RECEIVED
APR 28 1995
STATE OF ILLINOIS
POLLUTION CONTROL BOARD

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

In the Matter of:	)	
	)	
Petition of the Metropolitan Water	)	R- 95-14
Reclamation District of Greater	)	(Site-Specific Rule-
Chicago for Site-Specific Water	)	making) 35 Ill. Adm.
Quality Regulation:	)	Code 302, 303, 304

NOTICE OF FILING

TO:

Mr. Bruce Carlson
Division of Legal Counsel
Illinois Environmental
Protection Agency
2200 Churchill Road
Springfield, IL 62794

Mr. William Denham
Department of Energy and
Natural Resources
325 West Adams Street
Springfield, IL 62704

Mr. William Seith
Illinois Attorney General Office
100 West Randolph Street
Chicago, IL 60601

PLEASE TAKE NOTICE that I have today filed with the Office of the Clerk of the Pollution Control Board the APPEARANCE of Michael Rosenberg, Attorney, of the Metropolitan Water Reclamation District of Greater Chicago, a copy of which is herewith served upon you.

michael Rosenberg
Signature

April 28, 1995
Michael Rosenberg
Attorney
Metropolitan Water Reclamation
District of Greater Chicago
100 East Erie Street
Chicago, Illinois 60611
(312)751-6565

[THIS FILING IS SUBMITTED ON RECYCLED PAPER]

PROOF OF SERVICE

I, the undersigned, on oath state that I have served the Notice and Appearance of Michael Rosenberg, Attorney for the METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO by first class mail upon the following persons:

Mr. Bruce Carlson
Illinois Environmental
Protection Agency
2200 Churchill Road
Springfield, IL 62794-9276

Mr. William Denham
Department of Energy and
Natural Resources
325 West Adams Street
Springfield, IL 62704

Mr. William Seith
Illinois Attorney General Office
100 West Randolph Street
Chicago, IL 60601

Signature

Bernard Sawyer
Metropolitan Water Reclamation
District of Greater Chicago
100 East Erie Street
Chicago, Illinois 60611
(312)751-6565

Subscribed and sworn before me this

28th day of April, 1995.

Notary Public

OFFICIAL SEAL
ROSALIE BOTTARI
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES:04/10/98

[THIS FILING IS SUBMITTED ON RECYCLED PAPER]

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APR 28 1995
STATE OF ILLINOIS
POLLUTION CONTROL BOARD

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In the Matter of:	)	
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Petition of the Metropolitan Water	)	R- 95-14
Reclamation District of Greater	)	(Site-Specific Rule-
Chicago for Site-Specific Water	)	making) 35 Ill. Adm.
Quality Regulation:	)	Code 302, 303, 304

APPEARANCE

I hereby, file my appearance in this proceeding, on behalf of the Metropolitan Water Reclamation District of Greater Chicago.

michael Rosenberg
Signature

Michael Rosenberg
Attorney
Metropolitan Water Reclamation
District of Greater Chicago
100 East Erie Street
Chicago, Illinois 60611
(312)751-6565

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RECEIVED
APR 28 1995
STATE OF ILLINOIS
POLLUTION CONTROL BOARD

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

In the Matter of:	)	
	)	
Petition of the Metropolitan Water Reclamation District of Greater Chicago for Site-Specific Water Quality Regulation:	)	R- 95-14 (Site-Specific Rule-making) 35 Ill. Adm. Code 302, 303, 304

NOTICE OF FILING

TO:

Mr. Bruce Carlson
Division of Legal Counsel
Illinois Environmental
Protection Agency
2200 Churchill Road
Springfield, IL 62794

Mr. William Denham
Department of Energy and
Natural Resources
325 West Adams Street
Springfield, IL 62704

Mr. William Seith
Illinois Attorney General Office
100 West Randolph Street
Chicago, IL 60601

PLEASE TAKE NOTICE that I have today filed with the Office of the Clerk of the Pollution Control Board the PETITION FOR SITE-SPECIFIC RULEMAKING of the Metropolitan Water Reclamation District of Greater Chicago, a copy of which is herewith served upon you.

michael Rosenberg
Signature

April 28, 1995
Michael Rosenberg
Attorney
Metropolitan Water Reclamation
District of Greater Chicago
100 East Erie Street
Chicago, Illinois 60611
(312)751-6565

[THIS FILING IS SUBMITTED ON RECYCLED PAPER]

PROOF OF SERVICE

I, the undersigned, on oath state that I have served the Notice and Petition of the METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO for SITE-SPECIFIC RULEMAKING from 35 Ill. Adm. Code 302, 303, 304 by first class mail on Friday April 28, 1995, at Lyons, IL, Post Office upon the following persons

Mr. Bruce Carlson
Illinois Environmental
Protection Agency
2200 Churchill Road
Springfield, IL 62794-9276

Mr. William Denham
Department of Energy and
Natural Resources
325 West Adams Street
Springfield, IL 62704

Mr. William Seith
Illinois Attorney General Office
100 West Randolph Street
Chicago, IL 60601

Signature

Bernard Sawyer
Metropolitan Water Reclamation
District of Greater Chicago
100 East Erie Street
Chicago, Illinois 60611
(312)751-6565

Subscribed and sworn before me this

29th day of April, 1995.

Notary Public

OFFICIAL SEAL
ROSALIE BOTTARI
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES:04/10/98

[THIS FILING IS SUBMITTED ON RECYCLED PAPER]

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APR 28 1995
STATE OF ILLINOIS
POLLUTION CONTROL BOARD

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

In the Matter of:	)	
	)	
Petition of the Metropolitan Water Reclamation District of Greater Chicago for Site-Specific Water Quality Regulation:	)	R-95-14 (Site-Specific Rule-making) 35 Ill. Adm. Code 302, 303, 304

NOTICE OF FILING

TO:

Mr. Bruce Carlson
Division of Legal Counsel
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, IL 62794

Mr. William Denham
Department of Energy and Natural Resources
325 West Adams Street
Springfield, IL 62704

Mr. William Seith
Illinois Attorney General Office
100 West Randolph Street
Chicago, IL 60601

PLEASE TAKE NOTICE that I have today filed with the Office of the Clerk of the Pollution Control Board a Motion to Waive the 200 Signature Petition Requirement, a copy of which is herewith served upon you.

Michael Rosenberg
Signature

April 28, 1995
Michael Rosenberg
Attorney
Metropolitan Water Reclamation District of Greater Chicago
100 East Erie Street
Chicago, Illinois 60611
(312)751-6565

[THIS FILING IS SUBMITTED ON RECYCLED PAPER]

PROOF OF SERVICE

I, the undersigned, on oath state that I have served a Motion to Waive the 200 Signature Petition Requirement by first class mail upon the following persons:

Mr. Bruce Carlson
Illinois Environmental
Protection Agency
2200 Churchill Road
Springfield, IL 62794-9276

Mr. William Denham
Department of Energy and
Natural Resources
325 West Adams Street
Springfield, IL 62704

Mr. William Seith
Illinois Attorney General Office
100 West Randolph Street
Chicago, IL 60601

Signature

Bernard Sawyer
Metropolitan Water Reclamation
District of Greater Chicago
100 East Erie Street
Chicago, Illinois 60611
(312)751-6565

Subscribed and sworn before me this

28th day of April, 1995.

Notary Public

OFFICIAL SEAL
ROSALIE BOTTARI
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES:04/10/98

[THIS FILING IS SUBMITTED ON RECYCLED PAPER]

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STATE OF ILLINOIS
POLLUTION CONTROL BOARD

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

In the Matter of:	)	
	)	
Petition of the Metropolitan Water	)	R- 95-14
Reclamation District of Greater	)	(Site-Specific Rule-
Chicago for Site-Specific Water	)	making) 35 Ill. Adm.
Quality Regulation:	)	Code 302, 303, 304

MOTION TO WAIVE THE 200 SIGNATURE PETITION REQUIREMENT

As provided under 35 Ill. Adm. Code 102.103, the District hereby requests a waiver of the 200 signature petition requirement for filing a rulemaking [Sections 102.121(h) and 102.160(a)] based upon the fact that the District is a public agency, and the issues raised in this filing involve the possible expenditure of millions of dollars of taxpayer funds, and are of obvious public importance.

Michael Rosenberg
Signature

Michael Rosenberg
Attorney
Metropolitan Water Reclamation
District of Greater Chicago
100 East Erie Street
Chicago, IL 60611

[THIS FILING IS SUBMITTED ON RECYCLED PAPER]

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Petition of the Metropolitan Water	)	R- 95-14
Reclamation District of Greater	)	(Site-Specific Rule-
Chicago for Site-Specific Water	)	making) 35 Ill. Adm.
Quality Regulation:	)	Code 302, 303, 304

PETITION FOR SITE-SPECIFIC RULEMAKING

The Metropolitan Water Reclamation District of Greater Chicago (District), through its attorney, hereby files one original and nine copies of this signed petition for site-specific rulemaking in accordance with 35 Ill. Adm. Code 102.140.

Respectfully submitted,

By: Michael Rosenberg

Michael Rosenberg
Attorney
Metropolitan Water Reclamation
District of Greater Chicago
100 East Erie
Chicago, Illinois 60611
(312)751-6565

[THIS FILING IS SUBMITTED ON RECYCLED PAPER]

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STATE OF ILLINOIS
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BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

In the Matter of:	)	
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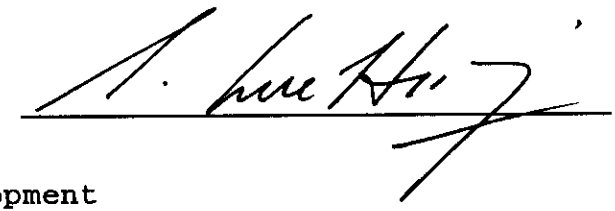
Petition of the Metropolitan Water	)	R-95-14
Reclamation District of Greater	)	(Site-Specific Rule-
Chicago for Site-Specific Water	)	making) 35 Ill. Adm.
Quality Regulation:	)	Code 302, 303, 304

AFFIDAVIT
PETITION FOR SITE-SPECIFIC RULEMAKING

I hereby verify, in accordance with 35 Ill. Adm. Code 102.140, that to the best of my knowledge all facts asserted in the attached PETITION FOR SITE-SPECIFIC RULEMAKING are true and correct.

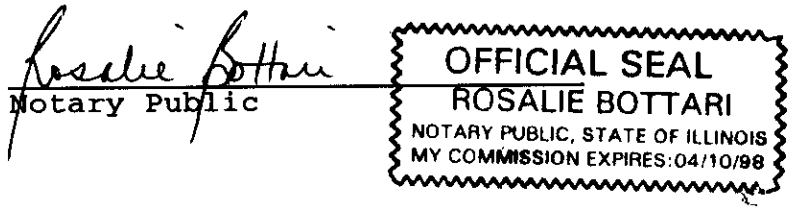
By:



Cecil Lue-Hing, D.Sc., P.E.
Director, Research and Development
Metropolitan Water Reclamation
District of Greater Chicago
100 East Erie
Chicago, Illinois 60611
(312)751-5190

Notary Seal

SUBSCRIBED AND SWORN TO BEFORE ME this 28th day of April 1995



Notary Public

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Petition of the Metropolitan Water Reclamation District of Greater Chicago for Site-Specific Water Quality Regulation:	)	R-95-14 (Site-Specific Rule-making) 35 Ill. Adm. Code 302, 303, 304

Metropolitan Water Reclamation
District of Greater Chicago
100 East Erie Street
Chicago, Illinois 60611
(312)751-6565

[THIS FILING IS SUBMITTED ON RECYCLED PAPER]

PETITION OF THE METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO (DISTRICT) FOR SITE-SPECIFIC RULEMAKING 35 ILL. ADM. CODE SUBTITLE C, SECTIONS 302, 303, 304 (GENERAL USE CHRONIC WATER QUALITY STANDARD FOR CYANIDE)

Introduction

In this petition before the Board, the District asks the Board to grant a site-specific regulation. The District asks the Board, through the adoption of the site-specific regulation, to do the following:

1. Revise the existing numerical General Use chronic water quality standard for weak acid dissociable (WAD) cyanide from 5.2 µg/l to 10.0 µg/l for:
   a. West Branch of the DuPage River
   b. Higgins Creek
   c. Salt Creek
   d. Des Plaines River (within Cook County)

The existing General Use chronic water quality standard for WAD cyanide is 5.2 µg/l. This standard was adopted as a result of the Board's Hearings in R88-21. The Board's existing General Use chronic water quality standard for cyanide uses the laboratory analytical test method for WAD Cyanide (Storet Number 00718) to determine compliance.

Background

DESCRIPTION OF THE DISTRICT

The District is located within the boundaries of Cook County Illinois and serves an area of 872 square miles. The

area served by the District includes the city of Chicago and 124 suburban communities with a combined population of 5.1 million people. In addition, a waste load equivalent to 4.9 million people is contributed by industrial sources. The District, on a daily basis, treats on the average, 1500 million gallons per day of wastewater. This wastewater flow is treated at the District's seven water reclamation plants (WRPs).

DISTRICT WRPs ON GENERAL USE STREAMS

Three of the District's seven WRPs discharge to General Use streams. These WRPs, the streams to which they discharge, and their average daily flows, are as follows:

WRP	1994 Average Daily Flow	Receiving Stream
Hanover Park	8.87 MGD	West Branch DuPage River
John E. Egan	24.5 MGD	Salt Creek
James C. Kirie	31.8 MGD	Higgins Creek

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY PERMITS

In 1993, the Illinois Environmental Protection Agency (Agency) issued renewed National Pollutant Discharge Elimination (NPDES) permits for the Hanover Park and James C. Kirie WRPs which for the first time included numerical effluent limits based upon the General Use Chronic Water Quality Criteria for Cyanide adopted by the Board in R88-21.

The Agency placed the following limits in the NPDES permits for the Hanover Park and James C. Kirie WRPs:

WRP	NPDES Permit Number	Monthly Average Effluent WAD Cyanide (µg/l)
Hanover Park	IL0036137	5.2 µg/l
James C. Kirie	IL0047741	5.0 µg/l

The numerical effluent limits were set equal to the Board's General Use chronic water quality standard for WAD cyanide since the West Branch of the DuPage River and Higgins Creek have a 7-day, 10-year low flow of zero. The District in these NPDES permits is required to measure the WAD cyanide concentration in the effluents from these WRPs to determine compliance. This is in keeping with the Board's existing General Use chronic water quality standard for WAD cyanide.

Because the District had never before measured the WAD cyanide concentration in the effluent from the James C. Kirie and Hanover Park WRPs, a 12-month delay in the imposition of the effluent limits for cyanide in the new NPDES permits was requested. The Agency granted the District's request and the effective date for the new WAD cyanide limits in these NPDES permits was changed to April 1, 1995. Thus, these new limits are now in effect.

DISTRICT STUDIES

During the past 20 months, the District has been conducting routine monitoring of the WAD cyanide level in the effluents from the James C. Kirie and Hanover Park WRPs.

In addition, the District has conducted studies on the following topic areas:

1. Inputs of WAD cyanide from industrial sources to the James C. Kirie and Hanover Park WRPs.
2. Effect of wastewater treatment on WAD cyanide levels.
3. Accuracy and precision of the laboratory analytical method for WAD cyanide.
4. Chlorine interference in the WAD cyanide analysis.

The District has also investigated the following:

1. Basis for the existing General Use chronic water quality standard for WAD cyanide.
2. Basis for using the WAD cyanide analytical protocol for determining compliance with the General Use chronic water quality standard for WAD cyanide.

In the above mentioned studies and investigations, the District has used the services of two experts. These are:

1. Dr. Richard Luthy
   Professor and Head
   Department of Civil and
   Environmental Engineering
   Carnegie Mellon University
   Pittsburgh, PA

2. Dr. Herbert E. Allen
   Professor
   Department of Civil
      Engineering
   University of Delaware
   Newark, Delaware

Dr. Luthy is a nationally recognized expert on cyanide chemistry and analytical measurements, and is currently the Chairman of the Standard Methods Joint Task Group on Cyanide. He has published many papers on these topics. His complete resume is contained in Attachment 1.

Dr. Herbert Allen is a nationally recognized expert on speciation chemistry, including chemical analysis. He has extensively studied the fate of pollutants in receiving streams and treatment plants and the effect of pollutants on aquatic life. He is currently the Principal Investigator on the following two United States Environmental Protection Agency (USEPA) sponsored research projects.

1. Speciation of Metals in Effluents and Receiving Waters.
2. Speciation, Bioavailability, and Fate of Contaminants in the Aquatic Environment.

A complete resume for Dr. Allen is contained in Attachment 2.

Summary of Site-Specific Relief Sought

The District asks that the Board revise the existing General Use chronic water quality standard for WAD cyanide from 5.2 µg/l to 10.0 µg/l for the following streams:

1. West Branch DuPage River

2. Higgins Creek

3. Salt Creek

4. Des Plaines River (in Cook County)

The District has found that the existing numerical chronic water quality standard of 5.2 µg/l WAD cyanide assumes that the receiving stream is capable of supporting a large population of the cold water fish species of rainbow trout. These streams in fact do not support such populations. Using USEPA approved procedures, and the fact that rainbow trout are not indigenous to the waterways in question, a General Use chronic water quality standard for cyanide of 10.0 µg/l WAD cyanide is justified.

The toxic form of cyanide to aquatic species is free cyanide ($HCN + CN^-$). The USEPA acknowledges this fact in their National Water Quality Criteria. However, the existing Board General Use chronic water quality standard for cyanide requires that compliance be based upon WAD cyanide. In fact the WAD cyanide analytical determination measures other cyanide species besides free cyanide. As such this test does not represent a true measurement of the cyanide form intended to be regulated, which is toxic to aquatic species, and is therefore a conservative methodology which overestimates free cyanide content and cyanide toxicity.

Informational Requirements from 35 Ill. Adm. Code 102.141

REGULATIONS FOR WHICH A SITE-SPECIFIC RULEMAKING IS SOUGHT

The regulation for which a site-specific rulemaking is sought is the General Use chronic water quality standard for WAD cyanide. The specific language requested for the site-specific rulemaking is as follows:

1. At 35 Ill. Adm. Code, Subtitle C, Subpart B, Section 302.208 add a new paragraph (f) which reads:

   f) The chronic standard (CS) for cyanide (STORET number 00718) listed in Section 302.208(d) shall not apply to Salt Creek, Higgins Creek, the West Branch of the DuPage River, and the Des Plaines River in Cook County, Illinois.

2. At 35 Ill. Adm. Code, Subtitle C, Subpart C add a new Section 303.444 which reads:

   Section 303.444 Salt Creek, Higgins Creek, West Branch of the DuPage River, Des Plaines River

   The General Use chronic water quality standard for cyanide (STORET number 00718) contained in Section 302.208 shall not apply to Salt Creek, Higgins Creek, the West Branch of the DuPage River, and the Des Plaines River in Cook County, Illinois. Instead, these waters shall

comply with a chronic cyanide standard of 10 µg/l.

3. At 35 Ill. Adm. Code, Subtitle C, Subpart B, Section 304.201 add a new paragraph (d) which reads:

d) John E. Egan, Hanover Park, and James C. Kirie Water Reclamation Plants

The discharges of the John E. Egan, Hanover Park, and James C. Kirie Water Reclamation Plants must meet a monthly average WAD cyanide effluent standard of 10 µg/l, subject to the averaging rule of Section 304.104(a).

DESCRIPTION OF PETITIONER'S ACTIVITY

General Description of the District. The District is located within the boundaries of Cook County, Illinois, and serves an area of 872 square miles. The area served includes the city of Chicago and 124 communities with a population of 5.1 million people. In addition, a waste load equivalent of 4.9 million people is contributed by industrial sources, making the total population served by the District equivalent to 10.0 million people. Obviously, such a population concentration and the attendant industrial and commercial enterprises require a complex and extensive wastewater collection and treatment system. In the case of the District, this system is comprised of seven water reclamation plants and over 500 miles of intercepting sewers. The District, since its

inception 105 years ago, has been at the forefront of using up-to-date processes and facilities for wastewater treatment and sludge management.

District Water Reclamation Plants (WRPs). The District's WRPs are designed to remove the soluble and insoluble organic matter in wastewater in an efficient and cost-effective manner. The final discharge from these WRPs meets or exceeds the effluent standards of the Board. The series of wastewater treatment operations that are employed to accomplish the purification process are generally classified as pretreatment, primary treatment, secondary treatment and advanced waste treatment.

The District operates seven WRPs that range in design capacity from the 3.4 MGD (Lemont WRP), to the 1200 MGD (Stickney WRP). A listing of the daily capacity for each of the seven WRPs is as follows:

1. Lemont WRP, located in Lemont, Illinois, has a design capacity of 3.4 MGD.
2. James C. Kirie WRP, located in Des Plaines, Illinois, has a design capacity of 72 MGD.
3. John E. Egan WRP, located in Schaumburg, Illinois, has a design capacity of 30 MGD.
4. North Side WRP, located in Skokie, Illinois, has a design capacity of 333 MGD.
5. Calumet WRP, located in Chicago, Illinois, has a design capacity of 354 MGD.

6. Stickney WRP, located in Stickney, Illinois, has a design capacity of 1200 MGD.

7. Hanover Park WRP, located in Hanover Park, Illinois, has a design capacity of 12 MGD.

Generally, initial treatment at these WRPs consists of coarse and fine screens and grit chambers followed by primary settling tanks. All seven WRPs next employ the activated sludge process for secondary treatment. Tertiary treatment is employed at the John E. Egan and James C. Kirie WRPs using dual media filters, while the Hanover Park WRP employs single media filters. The final effluents from the Hanover Park, John E. Egan, and James C. Kirie WRPs are first chlorinated and then dechlorinated before discharge to the receiving stream. Chlorination and dechlorination is only performed between April 1 and October 30 of each year.

With respect to this Petition, three District WRPs should be directly impacted. They are the John E. Egan, James C. Kirie, and Hanover Park WRPs, all of which discharge to General Use waters of the state of Illinois. The John E. Egan WRP discharges to Salt Creek, the James C. Kirie WRP discharges to Higgins Creek, and the Hanover Park WRP discharges to the West Branch of the DuPage River. All of these waterways eventually flow into the Des Plaines River.

Attachment 3 presents 1994 monthly averages of final effluent quality from each WRP. As can be seen from the final

effluent data, all three WRPs produce tertiary quality effluent, low in BOD_5, suspended solids, and ammonia.

Attachment 4 presents detailed data on WAD cyanide concentrations in the raw sewage and final effluent from the Hanover Park and James C. Kirie WRPs. WAD cyanide is the parameter of concern in this Petition. In August 1993 the District received draft NPDES permit renewals for the Hanover Park and James C. Kirie WRPs. These permits contained effluent limits for WAD cyanide. The previous permits had contained effluent limits for total cyanide. WAD cyanide had been substituted for total cyanide in the new permits based upon the Board's R88-21 rulemaking which revised the General Use water quality standards for cyanide. The proposed WAD cyanide effluent limit for the Hanover Park WRP was a monthly average of 5.2 µg/l and a daily maximum of 22 µg/l. The proposed effluent limit for the James C. Kirie WRP was a monthly average of 5.0 µg/l and a daily maximum of 22 µg/l. These effluent limits were set equal to the General Use water quality standard for WAD cyanide, as no dilution is available in the receiving stream.

As there had been no previous standards for WAD cyanide, the District had never analyzed the final effluents from its WRPs for WAD cyanide. Therefore, no database was available on WAD cyanide levels in WRP effluents. Thus, in September 1993 the District began to analyze the raw sewage and final effluent from the Hanover Park and James C. Kirie WRPs for

WAD cyanide. It quickly became apparent that final effluent WAD cyanide concentrations at both WRPs measured well below 22 µg/l on a daily basis, but were often equal to or greater than 5 µg/l, making compliance with the proposed monthly average NPDES permit limits problematic. As so little information was available on the sources and fate of WAD cyanide in the wastewater treatment process, discussions were held with the Illinois Environmental Protection Agency (Agency) relative to the NPDES permit limits for WAD cyanide. The Agency stated that the WAD cyanide effluent limits were water quality driven based upon the General Use standards for cyanide, and could not be changed without Board action. The Agency did agree, however, to add a Special Condition to the NPDES permits for both WRPs which changed the effective date for complying with the WAD cyanide standard from April 1, 1994 to April 1, 1995. This was done to allow the District adequate time to assess the occurrence, fate, treatability, and distribution of WAD cyanide throughout the Hanover Park and James C. Kirie WRP systems.

From September 1993 to the present, the District has been studying the WAD cyanide issue relative to the Hanover Park and James C. Kirie WRPs. These studies have involved the wastewater treatment processes at the WRPs, laboratory research work, industrial waste monitoring, and literature searches.

These studies revealed an unexpected result which can be seen from the WAD cyanide data presented in Table 1. During the months of November through April, when the chlorination/dechlorination system is not in use, the final effluent WAD cyanide concentrations measured at the Hanover Park WRP averaged 1.0 µg/l each month. The raw sewage wad cyanide concentrations also averaged 1.0 µg/l. For the months of May through October when the chlorination/dechlorination system is operational, the monthly average final effluent WAD cyanide concentrations increased to the 4.0-6.0 µg/l level even though the raw sewage WAD cyanide concentrations remained at either an 1.0 or 2.0 µg/l level. These monthly average values were thus equal to or exceeding the proposed NPDES permit limit for WAD cyanide of 5.2 µg/l at the Hanover Park WRP.

A similar, though not as pronounced, pattern occurred at the James C. Kirie WRP (Table 2) where November through April effluent WAD cyanide concentrations averaged either 1.0 or 2.0 µg/l versus May through October monthly averages of 3.0 and 4.0 µg/l.

In the summer of 1994 when the correlation between chlorination/dechlorination and effluent WAD cyanide concentrations was becoming evident, a more comprehensive sampling program was begun at both WRPs to study the fate of WAD cyanide through the wastewater treatment process. This involved collecting special samples for one month of raw sewage, primary effluent, secondary effluent, chlorine contact tank

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 1

MONTHLY AVERAGE OF RAW SEWAGE AND FINAL EFFLUENT WAD CYANIDE AT THE HANOVER PARK WRP

Month	Raw Sewage WAD Cyanide (µg/l)	Final Effluent WAD Cyanide (µg/l)
December 1993	1.0	1.0
January 1994	1.0	1.0
February	1.0	1.0
March	1.0	1.0
April	1.0	1.0
May	1.0	4.0
June	2.0	5.0
July	2.0	6.0
August	1.0	5.0
September	1.0	5.0
October	1.0	5.0
November	1.0	1.0
December	1.0	1.0

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 2

MONTHLY AVERAGES OF RAW SEWAGE AND FINAL EFFLUENT WAD CYANIDE AT THE JAMES C. KIRIE WRP

Month	Raw Sewage WAD Cyanide (µg/l)	Final Effluent WAD Cyanide (µg/l)
December 1993	1.0	1.0
January 1994	2.0	2.0
February	3.0	2.0
march	4.0	2.0
April	2.0	2.0
May	1.0	3.0
June	2.0	4.0
July	5.0	4.0
August	14.0	4.0
September	2.0	3.0
October	1.0	2.0
November	2.0	1.0
December	1.0	1.0

effluent, and dechlorinated effluent, and analyzing them for WAD cyanide. The results are presented in Attachment 5 and verify that chlorination is causing an increase in WAD cyanide as measured by the WAD cyanide analytical methodology.

As will be discussed in more detail in later sections of this Petition, the District pursued many avenues of study in 1994 relative to the issue of WAD cyanide. These included laboratory studies of cyanide and chlorine chemistry, studies of WAD cyanide analytical methodology, studies concerning chlorine interference in the WAD cyanide analysis, special industrial waste sampling programs, literature reviews, and the engaging of private consultants with expertise in the cyanide chemistry and toxicity fields.

Among the conclusions of these various studies was the agreement that chlorination/dechlorination was causing an interference which resulted in an increase in WAD cyanide concentrations as measured by accepted laboratory analytical procedures. What could not be definitely determined was the mechanism which would account for this increase.

It was also concluded that the current General Use chronic water quality standard for WAD cyanide of 5.2 µg/l for the waterways receiving the effluents from the John E. Egan, Hanover Park, and James C. Kirie WRPs could not be justified based upon guidelines set forth by the USEPA for determining such standards (Guidelines for Deriving National

Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses, NTIS, PB 85-227049, 1985).

EFFORTS NEEDED TO COMPLY WITH EXISTING BOARD REGULATIONS, COMPLIANCE ALTERNATIVES AND COSTS

As documented above, the District has reason to believe that the Hanover Park and James C. Kirie WRPs will not be able to consistently achieve a monthly average effluent WAD cyanide concentration of 5.2 and 5.0 µg/l, respectively, as specified in their NPDES permits. These Permit limits are based on the General Use chronic water quality standard for WAD cyanide. In addition, a study of the wastewater treatment processes at these WRPs has shown that chlorination/dechlorination interferes with the analytical methodology and causes an increase in WAD cyanide as measured by the accepted analytical procedures.

In order to reduce effluent WAD cyanide concentrations to levels which will meet the current standards, three potential options were identified.

1. Add an additional treatment process to the WRP to remove WAD cyanide from the effluent.
2. Reduce the raw sewage loading of WAD cyanide to each WRP by amending the District's Industrial Waste Ordinance relative to cyanide discharges.
3. Replace the existing chlorination/dechlorination system with a different disinfection process such as ozonation or ultraviolet light.

With respect to Alternative No. 1 above, a review of the technical literature indicated that no technologically feasible treatment processes exist for removing WAD cyanide from municipal wastewater at the low µg/l levels, which enter these WRPs.

In respect to Alternative No. 2 the District has in place a rigorous program to control discharges from industry including those that contain cyanide.

For over 15 years the District has had a program to continuously monitor discharges from industries in the North Service Area including the drainage basins of the John E. Egan, James C. Kirie, and Hanover Park WRPs. This program includes all industries subject to Federal Categorical Pretreatment Standards under the Electroplating Point Source Category (40 CFR 413) and the Metal Finishing Point Source Category (40 CFR 433), not just those which discharge cyanide. In this program automatic samplers are dedicated to continuously monitor discharges from industries, 24 hours per day, seven days per week. These dedicated samplers have a small computer which can be programmed to take samples at varying time intervals over the entire sampling period to ensure that the industry being monitored cannot circumvent the ability of the District to detect discharges which occur at any time during the day. The District has found that the use of dedicated continuous monitoring at an industry results

in strict adherence to the District's and federal pretreatment regulations.

Table 3 contains a listing of the industries where dedicated continuous monitoring is taking place in the District's North area. As can be seen, dedicated continuous monitoring is now being performed at 69 industries compared with 43 prior to 1993. This requires the District to maintain 83 dedicated automatic samplers in continuous operation, since some industries have multiple discharge points.

The District's dedicated continuous monitoring program has identified two industrial dischargers of cyanide in the Hanover Park WRP service area and six industrial dischargers of cyanide in the James C. Kirie WRP service area.

Although monitoring data existed on total cyanide concentrations in the discharges from these companies, no data existed on WAD cyanide concentrations, as this parameter is not currently regulated by the District's Sewage and Waste Control Ordinance. Therefore, the District instituted a special sampling program at these companies to measure the WAD cyanide concentrations and wastewater flows from each company. This WAD cyanide data is presented in Attachment 6.

The highest WAD cyanide concentration measured in the industrial discharges to the Hanover Park WRP tributary sewers was 4.0 µg/l with most values at the 1.0 µg/l level. Taking dilution from the domestic wastewater into account,

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TABLE 3

INDUSTRIAL WASTE DIVISION
DEDICATED SAMPLING PROGRAMS
REGULATED CATEGORICAL INDUSTRIES

Facility	Study Begun	Duration	Pollutants Analyzed*
A. B. Dick Co.	05/16/94	Indef.	CN, TM
A P I Industries	09/10/84	Indef.	TM, CN
Altec Specialty	05/14/92	Indef.	TM, CN
Amber Plating Co.	08/04/89	Indef.	CN, TM
Amitron	07/11/91	Indef.	TM, CN
Arlington Plating	07/23/83	Indef.	TM, CN
Bartlett Mfg.	10/31/88	Indef.	TM, CN
Berteau-Lowell Ptg.	10/24/90	Indef.	CN, TM
Bilbo Plating Co.	01/25/93	Indef.	CN, TM
Castle Metal Fin.	01/01/94	Indef.	TM, CN
Century Plating Co.	09/25/92	Indef.	CN, TM
Chem-Plate Ind.	05/19/93	Indef.	TM, CN
Chicago Faucet	01/01/94	Indef.	TM, CN
Chicago Magnet Wire	06/26/90	Indef.	TM, CN
Chicago Nameplate	03/31/88	Indef.	TM
Cinch Connectors	10/31/88	Indef.	TM, CN
Circuit Etching Tech.	04/12/91	Indef.	TM, CN
Circuit Systems	07/06/87	Indef.	TM
Circuit Systems #2	02/29/88	Indef.	TM, CN
Craftsman Plating	10/01/92	Indef.	CN, TM
Crescent Plating	11/02/92	Indef.	CN, TM
Davies Plating	07/16/90	Indef.	CN, TM
Dover Ind. Chrome	09/25/92	Indef.	CN, TM
Eagle Electronics	05/01/85	Indef.	TM, CN
Electro-Circuits	03/25/92	Indef.	TM, CN
Elec. Interconnect	12/16/94	Indef.	TM
Elk Grove Plating	12/05/88	Indef.	TM, CN
Enamlrs & Japann	10/01/92	Indef.	CN, TM
Gem Coat, Inc.	10/23/92	Indef.	CN, TM
Graham Plating Co.	08/18/89	Indef.	CN, TM
Gutmann Leather Co.	10/05/92	Indef.	TM
Hanover Park WRP	11/08/93	Indef.	TM, CN
Haydock Caster	05/16/94	Indef.	CN, TM
Horween Leather Co.	10/95/92	Indef.	TM
J.P. Custom Metal	01/22/93	Indef.	CN, TM
Jensen Plt. (Waban)	01/22/93	Indef.	CN, TM
Jensen Plt. (West)	01/22/93	Indef.	CN, TM

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TABLE 3 (Continued)

INDUSTRIAL WASTE DIVISION
DEDICATED SAMPLING PROGRAMS
REGULATED CATEGORICAL INDUSTRIES

Facility	Study Begun	Duration	Pollutants Analyzed
KVF	11/08/88	Indef.	TM
Lake City Pltg.	01/12/93	Indef.	CN, TM
Littelfuse	05/16/94	Indef.	TM, CN
Methode	10/12/92	Indef.	TM
Midwest Printed	07/25/89	Indef.	TM, CN
Motorola	10/14/92	Indef.	TM, CN
National Technology	01/03/89	Indef.	TM, CN
National Technology	11/05/93	Indef.	TM, CN
Northrop	10/13/92	Indef.	TM
Ohmite Mfg. Co.	05/16/94	Indef.	CN, TM
P&H Plating	05/01/91	Indef.	CN, TM
Petersen Finishing	01/01/94	Indef.	TM, CN
Pioneer Plating	09/30/92	Indef.	CN, TM
Plating Service	05/16/94	Indef.	CN, TM
Precision Pltg.	12/04/92	Indef.	CN, TM
Precision Plating	11/07/88	Indef.	TM, CN
Precision Sci.	05/16/94	Indef.	CN, TM
Q M A, Inc.	07/13/93	Indef.	TM, CN
Redeen Engraving	09/21/92	Indef.	TM, CN
Regency Metal Fin.	05/16/90	Indef.	TM, CN
Scott Plating	05/16/94	Indef.	CN, TM
Senior Flexonics	11/29/88	Indef.	TM, CN
Star Electronics	02/13/90	Indef.	TM, CN
Sterling Labs	03/07/94	Indef.	CN, TM
Sun-Tronics	07/10/89	Indef.	TM, CN
Three J's Industries	06/17/91	Indef.	TM, CN
United Metal Fin.	01/22/93	Indef.	CN, TM
Universal Scientific	07/08/86	Indef.	TM, CN
V.P. Anodizing	06/04/93	Indef.	CN, TM
V.P. Plating/Par	06/04/93	Indef.	CN, TM
Western Chain Co.	05/16/94	Indef.	CN, TM
Western Rustproof	09/30/92	Indef.	CN, TM

*CN - Total cyanide, TM - Trace metals

the industrial contribution of WAD cyanide to the Hanover Park WRP is insignificant.

For the six companies discharging to the James C. Kirie WRP, typical WAD cyanide concentrations are in the 0.2 to 0.4 mg/l range, with the highest observed value being 0.76 mg/l. However, taking flow dilution into account, the industrial contribution of WAD cyanide at the James C. Kirie WRP would only contribute 1.0 to 2.0 µg/l of WAD cyanide to the raw sewage.

Of these eight dischargers, only five use cyanide in their industrial processes. Four of these dischargers are electroplaters or metal finishers and are subject to categorical pretreatment standards. For the Electroplating Point Source Category the daily maximum discharge limit is 1.9 mg/l for total cyanide. For the Metal Finishing Point Source Category the daily maximum limit is 1.0 mg/l for total cyanide. The fifth discharger is not subject to categorical pretreatment standards, but must meet the local limit of 5.0 mg/L for total cyanide. All four categorically regulated dischargers are continuously monitored for total cyanide by the Industrial Waste Division, which represents the maximum enforcement effort possible. The District is continuing its surveillance of all other industrial dischargers to ensure that any new cyanide discharger would be identified and controlled.

In addition, the District, through its USEPA approved Pretreatment Program, has imposed more vigorous self-monitoring requirements on the above eight companies to sample and analyze their waste discharges for WAD cyanide. A self-reporting sampling program was conducted by outside laboratories, at industry expense, to document WAD cyanide concentrations in their discharges. The results of this program were consistent with those obtained by the District, and added nothing of substance to the data base.

Thus increased industrial waste enforcement activities would not be a solution to the WAD cyanide problem at these two WRPs as maximum effort is currently being expended to control such discharges by the District's Industrial Waste Division.

With respect to Alternative No. 3, technically feasible disinfection alternatives do exist as substitutes for chlorination/dechlorination in the wastewater treatment process. Since District data indicates that the chlorination/dechlorination process is causing the increase in effluent WAD cyanide, replacing this process with an alternate technology may reduce effluent WAD cyanide concentrations. However, since the reasons for the increase in WAD cyanide due to chlorination/dechlorination are not known, there is no guarantee that an alternative disinfection process would not also cause similar increases.

The District has developed a cost estimate for replacing the chlorination/dechlorination system at the Hanover Park and James C. Kirie WRPs (Attachment 7). This cost estimate indicates that ozonation would be the least costly alternative if the existing chlorination/dechlorination systems had to be replaced. For the Hanover Park WRP an ozone disinfection system is estimated to have a total construction cost of $1,294,228 and an annual operating cost of $35,400. The total annualized construction plus operating cost is $186,604. For the James C. Kirie WRP an ozone disinfection system is estimated to have a total construction cost of $4,405,500 and an annual operating cost of $128,800. The total annualized capital plus operating cost is $643,493.

Thus, the total cost to the District for replacing the chlorination/dechlorination system with an ozonation system would be a construction cost of $5,699,728 and an annual operating cost of $164,200. The total annualized capital plus operating cost for both WRPs would be $830,097. It should be noted that these costs do not include any costs for replacing the existing chlorination/dechlorination system at the John E. Egan WRP. However, it is the District's understanding that when the current NPDES Permit for the John E. Egan WRP expires on September 30, 1995, the new permit will contain a WAD cyanide effluent limit similar to that of the Hanover Park and James C. Kirie WRPs. Therefore, the

District anticipates even greater costs than those listed here for complying with the existing WAD cyanide standard.

Again, however, there is no guarantee that an ozonation system would not produce increases in WAD cyanide as observed for chlorination/dechlorination.

The current NPDES permits for the Hanover Park and James C. Kirie WRPs contain monthly average WAD cyanide limits equal to the existing General Use chronic water quality standard, as no instream dilution factor is available. Since the District anticipates that a similar NPDES Permit limit for WAD cyanide will be imposed at the John E. Egan WRP when its permit is renewed, the John E. Egan WRP and Salt Creek are included in this petition.

EFFORTS TO ACHIEVE PROPOSED STANDARD AND CORRESPONDING COSTS

The District believes that no changes in its existing operations will be required to meet the proposed standard assuming that the NPDES permits for the Hanover Park and James C. Kirie WRPs are modified to reflect the proposed change in the WAD cyanide chronic water quality standard. Likewise, no additional costs are anticipated.

QUANTITATIVE AND QUALITATIVE IMPACT OF ADJUSTED STANDARD ON THE ENVIRONMENT

The District's proposal in this Petition requests a change in the General Use chronic water quality standard for WAD cyanide. As will be demonstrated in a later section of

this Petition, no qualitative impact on the environment would occur if the proposed site-specific regulation is adopted since the waterways in question do not contain rainbow trout. Trout are not indigenous to these waterways and would not populate these waterways, even if the existing cyanide standard is retained. No adverse qualitative effects on the environment are anticipated if the proposed site-specific regulation is adopted.

No quantitative impacts on the environment are expected as a result of adopting the site-specific regulation as no change in District WRP operations would occur. Thus, WRP effluent quality would remain the same even after the site-specific regulation is adopted. As can be seen from Attachment 3 the final effluent from the Hanover Park, James C. Kirie, and John E. Egan WRPs is representative of well operated nitrifying activated sludge treatment plants with tertiary filtration. Applicable NPDES permit limits are consistently met at all three WRPs.

Biomonitoring Tests Performed on Effluents and Receiving Waters From the John E. Egan, Hanover Park, and James C. Kirie WRPs in 1993 and 1994

To further demonstrate the fact that no adverse environmental impacts would occur if the proposed site-specific regulation is adopted, the following biomonitoring information from the three WRPs in question is presented.

In 1988 the District began conducting acute bioassays (toxicity tests) with water fleas (Daphnia pulex) and fathead

minnows (Pimephales promelas) developed by the USEPA for use in the NPDES Permit program. These bioassays were designed to identify WRP effluents and receiving waters containing toxic materials in acutely toxic concentrations. Since 1986 the District has also conducted the Microtox™ analysis to detect aquatic toxicity and the Ames test to detect genotoxicity. In 1993 the District also developed the capability to conduct chronic bioassays with fathead minnows and water fleas (Ceriodaphnia dubia) to detect more subtle, low-level, long-term adverse effects of effluents on aquatic organisms. The trend in aquatic toxicology is to use end-points which are more sensitive than the mortality end-point which is normally used in acute tests. Table 4 shows the dates samples were collected for biomonitoring tests at the District's John E. Egan, Hanover Park, and James C. Kirie WRPs in 1993 and 1994.

In 1993 effluents and receiving waters from the John E. Egan, Hanover Park, and James C. Kirie WRPs were monitored quarterly for acute toxicity to the bacterium Photobacterium phosphoreum (Microtox™ reagent), the fathead minnow Pimephales promelas, and the water flea (either Daphnia pulex or Ceriodaphnia dubia). During the first three quarters of 1993 effluents from these WRPs were screened for genotoxicity with the Ames test. During the first quarter, effluents from these WRPs were also assayed for toxicity to the green alga Selenastrum capricornutum (four-day, static exposure).

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TABLE 4

JOHN E. EGAN, HANOVER PARK, AND JAMES C. KIRIE WATER RECLAMATION PLANT EFFLUENT SAMPLE COLLECTION[1] FOR BIOMONITORING TESTS IN 1993 AND 1994

Date Collected		
John E. Egan WRP	Hanover Park WRP	James C. Kirie WRP
March 1, 1993 (G)	January 25, 1993 (G)	February 1, 1993 (G)
May 17, 1993 (G)	April 12, 1993 (G)	May 3, 1993 (G)
August 16, 1993 (G)	July 19, 1993 (G)	August 2, 1993 (G)
November 8, 1993 (G)	November 22, 1993 (G)	November 15, 1993 (G)
January 31, 1994 (G)	March 13-14, 1994 (C)	December 13, 1993 (G)
April 4, 1994 (G)	March 15-16, 1994 (C)	January 3, 1994 (G)
July 5, 1994 (G)	March 17-18, 1994 (C)	April 4, 1994 (G)
October 17, 1994 (G)	April 10-11, 1994 (C)	July 5, 1994 (G)
	April 12-13, 1994 (C)	October 24, 1994 (G)
	April 14-15, 1994 (C)	
	May 15-16, 1994 (C)	
	May 17-18, 1994 (C)	
	May 19-20, 1994 (C)	
	June 12-13, 1994 (C)	
	June 14-15, 1994 (C)	
	June 16-17, 1994 (C)	
	July 19-20, 1994 (C)	
	July 21-22, 1994 (C)	
	July 24-25, 1994 (C)	
	August 14-15, 1994 (C)	
	August 16-17, 1994 (C)	
	August 18-19, 1994 (C)	
	November 7, 1994 (G)	

[1]G = Grab sample; C = 24-hour composite sample.

Table 5 shows the results of 53 toxicity tests conducted throughout 1993 on 12 WRP effluents. No toxicity was observed in 53 of the 55 tests conducted. LC50 values of 51 percent and 69 percent were observed for the fathead minnow, and the Ceriodaphnia tests, respectively, for the fourth quarter samples collected at the James C. Kirie WRP on November 15, 1993. Additional fourth quarter samples from the James C. Kirie WRP were collected on December 13, 1993. The fathead minnow and the Ceriodaphnia tests were repeated on these additional samples, and no toxic effects were observed.

In 1994 effluents and receiving waters from the John E. Egan, Hanover Park, and James C. Kirie WRPs were monitored quarterly for acute toxicity to the bacterium Photobacterium phosphoreum (Microtox^{TM} reagent), and these effluents were tested for mutagenicity with the Ames assay. From March through August, effluents from the Hanover Park WRP were monitored for chronic toxicity to the water flea Ceriodaphnia dubia and the fathead minnow Pimephales promelas. These chronic bioassays were performed as required by the Hanover Park WRP NPDES permit. The effluent from the James C. Kirie WRP was assayed for acute toxicity to Ceriodaphnia dubia and Pimephales promelas. This was also required by NPDES permit.

Table 6 shows the results of 23 biomonitoring tests conducted throughout 1994 on nine effluents from the John E. Egan, James C. Kirie, and Hanover Park WRPs. The results of chronic bioassays conducted on Hanover Park WRP effluent are

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TABLE 5

BIOMONITORING RESULTS[1] FOR THE JOHN E. EGAN, HANOVER PARK, AND JAMES C. KIRIE WATER RECLAMATION PLANTS DURING 1993

Effluent Tested	Bioassay[2]	Quarter Bioassay Performed			
		First	Second	Third	Fourth
Hanover Park WRP	Minnow	NTE	NTE	NTE	NTE
	D. pulex	NTE	NTE	NTE	NA
	C. dubia	NA	NTE	NTE	NTE
	Algae	NTE	NA	NA	NA
	Microtox™	NTE	NTE	NTE	NTE
	Ames	NME	NME	NME	NA
John E. Egan WRP	Minnow	NTE	NTE	NTE	NTE
	D. pulex	NTE	NTE	NTE	NA
	C. dubia	NA	NTE	NTE	NTE
	Algae	NA	NA	NA	NA
	Microtox™	NTE	NTE	NTE	NTE
	Ames	NME	NME	NME	NA

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TABLE 5 (Continued)

BIOMONITORING RESULTS[1] FOR THE JOHN E. EGAN, HANOVER PARK, AND JAMES C. KIRIE WATER RECLAMATION PLANTS DURING 1993

Effluent Tested	Bioassay[2]	Quarter Bioassay Performed			
		First	Second	Third	Fourth
James C. Kirie WRP	Minnow	NTE	NTE	NTE	LC50 = 51%[3]
	D. pulex	NTE	NTE	NTE	NA
	C. dubia	NA	NTE	NTE	LC50 = 69%[3]
	Algae	NTE	NA	NA	NA
	Microtox™	NTE	NTE	NTE	NTE
	Ames	NME	NME	NME	NA

[1]Results: NTE = No Toxic Effect; NME = No Mutagenic Effect; TE = Toxic Effect (Growth of algae in test sample less than 1% of growth of algae in control); NA = No Analysis; LC50 = Effluent concentration lethal to 50% of the organisms tested within the test period; EC50 15 min = the effective concentration (%) of sample causing a 50% decrease in the Microtox reagent light output after 15 minutes. This measurement is analogous to LC_{50} values obtained in other bioassays; EC10 15 min = the effective concentration (%) of sample causing a 10% decrease in the Microtox reagent light output after 15 minutes. This is interpreted to indicate the toxicity threshold of the analysis.

[2]Bioassay: Minnow = Fathead Minnow Pimephales promelas, 96 h acute toxicity test; D. pulex = Daphnia pulex, 48 h acute toxicity test; C. dubia = Ceriodaphnia dubia 48 h acute toxicity test; Algae = Green Alga Selenastrum capricornutum, 96 h chronic toxicity test; Microtox™ = Luminescent bacterium Photobacterium phosphoreum toxicity assay; Ames = Ames Salmonella mutagenicity assay.

[3]No toxicity was observed when a follow-up WRP effluent sample was collected and tested.

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TABLE 6

BIOMONITORING RESULTS[1] FOR THE JOHN E. EGAN, HANOVER PARK, AND JAMES C. KIRIE WATER RECLAMATION PLANTS DURING 1994

Effluent Tested	Bioassay[2]	Quarter Bioassay Performed			
		First	Second	Third	Fourth
Hanover Park WRP	Minnow (Chronic)	NOEC = 25%[3]	NTE[3,4]	NTE[3,5]	NA
	C. dubia (Chronic)	NTE	NTE[3,4]	NTE[3,5]	NA
	Microtox™	NTE	NTE	NTE	NTE
	Ames	NME	NA	NA	NA
John E. Egan WRP	Microtox™	NTE	NTE	NTE	NTE
	Ames	NME	NA	NA	NA
James C. Kirie WRP	Minnow (Acute)	NTE	NA	NA	NA
	C. dubia (Acute)	NTE	NA	NA	NA
	Microtox™	NTE	NTE	NTE	NTE
	Ames	NME	NA	NA	NA

[1]Results: NTE = No Toxic Effect; NME = No Mutagenic Effect; NA = No Analysis; LC50 = Effluent concentration lethal to 50% of the organisms tested within the test period (acute bioassays); NOEC = no observed effect concentration (chronic bioassays).

[2]Bioassay: Minnow (Acute) = Fathead Minnow, Pimephales promelas, 96 h acute toxicity test; Minnow (Chronic) = Fathead Minnow, Pimephales promelas, Larval Survival and Growth Test; C. dubia (Acute) = Ceriodaphnia dubia 48-h acute toxicity test; C. dubia (Chronic) = Cladoceran (Ceriodaphnia dubia) Survival and Reproduction Test; Microtox™ = Luminescent bacterium Photobacterium phosphoreum toxicity assay; Ames = Ames Salmonella mutagenicity assay.

[3]See Table 6.

[4]Three bioassays. See Table 6.

[5]Two bioassays. See Table 6.

shown in Table 7. No toxic effect was observed in 22 of these 23 tests. A no observed effect concentration (NOEC) of 25 percent was observed for the first chronic fathead minnow bioassay conducted on Hanover Park WRP effluent (collected March 13-18). No toxicity was observed in any of the five subsequent chronic bioassays performed from April through August 1994.

In summary, the District has conducted extensive biomonitoring tests on WRP effluents since 1986 as part of an integrated approach consisting of whole effluent and chemical-specific analyses as a means of protecting aquatic life and human health. These biomonitoring tests give a better picture of the true effect which effluents have on the aquatic community than do chemical-specific data alone. In 1993 and 1994, 76 biomonitoring tests were conducted on effluent and upstream receiving water from the John E. Egan, Hanover Park, and James C. Kirie WRPs. The biomonitoring data is summarized in Tables 5-7. These data indicate that neither acute nor chronic toxicity is associated with the effluents from these three WRPs.

Attachment 8 contains the detailed biomonitoring reports which were summarized above.

Water Quality Upstream and Downstream of the John E. Egan, Hanover Park, and James C. Kirie WRPs

For over 20 years the District has conducted a comprehensive monitoring program of water quality in the

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TABLE 7

RESULTS OF CHRONIC BIOASSAYS CONDUCTED ON HANOVER PARK WRP EFFLUENT IN 1994 EXPRESSED AS NO OBSERVED EFFECT CONCENTRATION VALUES[1]

Effluent Sampling Dates	Fish Bioassay[2]		Water Flea Bioassay[3]	
	Survival	Growth	Survival	Reproduction
March 13-18	25	25	100	100
April 10-15	100	100	100	100
May 15-20	100	100	100	100
June 12-17	100	100	100	100
July 19-25	100	100	100	100
August 14-19	100	100	100	100

[1]No Observed Effect Concentration (NOEC) = the highest effluent concentration having no observable effect on survival, growth, or reproduction.

[2]Fathead Minnow (Pimephales promelas) Larval Survival and Growth Test, (EPA/600/4-89/001, Second Edition, March, 1989).

[3]Cladoceran (Ceriodaphnia dubia) Survival and Reproduction Test (EPA/600/4-89/001, Second Edition, March, 1989).

Chicagoland area. One part of this program involves the collecting of grab samples, once per month, in the receiving waters upstream and downstream of the District WRPs. These water samples are analyzed for 43 water quality parameters.

The outfalls for the Hanover Park, John E. Egan, and James C. Kirie WRPs are located in the West Branch of the DuPage River, in Salt Creek, and in Higgins Creek, respectively. These streams fall within the General Use classification. For the Hanover Park WRP, the upstream station is located at Long Meadow Lane, 100 feet above the outfall, and the downstream station is located at Walnut Lane, a distance of 1,000 feet below. For the John E. Egan WRP, the upstream station is located at Higgins Road, 7,500 feet above the outfall, and the downstream station is located at Arlington Heights Road, a distance of 1,300 feet below. The upstream sampling point for the James C. Kirie WRP is located at the Visitor's Road "A" Bridge, about 1,000 feet upstream of the outfall, while the downstream station is at the Wille Road Bridge, about 300 feet downstream of the outfall.

In order to assess the impact of the WRP effluents on the corresponding receiving stream a statistical analysis of the 1993 and 1994 monitoring data has been performed. This statistical analysis is based upon comparing the annual means of each parameter measured at the respective upstream and downstream locations using a paired t-test. The complete data Tables used for this statistical analysis are presented

in Attachment 9. The results of this analysis using the 1993 data can be summarized as follows:

1. James C. Kirie WRP

   Of the parameters for which the downstream average levels are significantly higher than the upstream average levels, dissolved oxygen, temperature, sulfate, fluoride, zinc, total iron, and manganese, have an Illinois water quality standard. The water quality standard compliance rate of dissolved oxygen was 92 and 100 percent at the downstream and the upstream locations, respectively. The water quality standard compliance for other parameters was 100 percent at both locations.

2. John E. Egan WRP

   Significant differences are observed between the average levels at the upstream and the downstream locations for 13 parameters. Of these, three parameters - total iron, manganese and fluoride - have a pertinent Illinois water quality standard. The water quality standard compliance rate of total iron was 54.6 at the upstream location, and 100 percent at the downstream location. The water quality standard compliance rate of the other two parameters was 100 percent at both the locations.

3. Hanover Park WRP

There are significant differences between the upstream and downstream locations for seven parameters, of these, four parameters have a pertinent Illinois water quality standard. The water quality standard compliance rates for these parameters were very high. The water quality standard compliance rate of dissolved oxygen was 92 percent at both locations, and total iron was 83.3 percent at the upstream and 100 percent at the downstream locations. The water quality standard compliance rate of the other two parameters - fluoride and manganese - was 100 percent at both locations.

The results using the 1994 water quality data can be summarized as follows:

1. James C. Kirie WRP

The average levels of the parameters COD, total iron, and manganese upstream of the WRP are significantly higher than the average levels observed in downstream waters. The average levels of the parameters - temperature, NO_2+NO_3, total phosphorus, soluble phosphorus, alkalinity, sulfate, and fluoride at the downstream location are significantly higher than the corresponding upstream averages. Of these

parameters, temperature, sulfate, total cyanide, and fluoride have pertinent Illinois water quality standards; and these parameters were in total compliance at both the upstream and downstream locations.

2. John E. Egan WRP

The average levels, at the upstream location, of the parameters COD, total suspended solids, volatile suspended solids, turbidity, and total iron are significantly higher than the downstream levels. The downstream average levels of NO_2+NO_3, total phosphorus, soluble phosphorus, total cyanide, and fluoride are significantly higher than the corresponding upstream average levels. Of these parameters, cyanide and fluoride have a pertinent Illinois water quality standard which was in total compliance at both upstream and downstream locations.

3. Hanover Park WRP

The upstream average levels of TOC, chloride, and total iron are higher than the corresponding downstream averages; and the downstream averages of NO_2+NO_3, total phosphorus, soluble phosphorus, and fluoride are higher than the corresponding upstream

averages. Of these parameters, chloride and fluoride have pertinent Illinois water quality standards and these parameters were in total compliance at the upstream and downstream locations.

The above information demonstrates that the existing effluent discharges from the John E. Egan, Hanover Park, and James C. Kirie WRPs are not producing any detrimental water quality effects on the receiving streams.

As WAD cyanide had not previously been a constituent of concern to the District, no historical waterways database exists for it. However, beginning in January 1995 the District has collected special waterways samples upstream and downstream of the Hanover Park and James C. Kirie WRPs for WAD cyanide analysis.

Table 8 presents the January 1995 results. As can be seen, WAD cyanide concentrations in the waterways upstream and downstream of the two WRPs range from 0 to 3.0 µg/l, which is below the existing General Use chronic water quality standard for cyanide of 5.2 µg/l.

If the Board grants the relief sought by the District, no degradation of existing water quality will occur. The District will continue its program to reduce cyanide discharges to the John E. Egan, Hanover Park, and James C. Kirie WRPs through the use of dedicated continuous monitoring and strict self-reporting requirements for industry. In

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 8

WAD CYANIDE CONCENTRATIONS UPSTREAM AND DOWNSTREAM OF THE HANOVER PARK AND JAMES C. KIRIE WRPS

Date	Upstream of Hanover Park WRP	Downstream of Hanover Park WRP	Upstream of James C. Kirie WRP	Downstream of James C. Kirie WRP
	WAD Cyanide (µg/l)			
1/5/95	1.0	1.0	2.0	2.0
1/6/95	NS*	1.0	NS	1.0
1/9/95	1.0	1.0	NS	3.0
1/11/95	1.0	0	NS	1.0
1/17/95	1.0	1.0	2.0	2.0
1/19/95	2.0	2.0	2.0	1.0
1/23/95	3.0	2.0	3.0	2.0
1/25/95	2.0	1.0	2.0	1.0

*No sample.

addition, the District will continue to operate its WRPs to produce maximum removal efficiency for cyanide. Thus, no degradation of existing water quality will result from a change in the WAD cyanide water quality standard from 5.2 to 10 µg/l.

A STATEMENT OF JUSTIFICATION FOR THE PROPOSED SITE-SPECIFIC REGULATION

As presented above, the District believes that it has demonstrated that no adverse environmental impacts will result if the site-specific regulation proposed in this Petition is adopted. In addition, the District has shown that an unreasonable economic burden will be placed upon the taxpayers of Cook County if this Petition is rejected. This is due to the fact that even without the costs for modifying the John E. Egan WRP, $830,097 in annualized capital and operating costs would have to be needlessly expended at the two WRPs in question to install alternative disinfection systems with no assurance that the WRPs would comply with the existing General Use chronic water quality standard for cyanide, and with no anticipated environmental benefits being achieved.

The Illinois Legislature, with the approval of Governor Edgar, adopted into law on February 12, 1995 tax cap legislation which severely limits the operating and capital works budget of the District. For example, in 1995 because of this legislation the District must reduce its planned

budgetary expenditures by 17 million dollars. Overall, for the next five years (1995-1999), the District projects that its planned expenditures must be reduced by 147 million dollars. This makes it even more critical that each and every tax dollar be spent with maximum effectiveness. The unnecessary installation of alternative disinfection systems would not be a proper use of District funds. District taxpayer dollars would be better spent on projects which are environmentally more meaningful.

Therefore, the District maintains that the Board is justified in granting the requested relief.

TECHNICAL JUSTIFICATION FOR PROPOSED REGULATIONS

The District has identified four factors in its proposal which it believes significantly distinguishes it from those relied on by the Board in the R88-21 rulemaking relative to WAD cyanide. These are:

A. The indigenous species used in calculating fish toxicities are not applicable to the waterways named in the District's proposal.

B. Use of WAD cyanide for determining water quality standards is not directly related to toxicity as compared to use of free cyanide.

C. Chlorine interferes with the WAD cyanide test.

D. The regulatory limits are at or below the limit of detection.

Each of these factors is discussed in the following sections.

The Use of Non-Indigenous Species in Calculating Fish Toxicities

In reviewing the record of the Board's R88-21 rulemaking it can be seen that the Board adopted the Agency's recommendations relative to the General Use water quality standards for WAD cyanide. The Agency recommendations were based upon two USEPA documents. These are:

1. Ambient Water Quality Criteria for Cyanide - 1984, EPA-440/5-84-028.
2. Guidelines for Deriving National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses, NTIS, PB85-227049.

Dr. Herbert Allen, a nationally recognized expert on speciation chemistry and the effects of metals on aquatic life was retained by the District to review how the information contained in these two documents was applied in the R88-21 rulemaking, and how this methodology relates to the District's request for an adjusted standard.

Dr. Allen's report is presented, in full, in Attachment 10. The key findings can be summarized as follows. Using the cyanide toxicity data presented in the Ambient Water Quality Criteria for Cyanide - 1984 and the methodology specified in the Guidelines for Deriving National Water Quality Criteria for the Protection of Aquatic Organisms and Their

Uses, the Final Chronic Value for cyanide using the four most sensitive fish species (rainbow trout, brook trout, yellow perch, and bluegill which are the national default species) can be calculated to equal 7.32 µg/l. However, the Guidelines document states that if the species Mean Acute Value of a commercially or recreationally important species is lower than the calculated Final Acute Value, then the Species Mean Acute Value can replace the calculated value in order to provide protection for that one important species. The R88-21 record indicates that the Agency made the decision to use rainbow trout as the most important species, and substituted rainbow trout toxicity data for the calculated Species Mean Acute Value. This Species Mean Acute Value was then used to calculate a new Final Chronic Value for cyanide of 5.2 µg/l. The Agency then recommended the 5.2 µg/l value to the Board, instead of the national default value of 7.32 µg/l contained in the USEPA Guidelines document.

Dr. Allen's report also discusses the fact that the USEPA Guidelines document allows for the calculation of a site-specific toxicity value, if sufficient data exists for the rivers in question. The methodology for determining a site-specific toxicity value is contained in the USEPA document entitled "Guidelines for Deriving Numerical Aquatic Site-Specific Water Quality Criteria" (EPA-600/3-84-099). The methodology allows indigenous fish species to be substituted for the national default four most sensitive species

mentioned previously. Based upon the allowed USEPA methodology, the four most sensitive fish species which may actually exist in the rivers covered by this Petition are brook trout, black crappie, bluegill, and yellow perch. Rainbow trout do not exist in the waters covered by this petition. Using the cyanide toxicity data for these four fish species, the calculated Final Chronic Value for cyanide is 9.799 µg/l. Thus, the existing chronic standard for WAD cyanide of 5.2 µg/l is inappropriate.

It is the position of the District that the use of rainbow trout as the sole species for determining a chronic water quality standard for WAD cyanide in the rivers under question in this Petition is incorrect due to the fact that rainbow trout are not indigenous to Salt Creek, Higgins Creek, the West Branch of the DuPage River, or the Des Plaines River in Cook County.

For the past 20 years, as part of its environmental monitoring programs, the District has conducted fish collections in the rivers of Cook County. A total of 18,308 fish composed of 61 species and seven hybrids have been collected by the Metropolitan Water Reclamation District of Greater Chicago from the Des Plaines River, Salt Creek, and the DuPage River during the period 1974 through 1994 (Table 9). Fishing gear used included boat and backpack electrofishers, 15-foot and 25-foot minnow seines with 3/16-inch square mesh,

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 9

FISH SPECIES AND NUMBER OF FISH COLLECTED BY THE METROPOLITAN WATER RECLAMATION DISTRICT FROM THE DES PLAINES RIVER, SALT CREEK AND THE DU PAGE RIVER FROM 1974 THROUGH 1994

Fish Species Collected		Des Plaines River	Salt Creek	Du Page River	Grand Total
Scientific Name	Common Name				
		Number of Fish			
Amia calva	Bowfin	1	-	-	1
Alosa chrysochloris	Skipjack herring	1	-	-	1
Dorosoma cepedianum	Gizzard shad	210	-	8	218
Umbra limi	Central mudminnow	21	11	-	32
Esox americanus vermiculatus	Grass pickerel	-	-	1	1
Esox lucius	Northern pike	17	-	-	17
Campostoma anomalum	Central stoneroller	279	-	129	408
Carassius auratus	Goldfish	2396	95	15	2,506
Cyprinus carpio	Carp	1216	36	87	1,339
C. carpio x C. auratus	Carp x goldfish hybrid	405	3	3	411
Notropis nubilus	Ozark minnow	1	-	-	1
Nocomis biguttatus	Hornyhead chub	135	-	16	151
Notemigonus crysoleucas	Golden shiner	19	4	1	24
Notropis atherinoides	Emerald shiner	176	-	4	180
Luxilus chrysocephalus	Striped shiner	145	-	4	149
Luxilus cornutus	Common shiner	4	2	8	14
Notropis dorsalis	Bigmouth shiner	70	290	130	490
Cyprinella lutrensis	Red shiner	-	-	5	5
Notropis rubellus	Rosyface shiner	6	-	-	6
Cyprinella spiloptera	Spotfin shiner	699	-	307	1,006
Notropis stramineus	Sand shiner	499	-	74	573
Lythrurus umbratilis	Redfin shiner	5	-	56	61
Notropis volucellus	Mimic shiner	1	-	-	1

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 9 (Continued)

FISH SPECIES AND NUMBER OF FISH COLLECTED BY THE METROPOLITAN WATER RECLAMATION DISTRICT FROM THE DES PLAINES RIVER, SALT CREEK AND THE DU PAGE RIVER FROM 1974 THROUGH 1994

Fish Species Collected		Des Plaines River	Salt Creek	Du Page River	Grand Total
Scientific Name	Common Name				
		----------	Number of Fish	----------	
Phenacobius mirabilis	Suckermouth minnow	4	-	18	22
Pimephales notatus	Bluntnose minnow	4204	81	410	4,695
Pimephales promelas	Fathead minnow	410	80	54	544
Pimephales vigilax	Bullhead minnow	-	-	4	4
Semotilus atromaculatus	Creek chub	219	7	77	303
Carpiodes cyprinus	Quillback	3	-	-	3
Catostomus commersoni	White sucker	157	18	19	194
Erimyzon oblongus	Creek chubsucker	1	-	-	1
Hypentelium nigricans	Northern hogsucker	-	-	3	3
Moxostoma duquesnei	Black redhorse	-	-	1	1
Moxostoma erythrurum	Golden redhorse	4	-	-	4
Moxostoma macrolepidotum	Shorthead redhorse	6	-	-	6
Ameiurus melas	Black bullhead	214	38	11	263
Ameiurus natalis	Yellow bullhead	32	5	X*	37
Ictalurus punctatus	Channel catfish	9	-	-	9
Noturus flavus	Stonecat	1	-	5	6
Noturus gyrinus	Tadpole madtom	23	-	2	25
Fundulus notatus	Blackstripe topminnow	150	-	3	153
Gambusia affinis	Western mosquitofish	152	-	X	152
Culaea inconstans	Brook stickleback	1	-	-	1
Morone mississippiensis	Yellow bass	13	-	-	13
Ambloplites rupestris	Rock bass	32	-	3	35
Lepomis cyanellus	Green sunfish	1876	46	407	2329
Lepomis gibbosus	Pumpkinseed	76	7	37	120

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 9 (Continued)

FISH SPECIES AND NUMBER OF FISH COLLECTED BY THE METROPOLITAN WATER RECLAMATION DISTRICT FROM THE DES PLAINES RIVER, SALT CREEK AND THE DU PAGE RIVER FROM 1974 THROUGH 1994

Fish Species Collected		Des Plaines River	Salt Creek	Du Page River	Grand Total
Scientific Name	Common Name				
		Number of Fish			
Lepomis gulosus	Warmouth	2	-	-	2
Lepomis humilis	Orangespotted sunfish	32	-	9	41
Lepomis macrochirus	Bluegill	918	57	93	1068
Lepomis megalotis	Longear sunfish	47	-	2	49
Micropterus dolomieu	Smallmouth bass	26	-	7	33
Micropterus salmoides	Largemouth bass	108	52	8	168
Pomoxis annularis	White crappie	8	17	-	25
Pomoxis nigromaculatus	Black crappie	106	14	2	122
Lepomis cyanellus x Lepomis megalotis	Green sunfish x longear sunfish hybrid	-	-	1	1
Lepomis cyanellus x Lepomis humilis	Green sunfish x orange-spotted sunfish hybrid	-	-	X	X
Lepomis cyanellus x Lepomis gibbosus	Green sunfish x pumpkinseed hybrid	3	-	15	18
Lepomis cyanellus x Lepomis macrochirus	Green sunfish x bluegill hybrid	4	2	1	7
Lepomis gibbosus x Lepomis humilis	Pumpkinseed x orange-spotted sunfish hybrid	-	-	X	X
Lepomis gibbosus x Lepomis macrochirus	Pumpkinseed x bluegill hybrid	1	-	X	1
Etheostoma flabellare	Fantail darter	24	-	-	24
Etheostoma nigrum	Johnny darter	154	-	11	165
Etheostoma spectabile	Orangethroat darter	8	-	-	8
Etheostoma zonale	Banded darter	1	-	-	1

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 9 (Continued)

FISH SPECIES AND NUMBER OF FISH COLLECTED BY THE METROPOLITAN WATER RECLAMATION DISTRICT FROM THE DES PLAINES RIVER, SALT CREEK AND THE DU PAGE RIVER FROM 1974 THROUGH 1994

Fish Species Collected		Des Plaines River	Salt Creek	Du Page River	Grand Total
Scientific Name	Common Name				
			Number of Fish		
Perca flavescens	Yellow perch	1	-	-	1
Percina maculata	Blackside darter	23	-	-	23
Aplodinotus grunniens	Freshwater drum	2	-	-	2
Cottus bairdi	Mottled sculpin	31	-	-	31
	Total number of fish	15,392	865	2,051	18,308
	Total number of species	57	18	39	61
	Total number of hybrids	4	2	7	7

*Species present, but count of fish not completed.

and an electric seine. The data in Table 9 can be summarized as follows:

1. Des Plaines River: 15,392 fish composed of 57 species and 4 hybrids were collected from the Des Plaines River and its tributaries in Lake, Cook, DuPage, and Will Counties during 1976, 1977, 1978, 1979, 1992, and 1993.
2. Salt Creek: 865 fish composed of 18 species and two hybrids were collected from Salt Creek and its tributaries in Eastern DuPage County and north and central Cook County during 1974, 1975, and 1976.
3. DuPage River: 2,051 fish composed of 39 species and seven hybrids were collected from the DuPage River, including the east and west branches, and tributaries contained in DuPage County and northwestern Will County during 1976 and 1994.

Neither rainbow trout, nor any other species of trout, were ever present in any of these collections.

The Des Plaines River, Salt Creek, and the DuPage River are sluggish low gradient warmwater streams. Warmwater streams have more severe fluctuations of water temperature, chemical conditions, water volume, current velocity, and bottom contours than do coldwater trout streams. Warmwater streams are generally more turbid and deeper than coldwater

trout streams. The difference between warmwater streams and coldwater streams are summarized in Table 10.

Coldwater streams are suitable for trout while warmwater streams are not. Trout require coldwater streams containing riffles with good water and oxygen flow through the gravel on the stream bottom for embryo survival. Temperature influences fish by controlling reproductive cycles, feeding and metabolic rates, swimming performance, growth rates, and distribution. Temperatures below or above the general range of 10°C to 20°C have unfavorable consequences on the development and growth of trout.

The Des Plaines River, Salt Creek, and the DuPage River have summer temperatures exceeding 20°C and contain only warmwater fish species. The silty deposition of sluggish low gradient streams also prevents good water and oxygen flow for trout embryo survival. No species of trout was ever found in any of the collections from the Des Plaines River, Salt Creek, or the DuPage River. The habitat in these streams and their tributaries is not suitable for trout to successfully maintain sustainable populations.

This same general position has recently been affirmed by the Agency as evidenced by the Agency's recent testimony before the Board in the R94-1 rulemaking. In the Agency testimony (excerpts presented in Attachment 11) the Agency clearly states that it is improper to use cold water species toxicity data in calculating General Use water quality standards for

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 10

GENERALIZED CHARACTERISTICS OF WARMWATER STREAMS CONTRASTED WITH COLDWATER STREAMS[a]

Characteristic	Stream Category	
	Coldwater	Warmwater
Geology	Youthful	More mature
Valley shape	V	U
Temperature	Cold (<20°C)	Cool-warm (>20°C)
Discharge	Low	Medium-high
Velocity	Moderate (high turbulence)	Moderate to high (low turbulence)
Depth	Shallow	Medium to moderate
Width	1-6 m	> 3 m
Substratum	Rubble-gravel	Rubble-sand-mud
Gradient	High	Low
Elevation	High	Low
Turbidity	Clear	clear-turbid
Pools (riffles)	Short (many riffles)	Long (few riffles)
Temporal variability	High	Low
Aquatic flora	Periphyton	Macrophytes
Shade and cover	Extensive	Sparse
Organic material	Coarse particulate organic matter	Fine particulate organic matter

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 10 (Continued)

GENERALIZED CHARACTERISTICS OF WARMWATER STREAMS CONTRASTED WITH COLDWATER STREAMS[a]

Characteristic	Stream Category	
	Coldwater	Warmwater
Distance from source	< 8 km	> 16 km
Stream Order	Low (< 3)	Higher (> 3)
Competition	Intraspecific	Interspecific
Predatory fish	Few	Many
Fish community	Trout	Sunfish Catfish Suckers
Fish diversity	Low	High

[a]Reference: Winger, Parley V., "Physical and Chemical Characteristics of Warmwater Streams: A Review," In Krumholz, L. A., Editor, The Warmwater Streams Symposium, Southern Division, American Fisheries Society, Allen Press, Lawrence, Kansas, pp. 32-44, 1981.

ammonia nitrogen. The Agency also states that cold water species are not resident in Illinois waters except for Lake Michigan.

The District believes that the above information clearly demonstrates that the existing General Use chronic water quality standard for WAD cyanide was based upon factors significantly different than those relating to the District's situation.

Use of WAD Cyanide Instead of Free Cyanide for Determining Water Quality Standards

The R88-21 rulemaking established General Use water quality standards for cyanide based upon the measurement of WAD cyanide. However, the USEPA Ambient Water Quality Criteria for Cyanide - 1984 states that "free cyanide would provide a more scientifically correct basis upon which to establish criteria for cyanide." Free cyanide is defined as $HCN + CN^-$ whereas WAD cyanide is defined as $HCN + CN^- +$ weak metal cyanide complexes. Thus it is clear that WAD cyanide is a conservative measure of the truly toxic form of cyanide, i.e., free cyanide, and thus overestimates its presence.

Further details on cyanide chemistry and speciation are presented in Attachment 12 which was prepared for the District by Dr. Richard Luthy, a nationally recognized expert on cyanide chemistry and analytical methodology.

Unfortunately, there is no USEPA approved method for the analysis of free cyanide. Therefore, it is understandable as

to why the Board chose WAD cyanide as a regulatory measure. However, the District requests that the Board take this added measure of conservatism into account when evaluating the District's request for a site-specific rulemaking.

Chlorine Interference in the WAD Cyanide Test

As discussed above, the District believes that chlorination of WRP effluents causes analytical interferences which result in increased WAD cyanide concentrations as determined by the accepted WAD cyanide analytical method. During 1994 the District conducted a number of bench-scale laboratory experiments in an attempt to determine whether the chlorine interference was strictly a methodology related problem, or if the chlorine was actually affecting the cyanide speciation in the WRP effluent. The District also retained Dr. Richard Luthy to visit the District's laboratory and evaluate the WAD cyanide analytical procedures.

The types of bench-scale experiments conducted were as follows:

1. Studying the relationship between sodium hypochlorite (chlorination) and sodium bisulfite (dechlorination) dosage and WAD cyanide concentrations in effluent from the James C. Kirie and Hanover Park WRPs.
2. Checking the purity of the sodium hypochlorite and sodium bisulfite used at the two WRPs.

In the bench-scale experiments, secondary effluent, prior to chlorination, was collected at both the Hanover Park and James C. Kirie WRPs and brought to the laboratory. The effluents were then dosed with sodium hypochlorite, stirred for an appropriate contact time, and then dechlorinated by the addition of sodium bisulfite. Sodium hypochlorite and sodium bisulfite dosages were varied to span all normal WRP operating conditions.

To check the purity of the industrial grade sodium hypochlorite and sodium bisulfite used full-scale, at the two WRPs, samples of these chemicals were analyzed for trace amounts of cyanide, and were also compared to pure laboratory grade reagents.

The data from these laboratory experiments is presented in Attachment 13. The data indicates that chlorination/dechlorination interferes with the analytical test and causes an increase in WAD cyanide concentrations in some cases, but the magnitude of the increase in the laboratory did not always correspond to the field data observed at the District WRPs. The data also shows that there was no cyanide contamination in any of the chemicals being used at the two WRPs.

Dr. Luthy concluded that there were no problems with the analytical procedures being used (Attachment 14). However, he could not explain the observed chlorine interference. He did point out the fact that the chemical interactions of chlorine and cyanide are extremely complicated in a

wastewater matrix, especially at the low µg/l concentrations that are of concern. At higher WAD cyanide concentrations these matrix interactions would not be as significant.

The District believes that this unanticipated chlorine interference at low WAD cyanide concentrations was not known to the District, the Agency, or the Board during the R88-21 Rulemaking, and requests that this problem be taken into account when the Board reviews this Petition.

Setting Regulatory Limits at or Below the Limit of Detection

The current General Use chronic water quality standard for WAD cyanide is 5.2 µg/l. Standard Methods for the Examination of Water and Wastewater, 18th Edition, lists the limit of detection of the WAD cyanide analysis as 5 to 20 µg/l depending on the sample matrix. Thus, by adopting the 5.2 µg/l limit, the Board has unwittingly placed a considerable burden on the District to accurately analyze WAD cyanide in the effluents from its WRPs, perhaps beyond the limits of existing laboratory analytical methodology.

Dr. Richard Luthy, who is the chairman of the Standard Methods committee on cyanide analysis has prepared a report (Attachment 14) discussing the difficulties of accurately analyzing WAD cyanide at these low concentrations. In particular it should be noted that the precision of the WAD cyanide analysis at the limit of detection is ± 8.0 µg/l. Thus, at the lower limit of detection of 5 µg/l, the true value could be between -3.0 and 13.0 µg/l, and at the upper

limit of detection of 20 µg/l, the true value could be between 12.0 and 28.0 µg/l. For this reason, a regulatory limit of 5.2 µg/l is not meaningful.

Indeed, the District believes that a reasonable conclusion here would be that even the more conservative 7.32 µg/l WAD cyanide value, which is a calculated value designed to protect rainbow trout, falls below the accepted analytical range of precision of ± 8.0 µg/l.

The District has a comprehensive quality assurance/quality control (QA/QC) program in place at all of its laboratories. The details of this program as it relates to the WAD cyanide analysis is presented in Attachment 15.

It can be noted in Attachment 15 that for the past 20 years the District has been researching methods for improving cyanide analytical methodology. In 1977 the USEPA granted the District approval of an alternate test procedure for total cyanide and dissociable cyanide. The alternate test procedure improved the accuracy and precision of the standard cyanide test procedures (Attachment 16). In addition, the District holds the following two patents which relate to improvements in cyanide analysis:

1. Patent No. US4,265,857 (1981) - Thin film distillation apparatus for total cyanide analysis.
2. Patent No. US4,804,631 (1989) - Apparatus for differentiating total cyanide, simple cyanide, and thiocyanate.

In early 1994, as the District gained experience with the Standard Methods WAD cyanide procedure, it became clear that with our sample matrix, some modifications of the Standard Methods procedure would be required to allow the District to analyze for WAD cyanide at concentrations below 5 µg/l. This methodology is described in Attachment 15. Dr. Richard Luthy reviewed this methodology when he visited our laboratory, and as can be seen in his report (Attachment 14), he approves of our procedures.

It should also be noted that the USEPA continues to think highly of our laboratory as evidenced by the fact that the USEPA recently approved a District request for an alternate test procedure relating to the chemical extraction step of the "600 Series" of methods for priority pollutant analysis. Over two years of experimental work was involved in gaining this approval.

As stated previously, the Board has unwittingly placed a considerable analytical burden on the District, since the regulatory limit for WAD cyanide is so near the analytical detection limit. This led the District to conduct additional QA/QC studies above those routinely conducted in the laboratory to verify that we could accurately determine low µg/l levels of WAD cyanide on our actual sample matrix. These studies consisted of spike recovery tests using known WAD cyanide concentrations and the chlorinated and unchlorinated effluents from the Hanover Park and James C. Kirie WRPs. The

results of these studies are presented in Attachment 17 and demonstrate that the District's analytical methods are capable of accurately measuring WAD cyanide at low concentrations as evidenced by excellent spike recoveries near the limit of detection of the method.

Thus, the District believes that it has demonstrated to the Board that the increased WAD cyanide concentrations that are observed at these two WRPs during the chlorination/dechlorination season are not the result of poor analytical techniques.

It is the District's understanding that no other municipal wastewater dischargers in the state of Illinois are being required to achieve a detection limit below 10 µg/l for WAD cyanide. The District believes that requiring the development of special analytical methodology to demonstrate compliance with an inappropriate regulatory limit places an undue burden on its resources as compared to other discharges in the State, and is thus a significant factor to take into account.

Also, while the District is disappointed that it is being singled out to develop methodology to measure WAD cyanide concentrations below 10 µg/l, we believe that a WAD cyanide limit of 10 µg/l would be more meaningful for the following reasons:

1. Dr. Allen's calculated chronic value of 9.799 µg/l which is indistinguishable from 10 µg/l will protect all species except rainbow trout.
2. Dr. Luthy's determination that at the detection limit (5-20 µg/l) for WAD cyanide the precision is ±8.0 µg/l.
3. The District's demonstration, supported by Dr. Luthy, that chlorine interference is significant for WAD cyanide measurements below 10 µg/l.
4. The analytical burden of constantly trying to measure WAD cyanide concentrations below 10 µg/l.
5. The fallacy that reported WAD cyanide values of <10.0 µg/l obtained by existing methodology provide any meaningful basis for technical discussions relative to indigenous aquatic species toxicity.
6. The Agency's affirmation that cold water species such as rainbow trout are not indigenous to the water bodies in this Petition.
7. The value of 10.0 µg/l more properly targets the aquatic species of concern in the affected waterways.

Thus, notwithstanding the fact that the District is prepared to be cooperative regarding analytical methodology

development, the need for a WAD cyanide limit of <10.0 µg/l is not warranted.

THE EXISTENCE OF THE FACTORS RELATING TO THE DISTRICT JUSTIFIES A SITE-SPECIFIC REGULATION

The District's Petition clearly demonstrates that a number of unique factors exist which justify the adoption of a site-specific regulation for WAD cyanide. The Petition also demonstrates that no adverse environmental effects will result if the site-specific regulation for WAD cyanide is adopted.

The District has a long history of being in the forefront of wastewater treatment in the state of Illinois and nationally. The three WRPs in question produce high quality final effluents, and they will continue to produce these same high quality effluents after the site-specific regulation is adopted.

THE REQUESTED STANDARD IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT

The District believes that this petition has amply demonstrated that there will be no adverse environmental or health effects caused by revising the chronic water quality standard for WAD cyanide to protect indigenous species in the rivers in question. Approved USEPA methodology indicates that rainbow trout, which are not present in these rivers, would be the only species that might be affected by a

revision in the WAD cyanide standard. However, the presence of rainbow trout is not an issue here.

CONSISTENCY OF PROPOSED SITE-SPECIFIC REGULATION WITH FEDERAL LAW

As demonstrated above, the District has followed USEPA guidelines in calculating the proposed General Use chronic water quality standard for WAD cyanide. The Board in R88-21 actually took a very conservative approach to the cyanide toxicity question by adopting a WAD cyanide standard that was based solely upon toxicity to rainbow trout. The USEPA guidelines specify using the four most sensitive species. In addition, USEPA guidelines specify that the toxicity data is based upon free cyanide concentrations. The Board in R88-21 has taken the conservative approach of basing the cyanide standard on WAD cyanide, which is a broader measure of cyanide.

If the Board grants the proposed request for a site-specific regulation it will be consistent with existing USEPA guidelines and will conform with all applicable Federal Regulations.

RECOMMENDATION OF WHETHER AN ECONOMIC IMPACT STUDY IS ADVISABLE

Section 27 of the Environmental Protection Act no longer requires an "economic impact study" recommendation. The District notes though that it is the only entity directly

affected by this rulemaking, and the economic impacts on the District have already been described in this petition.

SYNOPSIS OF TESTIMONY TO BE PRESENTED

The District anticipates that three individuals will present testimony at the hearing on this proposal. A synopsis of their testimony is as follows.

1. Dr. Cecil Lue-Hing, Director of Research and Development at the District

   Dr. Lue-Hing will present a summary of the entire petition, which will include discussion of the existing WAD cyanide standard, the existing NPDES permits at the John E. Egan, Hanover Park, and James C. Kirie WRPs, and a review of the studies that the District has conducted relative to WAD cyanide. He will also discuss the economic impacts to the District, and the water quality of the rivers impacted by this petition. He will conclude by presenting the proposed site-specific regulations that the District is requesting.

2. Dr. Richard Luthy, Consultant

   Dr. Luthy will discuss the analytical methodology for determining WAD cyanide concentrations, the method detection limits, and the precision and accuracy of the WAD cyanide test.

He will also discuss his assessment of the District's laboratory procedures. His presentation will summarize the information contained in Attachments 12, 14, 15, and 17.

3. Dr. Herbert Allen, Consultant

Dr. Allen will discuss USEPA methodologies for deriving water quality criteria, and will explain, in detail, the various options that can be used for calculating a chronic water standard for WAD cyanide. His presentation will summarize the information contained in Attachment 10.

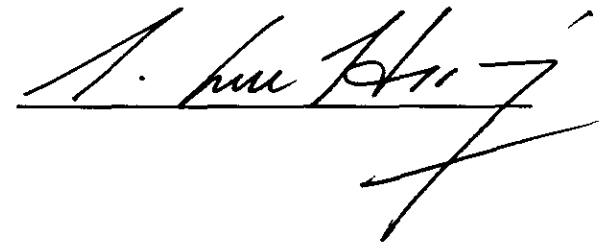
Summary Comments

The District has an outstanding record in providing high quality wastewater treatment to the residents of Cook County. The addition of an extremely conservative WAD cyanide limit to the NPDES Permits for two of the District's WRPs has created a situation where potential permit violations could occur even though effluent quality remains high, and reported WAD cyanide values would not endanger indigenous species. This could result in an unnecessary expenditure of taxpayer dollars for unneeded modifications to the WRPs.

The District believes that this Petition clearly demonstrates that the existing General Use chronic water quality standard for WAD cyanide was promulgated based upon incomplete and overly conservative assumptions which do not relate

to the District's true situation. The District believes that it has provided in this Petition ample justification that is technically feasible and economically reasonable, for a grant by the Board of a site-specific regulation, and respectfully asks the Board to so grant its Petition.

Respectfully submitted on
behalf of the Metropolitan
Water Reclamation District
of Greater Chicago,

by: 

Cecil Lue-Hing, D.Sc., P.E.
Metropolitan Water Reclamation
District of Greater Chicago
100 East Erie
Chicago, Illinois 60611
(312)751-5190

Section 302.208 Numeric Standards for Chemical Constituents

f) The chronic standard (CS) for cyanide (STORET number 00718) listed in Section 302.208(d) shall not apply to Salt Creek, Higgins Creek, the West Branch of the DuPage River, and the Des Plaines River in Cook County, Illinois.

Section 303.444 Salt Creek, Higgins Creek, West Branch of the DuPage River, Des Plaines River

The General Use chronic water quality standard for cyanide (STORET number 00718) contained in Section 302.208 shall not apply to Salt Creek, Higgins Creek, the West Branch of the DuPage River, and the Des Plaines River in Cook County, Illinois. Instead, these waters shall comply with a chronic cyanide standard of 10 µg/l.

Section 304.201 Wastewater Treatment Plant Discharges of the Metropolitan ~~Sanitary~~ Water Reclamation District of Greater Chicago

d) John E. Egan, Hanover Park, and James C. Kirie Water Reclamation Plants

The discharges of the John E. Egan, Hanover Park, and James C. Kirie Water Reclamation Plants must meet a monthly average WAD cyanide effluent standard of 10 µg/l, subject to the averaging rule of Section 304.104(a).

LIST OF ATTACHMENTS

Attachment 1	Resume of Dr. Richard G. Luthy
Attachment 2	Resume of Dr. Herbert E. Allen
Attachment 3	1994 Final Effluent Quality of the John E. Egan, James C. Kirie, and Hanover Park WRPs
Attachment 4	Daily Raw Sewage and Final Effluent WAD Cyanide Concentrations from the James C. Kirie and Hanover Park WRPs
Attachment 5	WAD Cyanide Concentrations at Various Points During Treatment at the James C. Kirie and Hanover Park WRPs
Attachment 6	WAD Cyanide Concentrations in Industrial Waste Discharges to the James C. Kirie and Hanover Park WRPs
Attachment 7	Cost Estimate for Replacing the Chlorination/ Dechlorination Systems at the James C. Kirie and Hanover Park WRPs
Attachment 8	1993 and 1994 Biomonitoring Results from the John E. Egan, James C. Kirie, and Hanover Park WRPs
Attachment 9	Statistical Analysis of Water Quality Data Upstream and Downstream of the John E. Egan, James C. Kirie, and Hanover Park WRP
Attachment 10	Report by Dr. Herbert E. Allen Entitled "Review of Chemistry, Toxicology and Standards for Cyanide Species in Water Reclamation Plant Effluents and Receiving Waters -- Application to Metropolitan Water Reclamation District of Greater Chicago"
Attachment 11	Excerpts from Illinois Environmental Protection Agency Testimony to the Board in the R94-1 Rulemaking
Attachment 12	Letter from Dr. Richard G. Luthy Discussing Cyanide Speciation
Attachment 13	Laboratory Data Demonstrating a Chlorine Interference in the WAD Cyanide Analysis

LIST OF ATTACHMENTS (continued)