		Ohio River	Ohio River	Ohio River	Cuyahoga R.	Lake Erie	Lake Erie	White River	White River
NPDES #		OH0025461	OH0025453	OH0025470	OH0024651	OH0024643	OH0024660	IN0031950	IN0023183
Permit expires		10/1/97	10/31/02	10/31/02	4/1/98	10/31/98	10/1/98	8/31/90	8/31/90
LIMIT	**PERIOD**								
Cyanide	mon avg								
	wkly avg								
	1 day avg								
	daily max							0.027	0.027
Cyanide, Free	mon avg	0.029			0.014				
	daily max	0.033			0.061		0.092		
Mercury	1 day avg	1.6 ug/l			1.1 ug/l		1.1 ug/l	0.0005	0.0005
	wkly avg								
	mon avg	0.2 ug/l			.012 ug/l		.012 ug/l		
Phenols	daily max								
Phenolics	mon avg								
	daily max								
Phosphorus	mon avg				1	1	1		
	wkly avg				1.5	1.5	1.5		
Phosphorus, diss.	mon avg								
WET - Acute		quarterly	monthly, 1yr	annual	quarterly		monthly, 1 yr		
WET - Chronic					quarterly	quarterly	quarterly, 1 yr		

NPDES PERMIT COMPARISONS

State		IN	IN	IN	NY	NY	KY	
Authority		E. Chicago	Gary	Hammond	New York	New York	Louisville	
Facility		Muni STP	WWTP	Muni STP	Newtown Cr	Ward's Island	Morris Forman	W. County
Capacity	mgd	15	60	37.8	310	250	105	19.5
Outfall		Grand Cal R to L. Michigan	Grand Cal & Little Cal R.	Grand Cal R to L. Michigan	East River	East River	Ohio River	Ohio R.
NPDES #		IN0022829	IN0022977	IN0023060	NY0026204	NY0026131	KY0022411	KY0078956
Permit expires		9/30/92	8/31/99	6/30/99	1/1/01	1/1/01	9/30/04	9/30/00
LIMIT	**PERIOD**							
TSS	mon avg	8.5	S 6 W 9.6	S 6.6 W 8.5	35	30	30	30
	wkly avg	12.8	S 9.9 W 14.4	S 9.9 W 12.8	53	45	45	45
	daily max							
	yr avg							
BOD5	mon avg				45	30	30	30
	wkly avg				68	45	45	45
	daily max							
	90 day avg							
CBOD5	mon avg	7.1	S 5 W 8.8	S 5.5 W 7.1				
	wkly avg	10.7	S 7.5 W 13.2	S 8.3 W 10.7				
Diss. Oxygen	daily min	6	S 6 W 5	S 6 W 5			2	2
	daily avg							
	wkly avg							
	mon avg							
Fecal Coliform	mon avg	200	200	200	200	200	S 200 W 1000	200
	wkly avg	400	400	400	400	400	S 400 W 2000	400
	daily max					2400		
E. coli	mon avg		125	125				
	daily max		235	235				

NPDES PERMIT COMPARISONS

State		IN	IN	IN	NY	NY	KY	
Authority		E. Chicago	Gary	Hammond	New York	New York	Louisville	
Facility		Muni STP	WWTP	Muni STP	Newtown Cr	Ward's Island	Morris Forman	W. County
Capacity	mgd	15	60	37.8	310	250	105	19.5
Outfall		Grand Cal R to L. Michigan	Grand Cal & Little Cal R.	Grand Cal R to L. Michigan	East River	East River	Ohio River	Ohio R.
NPDES #		IN0022829	IN0022977	IN0023060	NY0026204	NY0026131	KY0022411	KY0078956
Permit expires		9/30/92	8/31/99	6/30/99	1/1/01	1/1/01	9/30/04	9/30/00
LIMIT	**PERIOD**							
Ammonia N	mon avg	1.5	S 2 W 2.4	S 2.5 W 5				20
	wkly avg	6	S 3 W 3.6	S 3.8 W 7.5				30
	daily max							
Cadmium	mon avg		0.0061	0.0019				
	wkly avg							
	daily max	0.02	0.0143	0.0044				
Chlorine, residual	instant							
	daily max	1	0.04	0.02	2	2	0.019	0.019
	wkly avg							
	mon avg		0.02	0.01				
Chromium	mon avg		0.0125	0.0125				
	wkly avg							
	daily max	0.025	0.025	0.025				
Chromium, Hex.	mon		0.014					
	daily max		0.032					
Copper	mon avg		0.01	0.02				
	wkly avg							
	1 day avg							
	daily max	0.03	0.023	0.04				

NPDES PERMIT COMPARISONS

State		IN	IN	IN	NY	NY	KY	
Authority		E. Chicago	Gary	Hammond	New York	New York	Louisville	
Facility		Muni STP	WWTP	Muni STP	Newtown Cr	Ward's Island	Morris Forman	W. County
Capacity	mgd	15	60	37.8	310	250	105	19.5
Outfall		Grand Cal R to L. Michigan	Grand Cal & Little Cal R.	Grand Cal R to L. Michigan	East River	East River	Ohio River	Ohio R.
NPDES #		IN0022829	IN0022977	IN0023060	NY0026204	NY0026131	KY0022411	KY0078956
Permit expires		9/30/92	8/31/99	6/30/99	1/1/01	1/1/01	9/30/04	9/30/00
LIMIT	**PERIOD**							
Cyanide	mon avg		0.008	0.004				
	wkly avg							
	1 day avg							
	daily max	0.05	0.019	0.009				
Cyanide, Free	mon avg							
	daily max							
Mercury	1 day avg	0.0005	0.0005	0.0005				
	wkly avg							
	mon avg		0.0006	0.00001				
Phenols	daily max							
Phenolics	mon avg		0.051	0.046				
	daily max	0.01	0.118	0.107				
Phosphorus	mon avg	0.1	0.3	0.3				
	wkly avg		0.4	0.4 daily				
Phosphorus, diss.	mon avg							
WET - Acute		yes	yes	quarterly			yes	yes
WET - Chronic		yes	yes	quarterly				

NPDES PERMIT COMPARISONS

State		CA	CA	CA	CA	PA	PA	PA
Authority		Palo Alto	City of LA	LA County	LA County	Philadelphia	Philadelphia	Philadelphia
Facility		Reg WQCP	Hyperion	Carson	San Jose Cr	Northeast	Southwest	Southeast
Capacity	mgd	39 MGD	420 MGD	385 MGD	100 MGD	210	200	112
Outfall		SF Bay	San. Mon. Bay	Pacific Ocean		Delaware R.	Delaware R.	Delaware R.
NPDES #		CA0037834	CA0109991	CA0053813	CA0053911	PA0026689	PA0026671	PA0026662
Permit expires		6/17/03	3/10/99	5/10/02	5/10/00	9/27/98	9/27/98	9/27/98
LIMIT	**PERIOD**							
TSS	mon avg	10	60	90	15	30	30	30
	wkly avg		80	135	40	45	45	45
	daily max	20	120		45			
	yr avg							
BOD5	mon avg	10	30, 175	120	20	30	30	30
	wkly avg		45, 215	180	30	45	45	45
	daily max	20	275		45			
	90 day avg							
CBOD5	mon avg							200
	wkly avg							
Diss. Oxygen	daily min							
	daily avg							
	wkly avg							
	mon avg							
Fecal Coliform	mon avg				200	200	200	200
	wkly avg							
	daily max							
E. coli	mon avg							
	daily max							

NPDES PERMIT COMPARISONS

State		CA	CA	CA	CA	PA	PA	PA
Authority		Palo Alto	City of LA	LA County	LA County	Philadelphia	Philadelphia	Philadelphia
Facility		Reg WQCP	Hyperion	Carson	San Jose Cr	Northeast	Southwest	Southeast
Capacity	mgd	39 MGD	420 MGD	385 MGD	100 MGD	210	200	112
Outfall		SF Bay	San. Mon. Bay	Pacific Ocean		Delaware R.	Delaware R.	Delaware R.
NPDES #		CA0037834	CA0109991	CA0053813	CA0053911	PA0026689	PA0026671	PA0026662
Permit expires		6/17/03	3/10/99	5/10/02	5/10/00	9/27/98	9/27/98	9/27/98
LIMIT	**PERIOD**							
Ammonia N	mon avg	3	8.4					
	wkly avg							
	daily max	8	33.6					
Cadmium	mon avg		14 ug/l	167 ug/l	5 ug/l			
	wkly avg			668 ug/l				
	daily max		56 ug/l	1670 ug/l				
Chlorine, residual	instant	0	0.84					
	daily max			10020 ug/l				
	wkly avg			1336 ug/l				
	mon avg			334 ug/l				
Chromium	mon avg		28 ug/l	334 ug/l				
	wkly avg			1336 ug/l				
	daily max		112 ug/l	3430 ug/l				
Chromium, Hex.	mon				50 ug/l			
	daily max							
Copper	mon avg		16 ug/l	169 ug/l				
	wkly avg			676 ug/l				
	1 day avg	12 ug/l	142 ug/l					
	daily max			1690 ug/l				

NPDES PERMIT COMPARISONS

State		CA	CA	CA	CA	PA	PA	PA
Authority		Palo Alto	City of LA	LA County	LA County	Philadelphia	Philadelphia	Philadelphia
Facility		Reg WQCP	Hyperion	Carson	San Jose Cr	Northeast	Southwest	Southeast
Capacity	mgd	39 MGD	420 MGD	385 MGD	100 MGD	210	200	112
Outfall		SF Bay	San. Mon. Bay	Pacific Ocean		Delaware R.	Delaware R.	Delaware R.
NPDES #		CA0037834	CA0109991	CA0053813	CA0053911	PA0026689	PA0026671	PA0026662
Permit expires		6/17/03	3/10/99	5/10/02	5/10/00	9/27/98	9/27/98	9/27/98
LIMIT	**PERIOD**							
Cyanide	mon avg		14 ug/l	167 ug/l	5.2 ug/l			
	wkly avg			668 ug/l				
	1 day avg	5 ug/l						
	daily max		56 ug/l	1670 ug/l				
Cyanide, Free	mon avg							
	daily max							
Mercury	1 day avg	2.1 ug/l	2.2 ug/l	66 ug/l				
	wkly avg			26.4 ug/l				
	mon avg	0.025 ug/l	0.5 ug/l	6.6 ug/l	2 ug/l			
Phenols	daily max							
Phenolics	mon avg							
	daily max							
Phosphorus	mon avg							
	wkly avg							
Phosphorus, diss.	mon avg							
WET - Acute		monthly	monthly	monthly	yes			
WET - Chronic		variable	monthly	monthly	yes	yes	yes	yes

Friends of the Chicago River

407 S. Dearborn
Suite 1580
Chicago, IL 60605
312.939.0490
312.939.0931 Fax

Openlands Project

25 E. Washington St.
Suite 1650
Chicago, IL 60602
312.427.4256
312.427.6251 Fax

The Civic Federation

243 S. Wabash
Suite 850
Chicago, IL 60604
312.341.9603
312.341.9609 Fax