RESEARCH AND DEVELOPMENT DEPARTMENT

REPORT NO. 08-22

RESEARCH AND DEVELOPMENT

2007

Annual Report

APRIL 2008

Metropolitan Water Reclamation District of Greater Chicago
100 East Erie Street Chicago, IL 60611-2803 (312) 751-5600

RESEARCH AND DEVELOPMENT
2007
ANNUAL REPORT

Research and Development Department
Louis Kollias, Director

April 2008

TABLE OF CONTENTS

	Page
LIST OF TABLES	vi
LIST OF FIGURES	vi
DISCLAIMER	vi
RESEARCH AND DEVELOPMENT DEPARTMENT ORGANIZATION CHART - 2007	vii
ADMINISTRATION DIVISION	
Personnel Administration	1
Greater Chicago Pollution Prevention Program	1
Computer Systems Administration	2
Budget Administration	2
Purchasing Administration	2
Contract Administration	2
Laboratory Accreditation	3
Use Attainability Analysis Study	4
Departmental Reports	4
ENVIRONMENTAL MONITORING AND RESEARCH DIVISION	
Environmental Monitoring and Research Division Organization Chart - 2007	14
Environmental Monitoring and Research Division	15
Administrative	15
Experimental Design and Statistical Evaluation Group	16
Statistical and Computing Support	16

TABLE OF CONTENTS

	Page
Wastewater Treatment Process Research Section	17
Emission of Hazardous Air Pollutants from District WRPs	17
Odor Monitoring Programs	18
Phosphate Detergents	18
Calumet WRP Digester Mixing Study	18
Ultraviolet Disinfection	19
Potential Effects of Ferric Chloride Addition for Phosphorus Removal on Gravity Belt Thickener Performance at Egan WRP	19
Synergistic Inhibitory Effects of Heavy Metals Mixture on Activated Sludge Nitrification	20
Methane and Nitrous Oxide Emissions from Wastewater Treatment	20
Thornton Transitional Reservoir Fill Events for 2007	21
Groundwater Monitoring Reports	21
Pollutants Captured by TARP	21
Additional Digestion Tests for the Calumet and Egan WRPs	21
North Side WRP Master Plan Study Project	22
Unsteady Flow Water Quality Modeling for the Chicago Waterway System	22
Chemical Phosphorus Removal at the Egan WRP	22
Evaluating two Different Aeration Systems at the Egan WRP	22
Dynamic Simulation of the Stickney WRP Imhoff Tanks	23
Simulations of the Cal-Sag Channel	23

TABLE OF CONTENTS

	Page
Innovative Technologies	23
Collection System Bioaugmentation	23
Wastewater Disinfection with Doped Titanium Dioxide and Visible Light	24
Wastewater Disinfection with Quaternary Ammonium Chloride Coated Sand	24
Biosolids Utilization and Soil Science Section	24
Analytical Microbiology and Biomonitoring Section	25
Analytical Microbiology Sub-Group	26
Biomonitoring Sub-Group	26
Parasitology Sub-Group	27
Virology Sub-Group	27
Aquatic Ecology and Water Quality Section	27
Benthic Invertebrate Monitoring	27
Fish Monitoring	28
Habitat and Sediment Quality Monitoring	28
Chlorophyll Monitoring	28
Continuous Dissolved Oxygen Monitoring	28
Illinois Waterway Monitoring	29
Salt Creek Nutrient Demonstration Project	29
Fecal Coliform Density Sampling Study	29
Radiochemistry Section	29

TABLE OF CONTENTS

	Page
Radiological Monitoring of Waterways	29
Radiological Monitoring of Wastewaters and Biosolids	30
Radiation Safety Program Activities	30
Laboratory Quality Assessment Program Activity	30
ANALYTICAL LABORATORIES DIVISION	
Analytical Laboratories Division Organization Chart - 2007	31
Analytical Laboratories Division	32
Stickney Analytical Laboratory (SAL)	32
M&O Department	34
EM&R Division	34
IW Division	35
Other Services	35
Industrial Waste Analytical Laboratory (IWAL)	35
M&O Department	35
EM&R Division	35
IW Division	35
Organic Compounds Analytical Laboratory (OCAL)	36
M&O Department	36
EM&R Division	36
IW Division	37
John E. Egan Analytical Laboratory (EAL)	37

TABLE OF CONTENTS

	Page
M&O Department	37
EM&R Division	38
IW Division	38
Calumet Analytical Laboratory	38
M&O Department	38
EM&R Division	38
INDUSTRIAL WASTE DIVISION	
Administration/Industrial Waste Division Organization Chart - 2007	40
Industrial Waste Division	41
Administrative Section	41
Enforcement Section	41
User Charge and Technical Services Section	42
Field Services Section	43
APPENDICES	
Meetings and Seminars 2007	AI-1
Presentations 2007	AII-1
Papers Published 2007	AIII-1
Research and Development Department 2007 Seminars	AIV-1

LIST OF TABLES

Table No.		Page
1	Research and Development Numbered Reports Published During 2007	5
2	Total Number of Analyses Performed in 2007	33

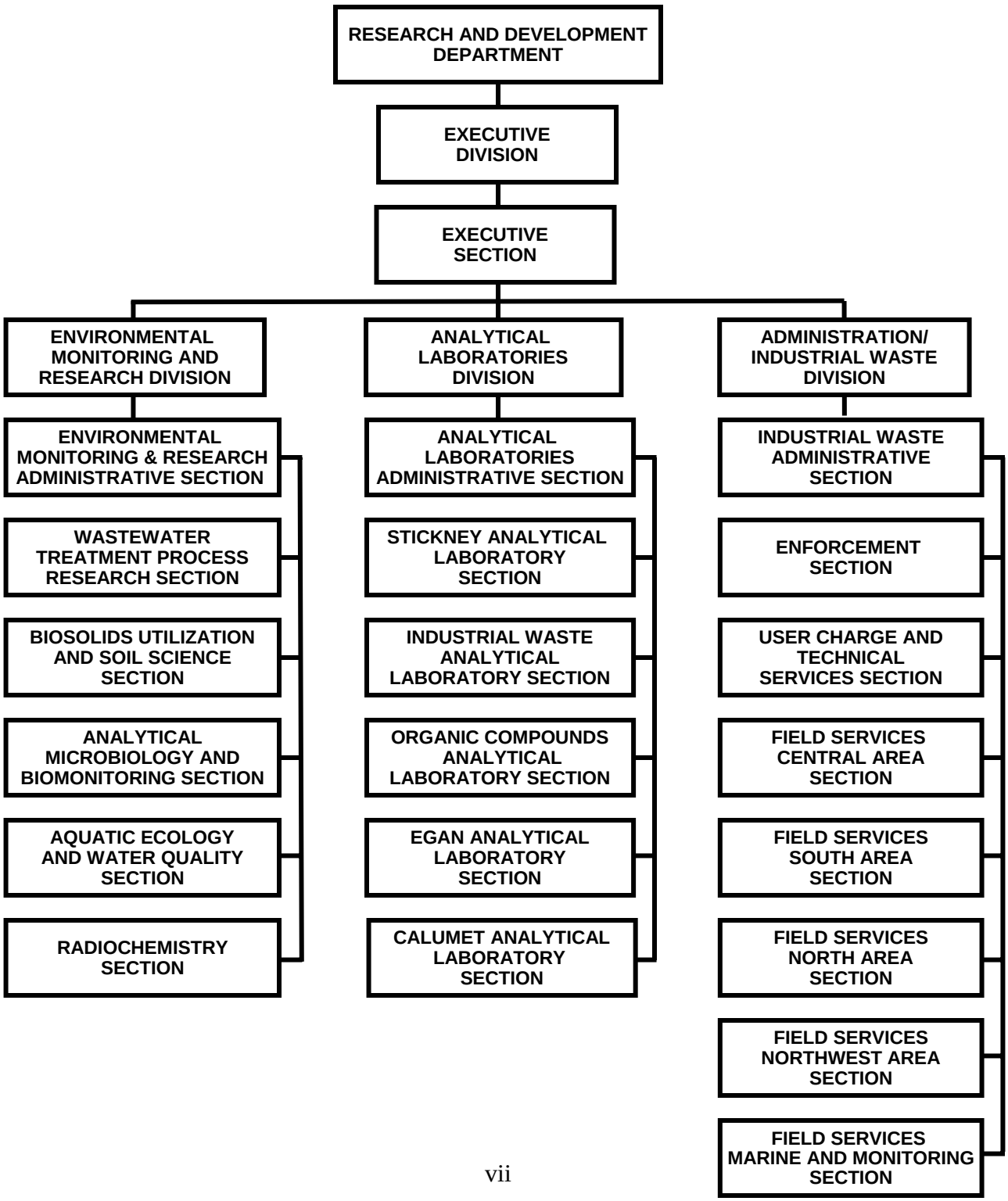
LIST OF FIGURES

Figure No.		Page
1	Environmental Monitoring and Research Division Organization Chart	14
2	Analytical Laboratories Division Organization Chart	31
3	Administration/Industrial Waste Division Organization Chart	40

DISCLAIMER

The mention of trade names of specific products does not constitute endorsement of them by the Metropolitan Water Reclamation District of Greater Chicago.

RESEARCH AND DEVELOPMENT DEPARTMENT
ORGANIZATION CHART FOR 2007



ADMINISTRATION DIVISION

The Administration Division is responsible for the coordination of all departmental services pertaining to personnel administration, purchasing, computer systems, and administrative assistance to the Director. Primary functions of the Division include: coordination and preparation of budget preparation and administration of consultant agreements; administration of requisitions and purchase orders; administration of departmental personnel actions; planning and coordination of departmental computer systems, training, and security requirements; liaison with other departments; and preparation of Board letters, correspondence, and reports, required by the Director.

Personnel Administration

The Department had 310 budgeted positions during 2007 with an adjusted total salary and wage appropriation of $21,803,800. All personnel transactions, including merit wage increases, personnel requisitions, service rating forms, personnel vacancy reports, overtime records, personnel transfers, appointments, resignations, leaves of absence, payroll changes, and disciplinary actions for the Department were either originated or coordinated by this Division. During 2007, the Department reviewed personnel actions relative to 11 retirements. In addition, as part of adopting the 2007 Budget and the Metropolitan Water Reclamation District of Greater Chicago's (District) attrition program, five existing positions were eliminated when vacated during 2006. This decrease in positions led to a 2007 salary expenditure-to-appropriation ratio of 99.9 percent.

Greater Chicago Pollution Prevention Program

In January 1994, the Greater Chicago Pollution Prevention Program (GCP3) was initiated as a cooperative project between the District and the Illinois Waste Management and Research Center (Center).

Technical assistance is provided directly to companies requesting such assistance by a member of the Center's staff. Based on District referrals during 2007, the Center provided onsite technical assistance to nine significant industrial users including four metal finishers, three food processors, a die caster and a truck washing facility.

Most of the assistance provided has been for industry, but others, such as citizens' community groups, schools, government, and trade associations have also benefited. Technical assistance includes pollution prevention, regulatory compliance, regulatory information, and guidance material.

Computer Systems Administration

In 2007, with the assistance of the Information Technology Department (IT), the Administration Division continues its review of all departmental computer systems, local and wide area networks, software utilization, compliance with District security and access procedures, training requirements, etc.

Since April 2001, the District has used an IT-designed program for budget preparation. This Budget Preparation Tool (BPT) was used to prepare the 2007 line item and position budgets. The Enterprise System, which was implemented in 2000, proved inadequate for preparing the District's budget and BPT was developed to assist in this area. The Administration Division prepared the 2007 budget using this system.

Budget Administration

A comparison of appropriations to expenditures for 2007 shows the following:

	Appropriation	Expenditure
Personnel (Line Item 101) (Adjusted)	$21,803,800	$21,786,415
Other Line Items	5,746,700	3,562,486
Total	$27,550,500	$25,348,901

Purchasing Administration

During 2007, about 310 requisitions were reviewed and processed by the Administration Division, prior to being forwarded to the Purchasing Department. This review verified the availability and proper use of department funds for all requisitioned items. The Division ensures that all departmental purchase orders are properly closed out at year's end and processes purchase order decreases or increases as appropriate.

Contract Administration

During 2007, the Division was involved in the preparation and administration of 25 contracts for a total cost of approximately $828,576.10, including multiyear contracts. This involved the preparation of detail specifications, Board letters, advertisements, coordination of the receipt and review of bids, recommendations to award, processing of purchase requisitions, change orders, payment of invoices, and release of bid deposits.

The Division prepared and administered 26 consulting services agreements with individual values of $9,000 or more and having a total value of approximately $7,368,456.10 during 2007. The Division also prepared and administered 24 maintenance agreements with individual values of $10,000 or more and a total value of $1,476,024.27. This involved preparation and processing of purchase requisitions, change orders, Board letters, and preparation and execution of consultant agreements, preparation of requests for proposals, and coordination of the receipt and review of proposals.

Laboratory Accreditation

In 2007, the seven Research and Development (R&D) Department laboratories previously accredited or certified with the State of Illinois maintained their status. The participation of our laboratories in these programs helps to ensure that the laboratories are operated in a manner that meets or exceeds the standards established by the applicable accreditation or certification program. Some benefits of maintaining the high standards required by these programs are better documentation of procedures, increased quality control and quality assurance, improved analyst training, and increased accuracy and precision of test results.

The five laboratories of the Analytical Laboratories Division have been accredited under the National Environmental Laboratory Accreditation Program (NELAP) since 2001. The Illinois Environmental Protection Agency (IEPA) Division of Laboratories is the NELAP accrediting authority for the State of Illinois. The Calumet, Egan, Stickney and Industrial Waste Analytical Laboratories are accredited for inorganic analysis of wastewater. The Organic Compounds Analytical Laboratory is accredited for organic analysis of wastewater and solid waste.

In 2002, the State of Illinois created an advisory committee to review and evaluate the IEPA management of the NELAP accreditation program. Under the enabling Public Act, the District maintains a permanent member on the nine-person committee. The fee schedule for accredited laboratories established in 2002 remained unchanged in 2007. Fees for the five accredited District laboratories range from $3,400 to $4,400.

Since 1979, the Analytical Microbiology Laboratory has been certified for microbiological analysis of water from public water supplies and their sources by the Illinois Department of Public Health (IDPH).

In June 2001, the Radiochemistry Laboratory was certified by the Illinois Emergency Management Agency, Division of Nuclear Safety (IEMA-DNS) for the radiochemical analysis of potable water.

The certification programs administered by the IDPH and the IEMA follow guidelines contained in the United States Environmental Protection Agency (USEPA) *Manual for the Certification of Laboratories Analyzing Drinking Water*. These guidelines are compliant with regulations issued pursuant to the Safe Drinking Water Act. Currently, no fees are charged for certifications of the Analytical Microbiology Laboratory and the Radiochemistry Laboratory.

Use Attainability Analysis Study

The IEPA began the Chicago Area Waterways Use Attainability Analysis (UAA) Study in 2002 to determine if these waterways can support a higher use designation and meet the goals of the Clean Water Act. Most of these waterways are designated as Secondary Contact and Indigenous Aquatic Life Use and an examination of this use designation has been urged for several years by the USEPA. The District is committed in its National Pollutant Discharge Elimination System (NPDES) permits to participate in and support the UAA Study. The District is carrying out this commitment by making available all of the water quality and related data from its monitoring activities and has developed an unsteady-state hydraulic and water quality model of the waterway system. This model has proven useful in determining water quality impacts associated with water quality improvement scenarios proposed as part of the UAA. The District will be supplying technical support through review of study reports, the conduct of a risk assessment for recreational use of the waterways, a review of the regulatory criteria for bacterial standards, an epidemiological study of waterways, recreators and a waterways habitat evaluation and improvement study.

Departmental Reports

During 2007, the Department published 82 formal reports dealing with various aspects of the District's operations. A list of these reports is given in Table 1.

TABLE 1: RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2007

Report No.	Report Title	Author(s)	Date	Organization or Conference
2007-1	Monthly Report of the Fulton County Environmental Protection System, October 2006	R&D Department Tian, G. and Cox, A.	January 2007	Illinois Environmental Protection Agency (IEPA)
2007-2	Odor Monitoring Program at Metropolitan Water Reclamation District Facilities during 2005	R&D Department Lordi, D. and Oskouie, A.	January 2007	IEPA
2007-3	Monthly Report of the Fulton County Environmental Protection System, November 2006	R&D Department Tian, G. and Cox, A.	January 2007	IEPA
2007-4	Monthly Controlled Solids Distribution Report, November 2006	R&D Department Tian, G.	January 2007	IEPA
2007-5	Environmental Monitoring and Research Division, 2005 Annual Report	R&D Department	January 2007	Internal District Report
2007-6	Annual Biosolids Management Report for 2006	R&D Department Cox, A., Lindo, P., Patel, M., and Granato, T. C.	February 2007	United States Environmental Protection Agency (USEPA), Region V
2007-7	Monthly Controlled Solids Distribution Report, December 2006	R&D Department Tian, G.	February 2007	IEPA
2007-8	Egan Solids Management Area Monitoring Report for Fourth Quarter 2006	R&D Department Cox, A.	February 2007	IEPA
2007-9	Hanover Park Fischer Water Reclamation Plant Farm Monitoring Report, Fourth Quarter 2006	R&D Department Lindo, P.	February 2007	IEPA
2007-10	Reporting Requirements for Site-Specific Equivalency to PFRP Designation of MWRDGC Biosolids Processing Trains at the Stickney and Calumet Water Reclamation Plants (January – July 2006)	R&D Department Cox, A.	March 2007	USEPA, Region V

TABLE 1 (Continued): RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2007

Report No.	Report Title	Author(s)	Date	Organization or Conference
2007-11	Reporting Requirements for Site-Specific Equivalency to PFRP Designation of MWRDGC Biosolids Processing Trains at the Stickney and Calumet Water Reclamation Plants, (August – December 2006)	R&D Department Cox, A.	March 2007	USEPA, Region V
2007-12	Calumet East Solids Management Area Monitoring Report for Fourth Quarter 2006	R&D Department Tian, G.	March 2007	IEPA
2007-13	Calumet West Solids Management Area Monitoring Report for Fourth Quarter 2006	R&D Department Tian, G.	March 2007	IEPA
2007-14	Harlem Avenue Solids Management Area Monitoring Report for Fourth Quarter 2006	R&D Department Lindo, P.	March 2007	IEPA
2007-15	Lawndale Avenue Solids Management Area Monitoring Report for Fourth Quarter 2006	R&D Department Lindo, P.	March 2007	IEPA
2007-16	Ridgeland Avenue Solids Management Area Monitoring Report for Fourth Quarter 2006	R&D Department Lindo, P.	March 2007	IEPA
2007-17	122nd and Stony Island Avenue Solids Management Area Monitoring Report for Fourth Quarter 2006	R&D Department Lindo, P.	March 2007	IEPA
2007-18	Monthly Report of the Fulton County Environmental Protection System, December 2006	R&D Department Tian, G. and Cox, A.	April 2007	IEPA
2007-19	Research and Development 2006 Annual Report	R&D Department	April 2007	Internal District Report
2007-20	Monthly Controlled Solids Distribution Report, January 2007	R&D Department Kumar, K.	April 2007	IEPA

TABLE 1 (Continued): RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2007

Report No.	Report Title	Author(s)	Date	Organization or Conference
2007-21	Monthly Report of the Fulton County Environmental Protection System, January 2007	R&D Department Tian, G. and Cox, A.	April 2007	IEPA
2007-22	Sampling and Analysis of Siloxane from the Digester Gas Line at the Stickney Water Reclamation Plant, Part of Master Plan Project #01-199-2P (Infrastructure and Process Needs Feasibility Study)	R&D Department Oskouie, A. and Lordi, D.	May 2007	IEPA
2007-23	Monthly Controlled Solids Distribution Report, February 2007	R&D Department Kumar, K.	May 2007	IEPA
2007-24	Salt Creek Phosphorus Reduction Demonstration Project Interim Report: Pre-Phosphorus Reduction Conditions	R&D Department Wasik, J.	May 2007	IEPA
2007-25	Continuous Dissolved Oxygen Monitoring in the Deep-Draft Chicago Waterway System During 2006	R&D Department Minarik, T., Wasik, J., Sopcak, M., and Dennison, S.	May 2007	IEPA
2007-26	Monthly Controlled Solids Distribution Report, March 2007	R&D Department Kumar, K.	May 2007	IEPA
2007-27	Hanover Park Water Reclamation Plant Fischer Farm Monitoring Report, First Quarter 2007	R&D Department Lindo, P.	May 2007	IEPA
2007-28	Continuous Dissolved Oxygen Monitoring in Chicago Area Wadeable Streams During 2006	R&D Department Minarik, T., Sopcak, M., Wasik, J., and Dennison, S.	May 2007	IEPA
2007-29	Egan Solids Management Area Monitoring Report for First Quarter 2007	R&D Department Cox, A.	May 2007	IEPA

TABLE 1 (Continued): RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2007

Report No.	Report Title	Author(s)	Date	Organization or Conference
2007-30	Lawndale Avenue Solids Management Area Monitoring Report for First Quarter 2007	R&D Department Lindo, P.	May 2007	IEPA
2007-31	122nd and Stony Island Avenue Solids Management Area Monitoring Report for First Quarter 2007	R&D Department Lindo, P.	May 2007	IEPA
2007-32	Calumet East Solids Management Area Monitoring Report for First Quarter 2007	R&D Department Kumar, K.	May 2007	IEPA
2007-33	Calumet West Solids Management Area Monitoring Report for First Quarter 2007	R&D Department Kumar, K.	May 2007	IEPA
2007-34	Harlem Avenue Solids Management Area Monitoring Report for First Quarter 2007	R&D Department Lindo, P.	May 2007	IEPA
2007-35	Ridgeland Avenue Solids Management Area Monitoring Report for First Quarter 2007	R&D Department Lindo, P.	May 2007	IEPA
2007-36	Monthly Report of the Fulton County Environmental Protection System, February 2007	R&D Department Tian, G. and Cox, A.	May 2007	IEPA
2007-37	Monthly Controlled Solids Distribution Report, April 2007	R&D Department Kumar, K.	June 2007	IEPA
2007-38	2006 Annual Summary Report Water Quality Within the Waterways System of the Metropolitan Water Reclamation District of Greater Chicago	R&D Department Abedin, Z.	June 2007	IEPA
2007-39	Water and Sediment Quality Along the Illinois Waterway from the Lockport Lock to the Peoria Lock During 2006	R&D Department Wasik, J. and Minarik, T.	July 2007	IEPA

TABLE 1 (Continued): RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2007

Report No.	Report Title	Author(s)	Date	Organization or Conference
2007-40	Monthly Controlled Solids Distribution Report, May 2007	R&D Department Kumar, K.	July 2007	IEPA
2007-41	Tunnel and Reservoir Plan, Calumet Tunnel System 2006 Annual Groundwater Monitoring Report	R&D Department Jain, J. S. and MacDonald, D.	July 2007	IEPA
2007-42	Tunnel and Reservoir Plan, Des Plaines Tunnel System 2006 Annual Groundwater Monitoring Report	R&D Department Jain, J. S. and MacDonald, D.	July 2007	IEPA
2007-43	Tunnel and Reservoir Plan, Mainstream Tunnel System 2006 Annual Groundwater Monitoring Report	R&D Department Jain, J. S. and MacDonald, D.	July 2007	IEPA
2007-44	Tunnel and Reservoir Plan, O'Hare CUP Reservoir Water Quality Monitoring Wells 2006 Annual Groundwater Monitoring Report	R&D Department Jain, J. S. and MacDonald, D.	July 2007	IEPA
2007-45	Tunnel and Reservoir Plan, Thornton Transitional Flood Control Reservoir Water Quality Monitoring Wells 2006 Annual Groundwater Monitoring Report	R&D Department Jain, J. S. and MacDonald, D.	July 2007	IEPA
2007-46	Tunnel and Reservoir Plan, Upper Des Plaines Tunnel System 2006 Annual Groundwater Monitoring Report	R&D Department Jain, J. S. and MacDonald, D.	July 2007	IEPA
2007-47	A Study of the Benthic Macro-invertebrate Community in Selected Chicago Metropolitan Area Waterways During 2003 and 2004	EA Engineering, Science, and Technology, Inc.	July 2007	Internal District Report
2007-48	Control, Reduction, and Utilization of Greenhouse Gases in Wastewater Treatment: Methane and Nitrous Oxide	R&D Department Kozak, J.	August 2007	IEPA

TABLE 1 (Continued): RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2007

Report No.	Report Title	Author(s)	Date	Organization or Conference
2007-49	Odor Monitoring Program at Metropolitan Water Reclamation District Facilities during 2006	R&D Department Lordi, D. and Oskouie, A.	August 2007	IEPA
2007-50	Monthly Report of the Fulton County Environmental Protection System, March 2007	R&D Department Tian, G. and Cox, A.	August 2007	IEPA
2007-51	Monthly Controlled Solids Distribution Report for June 2007	R&D Department Kumar, K.	August 2007	IEPA
2007-52	Egan Solids Management Area Monitoring Report, Second Quarter 2007	R&D Department Cox, A.	August 2007	IEPA
2007-53	Hanover Park Water Reclamation Plant Fischer Farm Monitoring Report, Second Quarter 2007	R&D Department Lindo, P.	August 2007	IEPA
2007-54	Calumet East Solids Management Area Monitoring Report for Second Quarter 2007	R&D Department Lindo, P.	August 2007	IEPA
2007-55	Calumet West Solids Management Area Monitoring Report for Second Quarter 2007	R&D Department Lindo, P.	August 2007	IEPA
2007-56	Harlem Avenue Solids Management Area Monitoring Report for Second Quarter 2007	R&D Department Lindo, P.	August 2007	IEPA
2007-57	Lawndale Avenue Solids Management Area Monitoring Report for Second Quarter 2007	R&D Department Lindo, P.	August 2007	IEPA
2007-58	Ridgeland Avenue Solids Management Area Monitoring Report for Second Quarter 2007	R&D Department Lindo, P.	August 2007	IEPA

TABLE 1 (Continued): RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2007

Report No.	Report Title	Author(s)	Date	Organization or Conference
2007-59	122nd and Stony Island Avenue Solids Management Area Monitoring Report for Second Quarter 2007	R&D Department Lindo, P.	August 2007	IEPA
2007-60	Report of the Fulton County Environmental Protection System, April, May, and June 2007	R&D Department Tian, G. and Cox, A.	August 2007	IEPA
2007-61	Synergistic Inhibitory Effects of Heavy Metal Mixture on Activated Sludge Nitrification	R&D Department Patel, K., Kozak, J., and Lordi, D.	September 2007	IEPA
2007-62	Reporting Requirements for Site Specific Equivalency to PFRP Designation of MWRDGC Biosolids Processing Trains at the Stickney and Calumet Water Reclamation Plants, January – July 2007	R&D Department	September 2007	IEPA
2007-63	Biomonitoring Report 2007, Whole Effluent Toxicity (WET) Test Results for the Hanover Park Water Reclamation Plant, Hanover Park, Illinois, NPDES Permit No. IL 0036137, May 2007	R&D Department Rijal, G.	October 2007	IEPA
2007-64	Report of the Fulton County Environmental Protection System, July, August, and September 2007	R&D Department Tian, G. and Cox, A.	October 2007	IEPA
2007-65	Recent Trend in Dioxins in Biosolids and the Levels of Dioxins in Soil and Corn Tissues from Plots after Thirty Years of Biosolids Application	R&D Department Hundal, L., Cox, A., and Granato, T. C.	November 2007	IEPA
2007-66	Calculation of 2008 User Charge Rates	R&D Department	November 2007	Internal District Report
2007-67	Monthly Controlled Solids Distribution Report, July 2007	R&D Department Kumar, K.	November 2007	IEPA

TABLE 1 (Continued): RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2007

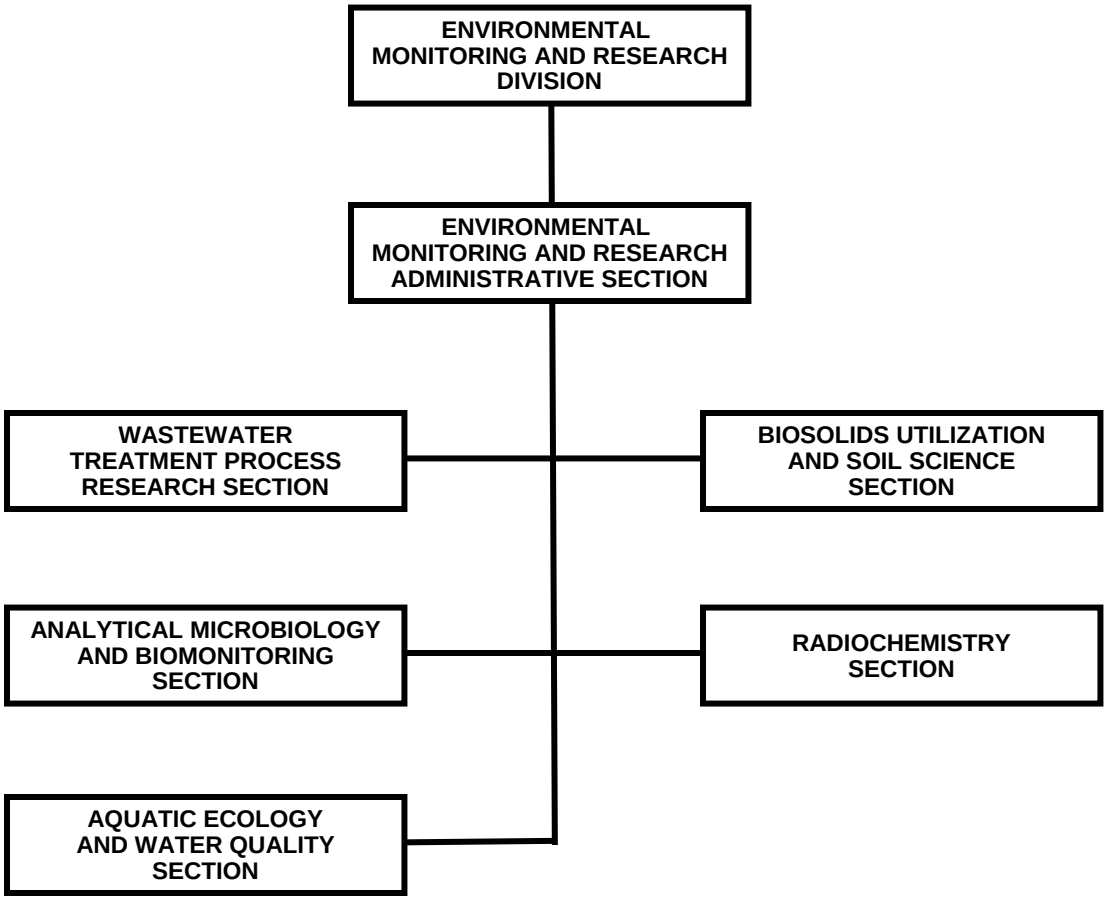
Report No.	Report Title	Author(s)	Date	Organization or Conference
2007-68	Monthly Controlled Solids Distribution Report, August 2007	R&D Department Tian, G. and Cox, A.	November 2007	IEPA
2007-69	Radiological Monitoring of the Raw Sewage Final Effluent Sludges, and Biosolids of the MWRDGC, 2006 Annual Report	R&D Department Khalique, A. and Abdussalam, T.	November 2007	Internal District Report
2007-70	Egan Solids Management Area Monitoring Report for Third Quarter 2007	R&D Department Cox, A.	November 2007	IEPA
2007-71	Monthly Controlled Solids Distribution Report, September 2007	R&D Department Tian, G. and Cox, A.	November 2007	IEPA
2007-72	Calumet East Solids Management Area Monitoring Report for Third Quarter 2007	R&D Department Lindo, P.	November 2007	IEPA
2007-73	Calumet West Solids Management Area Monitoring Report for Third Quarter 2007	R&D Department Lindo, P.	November 2007	IEPA
2007-74	Harlem Avenue Solids Management Area Monitoring Report for Third Quarter 2007	R&D Department Lindo, P.	November 2007	IEPA
2007-75	Lawndale Avenue Solids Management Area Monitoring Report for Third Quarter 2007	R&D Department Lindo, P.	November 2007	IEPA
2007-76	Ridgeland Avenue Solids Management Area Monitoring Report for Third Quarter 2007	R&D Department Lindo, P.	November 2007	IEPA
2007-77	122nd and Stony Island Avenue Solids Management Area Monitoring Report for Third Quarter 2007	R&D Department Lindo, P.	November 2007	IEPA

TABLE 1 (Continued): RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2007

Report No.	Report Title	Author(s)	Date	Organization or Conference
2007-78	Hanover Park Water Reclamation Plant Fischer Farm Monitoring Report, Third Quarter 2007	R&D Department Lindo, P.	November 2007	IEPA
2007-79	Fecal Coliform Densities in the Chicago Waterway System During Dry and Wet Weather 2004-2006	R&D Department Dennison, S., Rijal, G., and Granato, T. C.	December 2007	IEPA
2007-80	Monthly Report of the Fulton County Environmental Protection System, October 2007	R&D Department Tian, G. and Cox, A.	December 2007	IEPA
2007-81	Monthly Report of the Fulton County Environmental Protection System, November 2007	R&D Department Tian, G. and Cox, A.	December 2007	IEPA
2007-82	Environmental Monitoring and Research Division 2006 Annual Report	R&D Department	December 2007	Internal District Report

FIGURE 1

ENVIRONMENTAL MONITORING AND RESEARCH DIVISION ORGANIZATION CHART



ENVIRONMENTAL MONITORING AND RESEARCH DIVISION

The Environmental Monitoring and Research (EM&R) Division has 65 employees, and is comprised of six Sections, viz.,

1. Administrative
2. Wastewater Treatment Process Research
3. Biosolids Utilization and Soil Science
4. Analytical Microbiology and Biomonitoring
5. Aquatic Ecology and Water Quality
6. Radiochemistry

The major areas of focus of the Division were as follows:

- Monitoring the environmental quality of Lake Michigan, area rivers and canals, and the Illinois River to document the effectiveness of the District's wastewater treatment program.
- Assisting in the resolution of sewage treatment and solids disposal operation problems.
- Providing technical assistance to other departments and agencies with respect to issues related to wastewater treatment; combined sewer overflow (CSO) management; waterways management; and solids processing, utilization, and marketing.
- Conducting applied and operations research to achieve improvement and cost reductions in District wastewater treatment, waterways management, and solids processing and biosolids utilization activities.
- Assessing the impacts of new or proposed regulations on District activities, with particular focus on the impacts to the District, of the proposed water quality standards for the Chicago Area Waterway System (CAWS) that were submitted to the Illinois Pollution Control Board (IPCB) by the IEPA.

Administrative

The Administrative Section provides technical guidance, scientific review, and administrative support for the work being carried out by the EM&R Division staff. The Section also organizes a monthly seminar series, open to all District employees, which presents information on

areas of interest to the wastewater field. In 2007, 1,892 people attended these seminars. A list of the seminar topics is shown in Appendix IV.

In addition to the overall administrative and supervisory functions performed by the Administrative Section, the Experimental Design and Statistical Evaluation Group, which is part of the Administrative Section, provided the following support to the rest of the EM&R Division.

Experimental Design and Statistical Evaluation Group. The Experimental Design and Statistical Evaluation Group is responsible for providing assistance in the design of laboratory and full-scale experiments, collection of appropriate data, development of guidelines for data collection methodology, and statistical analyses. Since 1999, Section personnel have been performing these tasks using PC computing media. They also developed programs to interconnect LATEX and Visual Basic Programs with SAS, Access, Excel, Outlook, and Power Point software programs. This computer automation has enabled the section to produce reports, tables, and texts in suitable designs, and to respond to many requests in a shorter period of time.

Statistical and Computing Support. During 2007, a Biostatistician provided statistical and computing support to various projects. The following is a description of some of the activities.

1. Statistical support was provided to the Analytical Microbiology & Biomonitoring Section to study whether fecal coliform (FC) resistant to different antibiotics are the same in influents and effluents in all water reclamation plants (WRPs), to establish a relationship between FC counts and distance (in miles) downstream of WRP outfalls, and to predict geometric mean of FC concentration in a sampling point on the basis of its distance from the upstream WRP location.

2. Continuous support is being provided to the Biosolids Utilization and Soil Science Section to produce quarterly reports on biosolids management at the District's Biosolids Management Areas to meet IEPA permit requirements.

3. Statistical support and consulting was provided to the Biosolids Utilization and Soil Science Section on projects including the USX Demonstration Project and the St. David Coal Refuse Reclamation Project.

4. Statistical support was provided to the Biosolids Utilization and Soil Science Section for a research paper on biosolids phosphorus availability.

5. Statistical support was provided to the Biosolids Utilization and Soil Science Section for a research project in dioxin study.

6. Analysis was conducted of a soluble organic carbon concentration of Lenzburg, Rozetta, and Rapatee soils.

7. Modeling Carbon Decay Rate by solving of polynomial equations.

8. Continuous support is being provided to the Aquatic Ecology and Water Quality Section on the production of Continuous Dissolved Oxygen (DO) Monitoring Reports (Deep-Draft, and Wadeable) annually.

9. Four Ambient Water Quality Monitoring Exceedance Reports were produced by this section for last quarter of 2006 and first three quarters of 2007.

10. The annual Ambient Water Quality report for 2006 was produced.

11. Statistical support and consulting was provided on data management, automation of reports, etc. to various sections in the EM&R Division.

Wastewater Treatment Process Research Section

The Wastewater Treatment Process Research (WTPR) Section is responsible for conducting basic, applied, and problem-solving research on various wastewater and sludge treatment processes currently utilized by the District. Technical assistance is provided to the Maintenance and Operations (M&O) Department for solving WRP operating problems. This Section also investigates innovative treatment processes for potential future use. The investigation of current operations may originate as the result of a WRP problem, or interest in arriving at new knowledge concerning certain aspects of a wastewater treatment process.

Studies of future operations are concerned with maximizing the efficiency of an existing process at the lowest cost or the development of new processes. Investigations may take the form of surveys, literature reviews, laboratory bench-scale testing, pilot-plant studies, full-scale testing, special analyses, or a combination or progression of any or all of the above. Plans and specifications are also reviewed at the request of the Engineering Department for the purpose of optimizing process design criteria.

The major areas of study in 2007 included the following.

Emission of Hazardous Air Pollutants from District WRPs. As part of the NPDES permits and regulations under the Clean Air Act, an estimate of the emission of hazardous air pollutants (HAPs) from the wastewater treatment processes was made. Raw sewage samples were collected twice during the year at each of the District's seven WRPs and analyzed by the Organic Compounds Analytical Laboratory Section for 87 compounds which are Hazardous Air Pollutants (HAPs) of concern for publicly owned treatment works. Using the BASTE fate model and the raw sewage concentrations, the emissions of HAPs from the wastewater treatment processes were

determined. HAP emissions at each of the WRPs were below the 25 tons/year total HAP criterion and 10 tons/year for individual HAPs and thus not considered a major source.

In addition, as part of the Stickney WRP Title V permit, the HAP emissions for the Stickney WRP during the summer period was calculated as part of the Emissions Reduction Marketing Systems reporting requirement.

Odor Monitoring Programs. As part of the District's continuing odor surveillance program, the EM&R Division conducts odor monitoring at the Harlem Avenue Solids Management Area (HASMA), Vulcan, the Lawndale Avenue Solids Management Area (LASMA), Marathon Solids Drying Area (SDA), and Calumet SDAs. A similar odor monitoring program was initiated in the spring of 2001 at the Stony Island SDA and the Ridgeland Avenue Solids Management Area (RASMA) SDA. The programs are required by NPDES permits for the solids management areas. Odor monitoring is also conducted at the Calumet WRP, the John E. Egan (Egan) WRP, the Stickney WRP, the James C. Kirie (Kirie) WRP, and the North Side WRP.

A similar protocol for monitoring odors is used at each location. Either R&D or M&O Department personnel (at some WRPs) visit various stations at each site on a regular basis. Frequency can range from once per week (Egan WRP) to daily (Kirie WRP), depending on the program. The odor monitoring personnel make subjective observations regarding the character and intensity of odors at each of the stations. The odor intensities are ranked on a scale from 0, no odor, to 5, very strong odor. These data are tabulated monthly and will be summarized in an annual report for 2007.

Phosphate Detergents. In view of pending requirements for the removal of phosphorus (P) from WRP effluents, the District has supported a bill introduced in the Illinois General Assembly by the Illinois Association of Wastewater Agencies. This legislation is to limit P in automatic dish washer detergents (ADWDs) and other cleaning products used in business and homes. It has been estimated that P loading due to ADWDs District-wide accounts for 6.2 percent of the total P (TP) load to all the District's WRPs. Discussions with the Soap and Detergent Manufacturers' Association regarding the proposed ban resulted in agreement on the language of the proposed ban. There was no further activity in the Illinois Legislature.

Calumet WRP Digester Mixing Study. Mixing is one of the most important physical factors that affect the anaerobic digestion process. Adequate mixing has been related to several operational and performance advantages, such as methane production. Natural mixing of digester contents may not be enough and external mixing devices may be used to augment natural sludge mixing.

Under Engineering Department Contract 02-818-2P, six new mechanical digester sludge mixers have been installed on an experimental basis, on the floating cover of digester number 5 at Calumet WRP for the evaluation of the performance of an external mixing system, compared to passive mixing. A full-scale performance evaluation study has been proposed in response to a

request by the Engineering Department during 2006, with the cooperation of the M&O Department staff at Calumet WRP. An approved study plan was prepared and approved during 2007. However, problems related to gas meters could not be resolved during 2007. The study has been postponed and is now scheduled for 2008, as soon as gas flow meters are operational.

Ultraviolet Disinfection. The Master Plan consultants recommended ultraviolet (UV) disinfection for all the major WRPs in anticipation of future NPDES permit requirements. In light of the potential for disinfection requirements in the future, the R&D Department has conducted a laboratory-scale study to determine the UV dose-response relationship for the following: Stickney WRP final effluent, Calumet WRP final effluent, North Side WRP final effluent, Egan WRP secondary effluent, Kirie WRP secondary effluent, Hanover Park WRP secondary effluent, and Lemont WRP final effluent.

The seven plant effluent samples were collected a maximum six times from August 8, 2007 through November 8, 2007. Single grab samples were collected from the Stickney, Calumet, North Side, and the Lemont WRPs at plant outfall locations. Composite samples were collected from the Egan, Kirie, and Hanover Park WRPs.

The percent UV transmittance of each day's sample was measured using a Trojan P254C Photometer, and the UV dose response of FC in the effluent was determined using a Trojan Technologies collimated beam apparatus and the species-specific enumeration method.

Results indicate that collectively, a 2-log reduction in FC was achieved with a UV dose of 10 mJ/cm^2 and a 3-log reduction in FC for each WRP effluent was also achieved at or below 40 mJ/cm^2, with the exception of Egan WRP. A 2-log reduction in FC was not observed with Egan WRP secondary effluent within the study dose range (0-40 mJ/cm^2) and will be the subject of further study.

Potential Effects of Ferric Chloride Addition for Phosphorus Removal on Gravity Belt Thickener Performance at Egan WRP. During the course of a six-month full-scale experiment conducted in 2005 at the Egan WRP as a part of the Water Environment Research Foundation (WERF) Project No. 02-CTS-1 (Technologies to Achieve Low Nitrogen and Phosphorous Effluents), approximately 30 to 45 mg/L of ferric chloride ($FeCl_3$) was applied to mixed liquor to achieve low levels of P as a part of a nutrient removal strategy. The waste activated sludge (WAS) subsequently accumulated $FeCl_3$ over the experimental period. Subsequently, the M&O staff at the Egan WRP observed poor performance of the gravity belt thickener (GBT) during the experimental period and related it to the $FeCl_3$ application.

In anticipation of an analogous long-term experiment to be conducted at the Egan WRP during 2007, the Egan M&O staff were concerned about similar poor performance of GBTs. In addition, the Engineering Department is concerned about the influence of $FeCl_3$ addition on GBT thickening. These concerns have been raised because GBTs are being designed for both the Stickney and Calumet WRPs and $FeCl_3$ may be used for P removal in the future.

To verifying if $FeCl_3$ interferes with GBT performance, laboratory experiments on WAS were conducted. The results suggested that the application of $FeCl_3$ during the WERF study at the Egan WRP may have negatively influenced the performance of the GBTs as the operators suspected.

The effects of different doses of $FeCl_3$ on the different solids streams at Egan WRP were evaluated with respect to background levels, i.e. before $FeCl_3$ addition began on February 6, 2007. The $FeCl_3$ addition resulted in increased total solids (TS) in both Egan WAS streams and the GBT feed. The results to date indicate that $FeCl_3$ addition has little to no effect on the TS concentrations in thickened sludge, and therefore at the $FeCl_3$ doses investigated so far there is no evidence that the $FeCl_3$ interferes with GBT performance.

Synergistic Inhibitory Effects of Heavy Metals Mixture on Activated Sludge Nitrification. The Calumet WRP experienced inhibited nitrification during April 2005 believed to be caused by elevated heavy metal concentrations in the plant influent. Laboratory-scale tests were conducted during 2006 to evaluate the possible effects of various combinations of heavy metals on nitrification. The heavy metals of concern are: cadmium (Cd), chromium (Cr), copper (Cu), nickel (Ni), lead (Pb), and zinc (Zn).

Based on preliminary results, synergistic effects were observed with increasing metal concentrations in the metal cocktail (MC) treatments. However, it was difficult to corroborate this synergy of MCs from specific oxygen uptake rates. Nonetheless, an additive effect was observed with respect to nitrate production rates among the MCs, and potentially a synergistic effect was observed with respect to ammonia depletion rates among the MCs.

A comprehensive District report of the above study entitled "Synergistic Inhibitory Effects of Heavy Metals Mixture on Activated Sludge Nitrification" was published in September 2007 (Report No. 07-61).

Methane and Nitrous Oxide Emissions from Wastewater Treatment. According to a recent USEPA report (Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2004, USEPA 2006), domestic and industrial wastewater treatment is the sixth highest contributor to atmospheric methane (CH_4), and human sewage is the fourth highest contributor to atmospheric nitrous oxide (N_2O). A literature review was performed in 2007 by the District's R&D Department to determine the possible sources of fugitive CH_4 and N_2O in wastewater treatment unit processes and collection systems. The literature review was added to a comprehensive District report entitled "Control, Reduction, and Utilization of Greenhouse Gases in Wastewater Treatment: Methane and Nitrous Oxide" which was published in August 2007 (Report No. 07-48).

To quantify and investigate potentially controlling CH_4 and N_2O emissions, a short-term monitoring plan to evaluate the rate of fugitive emissions of CH_4 and N_2O from wastewater treatment was developed. Currently, the monitoring plan is expected to be performed at the Stickney WRP in the spring of 2008.

Thornton Transitional Reservoir Fill Events for 2007. One of the reporting requirements for the Thornton Transitional Reservoir as specified by the IEPA is to write narrative reports of fill events that have occurred during the year.

There were three fill events at the Thornton Transitional Reservoir during the year 2007, January 5-6, 2007, April 25-26, 2007, and August 23-25, 2007. During each fill event, samples were collected from the reservoir and the four water quality monitoring wells surrounding the reservoir. The results of the analyses from the water quality monitoring wells were then compared with the statistical background concentrations these wells.

Groundwater Monitoring Reports. In 2007, groundwater monitoring reports for the year 2006 were prepared for the six Tunnel and Reservoir Plan (TARP) systems, which included Mainstream, Calumet, Des Plaines, Upper Des Plaines, the O'Hare Chicago Underflow Plan (CUP) Reservoir, and the Thornton Transitional Reservoir. These reports were submitted to the IEPA as well as to the USEPA.

Pollutants Captured by TARP. The R&D Department annually calculates the removal of certain pollutants, including SS, both carbonaceous and nitrogenous oxygen-demanding substances, and the flow volume of CSOs collected by the TARP system. As such pollutants removal by TARP was calculated for the year 2007.

The purpose of building the TARP system was to prevent CSOs from entering Lake Michigan and the CAWS. Calculating pollutants removal gives an indication how well TARP is serving its function. The pollutants captured by the TARP system would have otherwise been discharged into area waterways.

Additional Digestion Tests for the Calumet and Egan WRPs. This is a continuous monitoring program that assesses whether the requirements for vector attraction reduction could be met in the biosolids processing at the District WRPs employing Option 2 of Section 503.33(b) of the 40 CFR Part 503 Regulations (Option 2). Option 2 states that vector attraction reduction is demonstrated if after anaerobic digestion of the biosolids, the volatile solids (VS) in the biosolids are reduced by less than 17% in an additional 40 days of bench-scale anaerobic digestion at a temperature between 30° and 37°C. The additional anaerobic digestion tests in accordance with Option 2 are used as a supplemental monitoring program, in addition to the routine monitoring of anaerobic digestion performance. The requirements for vector attraction reduction is met, if Option 2 is satisfied, but VS reduction of 38%, which is the requirement for achieving vector attraction reduction in accordance with Option 1 of Section 503.33(b) of the 503 Regulations (Option 1), is not achieved in the same time period, or vise versa. In 2007, a total of fourteen additional anaerobic digestion tests were performed in the R&D WTPR laboratory for the digester draw from the Calumet WRP through a twelve-month period. Upon the request of the M&O Department, the laboratory-scale additional anaerobic digestion tests in accordance with Option 2 were conducted for the Egan WRP from September to December 2007. A total of nine tests were

conducted. The combined monitoring results indicated that the requirements for vector attraction reduction for the biosolids generated at the Calumet and Egan WRPs were met throughout 2007.

North Side WRP Master Plan Study Project. This project was a study conducted by a consultant team on the future infrastructure and process needs for the North Side WRP and evaluating water quality improvement alternatives for its receiving water, the Chicago Area Waterway System (CAWS), which is called the North Side Master Plan Study. The project involved attending workshops, which were held by the consultant team, to discuss and evaluate the alternatives for improving and updating infrastructure and process facilities of the North Side WRP to meet future needs and for improving water quality in the CAWS. Another major task of the project was to review the documents generated by the consultant team as a result of the North Side Master Plan Study, check the accuracy and suitability of documents pertinent to the study, and to make comments on the documents. WTPR Section personnel attended one workshop and reviewed five documents for this study in 2007.

Unsteady Flow Water Quality Modeling for the Chicago Area Waterway System. An unsteady flow water quality model for the CAWS was developed by Marquette University to simulate various scenarios related to the water quality concerns in the CAWS. The water quality model for the CAWS was built on the platform of Duflow modeling studio. The model was calibrated and verified using part of the 2001 and 2002 hydraulic and water quality monitoring data, respectively, and was delivered to the District in August 2005. In 2007, the model was used to study the impact of discretionary Lake Michigan diversion at three locations, i.e., Wilmette on the North Shore Channel, the Chicago River Controlling Works on the Chicago River, and O'Brien Lock and Dam on the Calumet River, on the water quality, particularly DO concentrations, in the CAWS. A draft summary report on the model simulation results was prepared in 2007.

Chemical Phosphorus Removal at the Egan WRP. For the Salt Creek Phosphorus Reduction Demonstration Project, the P concentrations in the final effluent of the Egan WRP was to be reduced to a level of 0.5 mg/L of TP. Chemical precipitation of P with $FeCl_3$ was chosen to remove P at the Egan WRP. The $FeC1_3$ is added into the mixed liquor at the end of aeration tanks and phosphorus is removed from the wastewater by precipitating ferric phosphate in the secondary clarifiers. The $FeCl_3$ dosing commenced on February 6, 2007. The initial $FeCl_3$ dosing rate, was 1.32 gallons per minute (gpm). Three dosing rate adjustments with rates ranging from 1.17 gpm to 1.32 gpm were made in 2007. The average TP concentration in the final effluent of the Egan WRP from February 7 to December 31, 2007, was 0.35 mg/L with a range from 0.06 to 1.77 mg/L. The spike of TP concentrations in the final effluent occurred in the last week of July 2007 because in this period no $FeCl_3$ was added to the north aeration tank during its startup after aeration diffuser pipe repair. Two interim reports summarizing the monitoring results for this project were prepared in 2007.

Evaluating Two Different Aeration Systems at the Egan WRP. This project was initiated to compare operational efficiency of two different aeration systems at the Egan WRP. The

Egan WRP has two aeration batteries with similar tank configurations. However, the aeration systems are different. The aeration system in the North Aeration Battery (NAB) was replaced with a full floor coverage fine-bubble disc ceramic diffusers a few years ago. The South Aeration Battery (SAB) still has the original spiral roll aeration system using square ceramic diffusers placed on one side of the aeration tank. The two batteries are operated in parallel, which provides an opportunity to conduct a side-by-side evaluation of the performance efficiency. In 2007, the experimental plan for this study was complete and implemented. Field testing, including process oxygen transfer efficiency measurement using the off-gas technique and profile sampling along the aeration tanks for evaluating oxygen uptake rates, nitrification and DO distribution, was conducted in September through November. Valuable field, analytical and operational data were collected and the data analysis is being performed. A summary report on this study will be prepared in early 2008.

Dynamic Simulation of the Stickney WRP Imhoff Tanks. A computer simulation of the Imhoff tanks at the Stickney WRP was developed using the Hydromantis GPS-X software. The model was used to evaluate the effect of taking the Imhoff tanks out of service. The results of the dynamic simulations of the Imhoff tanks were used along with the daily southwest primary effluent as input to the secondary treatment system in the model. The model was used to demonstrate that the Stickney WRP could operate and meet NPDES permit limits for ammonia with Imhoff Battery A out of service.

Simulations of the Cal-Sag Channel. The CAWS model based on the Duflow software was used to evaluate various combinations of the Sidestream Elevated Pool Aeration (SEPA) pumps along the Cal-Sag Channel.

The model was used to simulate operation of two pumps at SEPA station 2 and three pumps at SEPA stations 3, 4, and 5. Four simulation periods were run: July 12, 2001, through September 14, 2001; September 1, 2001, through November 9, 2001; May 1, 2002, through August 11, 2002; and August 10, 2002, through September 23, 2002. A field test that verifies the results of the model using the SEPA Stations and the continuous DO monitoring stations is planned for 2008.

Innovative Technologies. *Collection System Bioaugmentation.* The collection system can be used for pretreatment. In most cases it currently is an ineffective pretreatment process. The microbes that occur naturally are usually not very efficient in the collection system. Since the wastewater is generally in the collection system longer than it is in the treatment plant, it makes sense to try to take advantage of the opportunity and turn the collection system into an effective waste removal pretreatment step.

Case studies of collection system bioaugmentation were evaluated. The WRPs in the case studies were in both warm and cold climates. Literature was evaluated on the effectiveness of the technology. After the technology evaluation the cost was evaluated and determined to be too expensive for the benefits.

Wastewater Disinfection with Doped Titanium Dioxide and Visible Light. Researchers at the University of Illinois at Urbana-Champaign, Center of Advanced Materials for Purification of Water Systems (WaterCAMPWS), report that they have a technology feasible for wastewater disinfection. The WaterCAMPWS researchers have doped the titanium dioxide with nitrogen creating a photocatalyst, TiON, activated by visible light. The TiON was further improved by incorporating a proprietary metal, M/TiON. The researchers have demonstrated that the M/TiON generates hydroxyl radicals which, when illuminated with visible light, results in rapid inactivation of common bacteria such as *E. coli*.

A bench trial was performed with a powder version of the M/TiON produced at WaterCAMPWS. The Stickney WRP effluent was used to evaluate the disinfection efficiency. Additionally, two similar titanium samples were produced at Clark-Atlanta University. However, production problems with the M/TiON a the WaterCAMPWS will delay this investigation indefinitely.

Wastewater Disinfection with Quaternary Ammonium Chloride Coated Sand. Disinfection technology using Quaternary Ammonium Chloride (QAC) could be a cost effective disinfection treatment for wastewater. QAC is used as a disinfectant in hospitals and some industrial applications. The QAC disinfectant has been incorporated into a coating and applied to sand. An experimental plan was developed to determine if the QAC coated sand would be an effective disinfectant for wastewater. The bench trial will be done in the early part of 2008.

Biosolids Utilization and Soil Science Section

The Biosolids Utilization and Soil Science Section is responsible for determining the environmental impact of the District's biosolids management program and promoting local beneficial use of the District's biosolids. This is done through monitoring, research, and biosolids marketing activities. The biosolids management program consists of application of biosolids on agricultural fields, disturbed lands, recreational areas, and landfill sites. The Section also provides oversight for technical aspects of biosolids land application contracts.

The environmental monitoring component of the program includes the sampling and analysis of waters, soils, plant tissue, and biosolids at land application sites and biosolids drying facilities. The results of this monitoring program are reported to the IEPA and the USEPA. In 2007, the Section submitted 56 permit-required reports to the IEPA, three reports to the USEPA, and six reports to the M&O Department for reporting to the IEPA. The Section is responsible for maintaining the District's site-specific certification of processes that further reduce pathogens for processing trains at the Stickney and Calumet WRPs, as awarded by the USEPA.

The research component of the program consists of studies to support the local marketing of biosolids such as: research plots in farmers' fields to demonstrate the safety of farmland application of biosolids, cooperative research with consulting soil scientists and the IEPA to study availability of biosolids phosphorus to plants and its environmental impacts, and evaluation of the beneficial effects of biosolids use on the growth of turf on golf courses and recreational

fields. The research component also consists of studies to demonstrate that land application of biosolids according to the USEPA Part 503 biosolids rule provides protection to human health and the environment, such as: studying changes in the bioavailability of trace elements to plants over time in biosolids-amended soils and the fate of organic contaminants in the soil environment.

The Section also conducts applied research at the District's land reclamation site in Fulton County to study the impact of land application activities at the site and of biosolids phosphorus on the environment. The studies include the experimental corn plots which have received cumulative applications of 1,050 dry tons of biosolids per acre (maximum-amended plots) from 1973 through 2007. These plots are utilized to study the uptake of trace elements into corn, and the fate of nutrients from continuous annual applications of biosolids. The biosolids phosphorus studies are aimed at determining the bioavailability of biosolids phosphorus, and estimating and mitigating P runoff in biosolids-amended soils.

The Section also assists in local marketing of biosolids and providing technical support to biosolids users. The biosolids marketing activities include preparation of promotional documents, showcasing the District's biosolids management program at local trade shows and conferences, and presentations to potential biosolids users. The Section also maintains continuous demonstrations of turfgrasses, prairie grasses, forage grasses, and wild flowers in a greenhouse at the Cecil Lue-Hing R&D Complex.

The Section also provided technical support in 2007 to the District's Native Prairie Landscape initiative and the District's new stormwater management program.

Analytical Microbiology and Biomonitoring Section

In 2007 the Analytical Microbiology and Biomonitoring Section was involved in a number of large research studies, routine monitoring programs and the review of proposed regulations and draft permits. This Section coordinated the following studies designed to assess the future needs of the District: (1) Microbial Risk Assessment of Human Health Impacts of Disinfection Versus No Disinfection, (2) Epidemiological Study of Recreational Use of the CAWS. The section also conducted analysis and provided technical counsel for the following (1) Monitoring for Fecal Coliform to Evaluate the Disinfection Technologies - Ultraviolet Light and Titanium Oxide, (2) Monitoring Bacterial Densities on Farm Soil After Application of Biosolids, (3) Monitoring Antibiotic Resistant Bacteria (ARB) in Final Effluents and the CAWS, (4) Master Planning for the Stickney, Calumet, and North WRPs, (5) Lemont WRP Expansion Permit, and (6) the Salt Creek Nutrient Reduction Demonstration Project. The Section also reviewed the CAWs UAA Study and the IEPA Proposed Standards for Bacteria. The Section was comprised of the following sub-groups, which performed specific monitoring or research activities: Analytical Microbiology, Biomonitoring, Parasitology, and Virology. The specific activities of the subgroups in 2007 are summarized below.

Analytical Microbiology Sub-Group. FC, *E. coli*, and other microbiological analyses were conducted for the following: Illinois Waterway; CAWS Ambient Water Quality Monitoring (AWQM) Program; Disinfection Study; Biosolids Monitoring for Part 503 Compliance; Biosolids Land Application Project, SDAs Monitoring Wells; TARP Groundwater Monitoring Wells; and TARP Reservoir Monitoring. Potable water at District facilities was also monitored for total coliforms, *E. coli*, and total heterotrophic bacteria. Further, analyst performance evaluation testing as required for IDPH laboratory certification was completed.

In 2007, a second phase of an ARB research study entitled, "Monitoring the Total Numbers, Percentages, and Antibiotic Resistance Patterns of Antibiotic Resistance Fecal Coliforms in the Chicago Waterway System", was continued. The monitoring of the density of ARB in the CAWS upstream and downstream of the Stickney and North Side WRPs, as well as the final effluents from these plants was completed. Also, wet weather samples collected from the waterways, WRP final effluent, and pumping station monitoring was completed.

As part of the UAA study of the CAWS, a microbial risk assessment of the human health impact of disinfecting versus not disinfecting effluents from the District's Calumet, North Side, and Stickney WRPs, was conducted in two phases. The first phase, completed in 2006, evaluated the levels of microbial concentrations (indicator and pathogens) in the CAWS under dry weather conditions. The second phase, completed in 2007, evaluated the impact of Pumping Station CSOs and other wet weather impacts on the microbial quality and pathogen risk to recreational users of the CAWS. The Section provided review and comments on a draft report on the dry and wet-weather risk assessment study.

To verify the results of the microbial risk assessment study and to characterize the health risks of incidental contact recreation in the CAWS, an epidemiological research study known as the Chicago Health, Environmental Exposure and Recreation Study (CHEERS), was initiated in collaboration with a multidisciplinary team at the University of Illinois at Chicago School of Public Health. CHEERS has undergone peer review and is being conducted in consultation with national and international experts including USEPA epidemiologists, the WERF, and Center for Disease Control (CDC) personnel. The health survey and data collection, which commenced in 2007, is scheduled to be completed in the spring of 2010.

Biomonitoring Sub-Group. Chronic whole effluent toxicity (WET) tests with fish (*Pimephales promelas)* and daphnids (*Ceriodaphnia dubia)* were conducted on effluent samples from the Hanover Park WRP. No chronic toxicity was found to be associated with this final effluent.

A biomonitoring report was submitted to the IEPA in compliance with Hanover Park WRP's NPDES permit. Also, the Discharge Monitoring Report – Quality Assurance (DMR-QA) Study 27 for WET as required under the Clean Water Act's NPDES was completed.

The *Selenastrum capricornutum* Printz Algal Assay Bottle Test (AGT) was conducted to study the biological available P in the Egan and Lemont WRPs final effluent and in upstream and downstream locations, in conjunction with a planned demonstration project to study river

response to P reduction. Eight valid AGTs were conducted to measure biosolids phosphorus in effluent samples from the Egan WRP and samples from three monitoring stations on the Salt Creek receiving stream. In addition, four valid AGTs were conducted on effluent samples from the Lemont WRP and samples from three monitoring stations on the Chicago Sanitary and Ship Canal (CSSC). The samples were collected and analyzed once each quarter. The results of the AGTs are important in the District's effort to maintain the biotic integrity of the waterways (Salt Creek and CSSC) and the IEPA's effort to develop nutrient standards for the State of Illinois.

The Biomonitoring group also worked cooperatively with the WTPR Section by providing microbiological evaluation on protozoa, *Microthrix parvicella*, and *Nocardia* spp. to solve operational problems at the Egan WRP.

Parasitology Sub-Group. Air-dried biosolids (final product) were analyzed for viable *Ascaris* ova for compliance with the Part 503 Standards. All biosolids produced from the District's codified process were determined to be Class A biosolids with respect to pathogens (less than 1 viable *Ascaris* ovum per four grams) as defined by the Part 503 Standards. This sub-group also continued monitoring of parasite (viable *Ascaris* ova) and coliphages (male-specific RNA and somatic) in biosolids amended farmland research sites.

Virology Sub-Group. Air-dried biosolids (final product) were analyzed for culturable enteric viruses for compliance with the Part 503 Standards. All biosolids produced from the District's codified process were determined to be Class A with respect to pathogens (less than 1 enteric virus per four grams) as defined by the Part 503 Standards. Monitoring of virus densities in biosolids amended farmland research sites also continued.

Aquatic Ecology and Water Quality Section

The Aquatic Ecology and Water Quality Section is responsible for monitoring and assessing the water and sediment quality in the CAWS. An additional responsibility is to review and participate in regional work groups that formulate emerging federal and state water quality rules and regulations that directly relate to District NPDES permits and to water quality in the CAWS. These regulations include 305(b) assessment reporting, 303(d) listing of impaired waters, lower Des Plaines River UAA, Chicago River UAA, total maximum daily loads for Salt Creek and the West Branch of the DuPage River, and the development of nutrient standards.

Field monitoring activities conducted during 2007 by the Aquatic Ecology and Water Quality Section included the following:

Benthic Invertebrate Monitoring. As part of the AWQM Program, the numbers of benthic invertebrates were assessed at 25 monitoring stations in the Chicago, Calumet, and Des Plaines River Systems from June through October 2007. Samples were collected from 14 stations located on the deep-draft waterways and 11 stations on wadeable streams. Benthic

invertebrates were collected using a 6- x 6-inch Ponar Grab sampler and a 3- x 3-inch Hester-Dendy artificial substrate. In the laboratory, the sediment samples were washed, screened, and the oligochaetes (sludge worms) were sorted and counted. Other benthic invertebrates were sent to an outside contractor for identification. The benthic invertebrate data will be provided to the IEPA for their use in preparing the Illinois 305(b) assessment report.

Fish Monitoring. As part of the AWQM Program, fish were collected from June through October 2007 at 28 stations in the Chicago, Calumet, and Des Plaines River Systems. Seventeen stations were located on the deep-draft waterways and 11 stations were on wadeable streams.

On the deep-draft waterways, fish were collected using an electrofishing boat. Electrofishing, using either a backpack electrofisher or a small electrofishing boat, and seining, using a 15-foot bag seine, were used to assess the fish population on wadeable streams. Fish were identified, weighed, measured for length, and examined for parasites and disease. The fish data will be provided to the IEPA for their use in preparing the Illinois 305(b) assessment report.

In cooperation with the IEPA, as part of the Illinois Fish Contaminant Monitoring Program, a total of 12 composite fish fillet samples, from 53 fish collected from nine sample stations, will be sent to IEPA for contaminant analyses.

Habitat and Sediment Quality Monitoring. From June through October 2007, a physical habitat assessment was conducted at 25 monitoring stations in the Chicago, Calumet, and Des Plaines River Systems. In order to assess sediment chemistry and sediment toxicity, sediment samples were collected at 13 monitoring stations in the Calumet River System. The results of the habitat assessments, chemical analyses of sediments, and sediment toxicity testing will be provided to the IEPA for their use in preparing the Illinois 305(b) assessment report.

Chlorophyll Monitoring. During 2007, chlorophyll in phytoplankton was monitored monthly at 59 stations in the Chicago, Calumet, and Des Plaines River Systems. Surface water samples were collected using a stainless steel bucket. In the laboratory, samples were analyzed for chlorophyll *a*, *b*, and *c*, and pheophyton *a*. The concentration of chlorophyll *a* will be used to estimate the phytoplankton biomass and productivity, and to determine the trophic status of surface waters.

Continuous Dissolved Oxygen Monitoring. DO monitoring continued during 2007 at 32 stations in the Chicago, Calumet, and Des Plaines River Systems, including 20 deep-draft stations and 12 wadeable stream stations. Deep-draft monitoring stations extended from Main Street on the North Shore Channel, Clark Street on the Chicago River, and Torrence Avenue on the Grand Calumet River, to Jefferson Street on the Des Plaines River below the Lockport Lock and Dam. Water quality monitors were deployed and retrieved weekly at all monitoring stations. Annual summary reports for the 2006 DO monitoring results were published in May 2007. The 2007 reports are planned for publication in the first quarter of 2008.

Illinois Waterway Monitoring. During May, August, and October of 2007, water samples were collected from 49 stations in six navigational pools along 133 miles of the Illinois Waterway System from the Lockport Lock and Dam to the Peoria Lock. The primary objective of the monitoring is to determine water quality and sediment trends along the waterway system from Chicago to Peoria. In order to characterize the chemical quality of the sediments, sediment samples were collected during October at 14 monitoring stations.

Salt Creek Nutrient Demonstration Project. In 2005, the District conferred with IEPA and agreed to conduct a large-scale P reduction demonstration project at the Egan WRP, which included extensive sampling at three new stations on Salt Creek. Pre-implementation chemical and biological monitoring began in February 2005, and P removal began behind schedule in February of 2007. Water samples were collected one time per month during January through March, and December, twice per month between April through November, and on four consecutive days during rain events. Water samples were analyzed for nutrients and other pertinent constituents. The Aquatic Ecology and Water Quality Section conducted full-scale biological sampling at each of the three locations once per year, including benthic invertebrate and fish collections, sediment chemistry analyses, and habitat assessments.

Fecal Coliform Density Sampling Study. In order to assess the distribution and die off of FC bacteria in District waterways, a FC density sampling study, initiated in 2004, was continued with waterway grab samples collected from January through December in both 2005 and 2006. During this period, there were 12 dry weather sampling events at each of 12 waterway stations per year. Six stations were located on the North Shore Channel and North Branch Chicago River and six stations were on the Little Calumet River and the Calumet-Sag Channel. Routine monthly monitoring samples were also collected at each of these 12 stations per year. Wet weather events required water sampling for a maximum of three days following a rain event. The results of this study may impact the current CAWS UAA study. The final report was published as R&D Report 07-79 “Fecal Coliform Densities in the Chicago Waterway System During Dry and Wet Weather 2004-2006.”

Radiochemistry Section

The Radiochemistry Section is responsible for the radiological monitoring of waters, wastewaters, and biosolids, and the maintenance of radiation safety at the District. It also performs any special tasks involving the use of ionizing radiation and radioisotopes. The Section performed 3,907 tests in 2007.

Radiological Monitoring of Waterways. The radiological monitoring of the CAWS is a part of the AWQM Program of the District. The waterways under the jurisdiction of the District include the Calumet, Chicago, and Des Plaines River Systems. The gross alpha and gross beta radioactivity was measured monthly at 45 sampling locations. The radioactivity concentrations

in water samples analyzed from all three river systems were within the IPCB's General Use Water Quality Standards.

Radiological Monitoring of Wastewaters and Biosolids. The radiological monitoring of raw and treated wastewaters from the District's WRPs was initiated in 1967 and continues to date. During the year, the radioactivity in the final effluent of all the WRPs was generally lower than the corresponding raw sewage of the WRP, indicating that the wastewater treatment process is removing radioactivity from the raw sewage. The amount of gross alpha and gross beta radioactivity in the final effluent is also less than the USEPA standards for gross alpha and gross beta radioactivity in the community water system. This shows that the discharge of final effluent from the District's WRPs is not likely to have an adverse effect on the radiological quality of the CAWS.

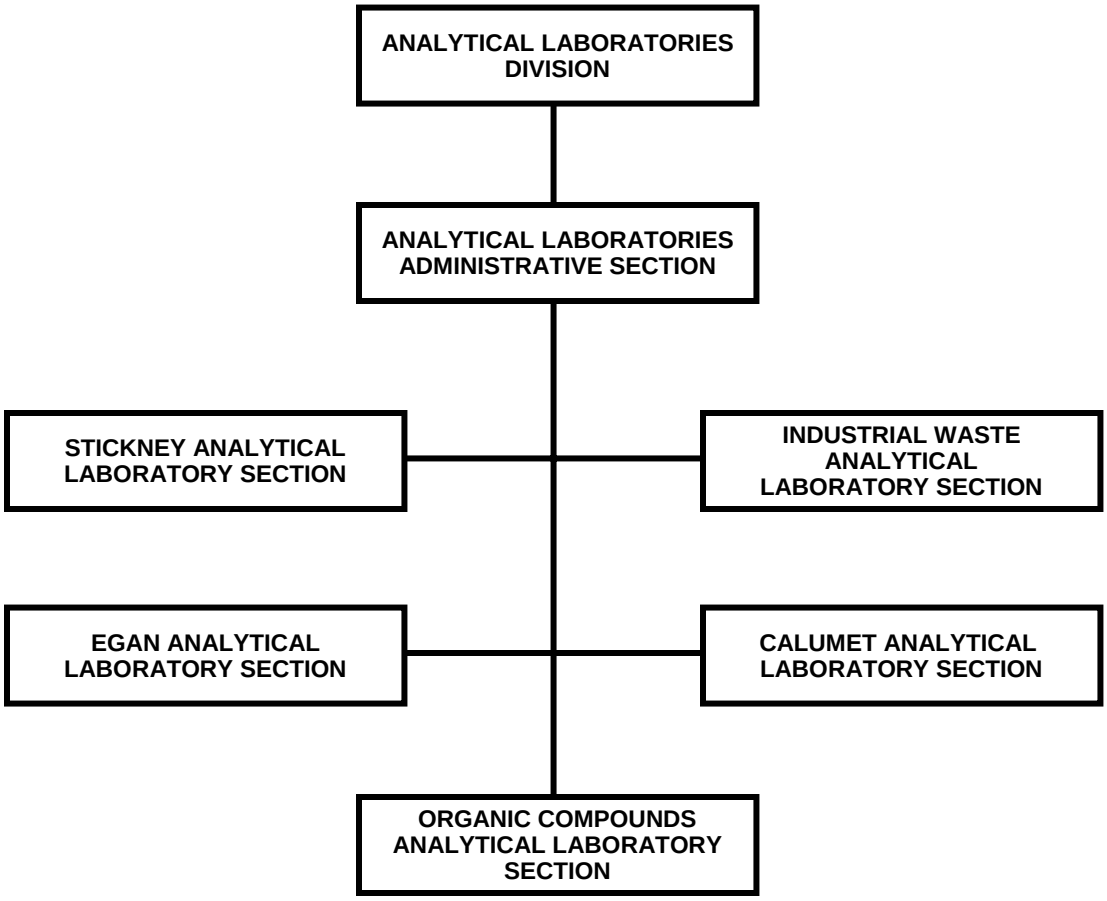
The Section also performs radiological monitoring of biosolids from the seven WRPs, Hanover Park WRP lagoons, and from the solids drying sites of the District. The monitoring data serves as a measure of present-day radioactivity levels in comparison to levels in the past years for gross alpha, gross beta, and gamma-emitting radionuclides in biosolids.

Radiation Safety Program Activities. The Section maintains a radioactive material license issued to the District by the IEMA-DNS, assuring that activities are conducted according to the license conditions and regulations. These activities include the personnel monitoring for radiation exposure, radiological monitoring of work areas in the Radiochemistry Laboratory, testing for leakage and contamination of nickel-63 detectors in gas chromatographs at the R&D laboratories, testing for leakage and contamination of nuclear gauges used by the Engineering Department, and testing for leakage and contamination of an X-ray fluorescent paint analyzer and an APD2000 Chemical Warfare detector owned by Safety Section of the General Administration Department.

Laboratory Quality Assessment Program Activity. The Section continued to participate in the Environmental Resource Associate (ERA) RadChem proficiency testing (PT) program as required by the DNS as a part of the Radiochemistry Laboratory certification. Water samples were analyzed for gross alpha, gross beta, tritium, barium-133, cesium-134, cesium-137, cobalt-60, and zinc-65 radioactivity. The Section also participated in the ERA's MRAD radiochemistry PT studies for soil samples. The soil samples were analyzed for actinium-228, bismuth-212, bismuth-214, cesium-137, lead-212, lead-214, and potassium-40 radioactivity. Acceptable results were obtained on all these samples.

FIGURE 2

ANALYTICAL LABORATORIES DIVISION
ORGANIZATION CHART



ANALYTICAL LABORATORIES DIVISION

The Analytical Laboratories Division (ALD) provides daily analytical services to the District as follows:

- To the M&O Department for monitoring treatment process operations and NPDES permit compliance for the seven WRPs, for monitoring biosolids processing activities and the operation of the TARP project.

- To the EM&R Division for various applied and operations research to achieve improvements and cost reductions in District treatment process operations, and to assist in monitoring Chicagoland and Illinois waterways.

- To assist the Industrial Waste (IW) Division as it routinely regulates categorical industrial discharges to the sewer system and waterways to determine compliance with the Sewage and Waste Control Ordinance (SWCO) and the USEPA-approved Pretreatment Program.

A centralized laboratory located at the Stickney WRP and two other regional laboratories (a total of one organic and four inorganic analytical laboratory sections) are maintained in order to consistently provide the needed analytical services in a timely manner.

The large number of analyses performed by the ALD, as shown in Table 2 on page 33, could not be accomplished without automation and instrumentation. Staff from the R&D and IT Departments worked together to further improve the Laboratory Information Management System (LIMS) to increase data processing and reporting, and to enhance data acquisition from automated instruments. Through its LIMS team, the ALD provided ongoing support during 2007 to the EM&R Division, IW Division, and M&O Department personnel.

In mid-2003, the ALD implemented a chemical hygiene plan (CHP) for the District laboratories, which was revised in 2006. The third round of audit inspections of the laboratories was completed during 2007. Each laboratory is in compliance with the requirements of the CHP.

The five analytical laboratories maintained laboratory accreditation by the IEPA during 2007 in accordance with NELAP.

Stickney Analytical Laboratory (SAL)

This laboratory is located at the Cecil Lue-Hing R&D Complex and performed 618,926 analyses for solids, nutrients, and metals on 53,780 samples in providing analytical services for the following:

TABLE 2: TOTAL NUMBER OF ANALYSES PERFORMED IN 2007

Program	Nutrients	Oxygen Demands	Metals	Solids	Organic Compounds	Others	Total Program
4652 Liquid Monitoring	96,090	75,199	205,523	55,500	38,940	59,881	531,133
TARP	2,925	1,170	3,625	634	0	3,429	11,783
Treatment Facilities	93,165	74,029	201,898	54,866	38,940	56,452	519,350
4653 Solids Monitoring	19,650	1,184	125,441	127,624	5,895	33,615	313,409
4666 Sewage & Waste Control	1,035	188	291,230	706	39,296	13,512	345,967
4663 User Charge	0	63,533	0	18,162	0	33,959	115,654
4672 Waterways	12,316	3,029	66,467	3,900	72,240	18,003	175,955
4681 Assistance to M&O	2,614	48	1,958	2,993	1,281	11,239	20,133
4682 Assistance to Others	29	819	163	122	0	494	1,627
4690 Operations & Research	28,008	1,334	55,135	5,194	19,740	3,153	112,564
Totals	159,742	145,334	745,917	214,201	177,392	173,856	1,616,442

M&O Department.

1. Process Control, Operations Monitoring, and NPDES Permit Compliance Monitoring for the Stickney WRP.

2. Solids management areas at Harlem Avenue, Lawndale Lagoons, Ridgeland Avenue, Stony Island, and Calumet.

3. Calumet, Stickney, and Egan WRPs Biosolids Centrifuge Cake Application to agricultural lands.

4. USEPA and IEPA Split Sampling Program.

5. TARP Groundwater Monitoring Program.

EM&R Division.

1. Environmental and permit compliance monitoring in Fulton County involving biosolids quality, test well water quality, surface water quality, and plant tissues.

2. Ambient Water Quality Monitoring Network Program.

3. Solids management areas at LASMA, Calumet East and West Marathon, Vulcan, HASMA, Stony Island and RASMA.

4. Analytical support for biosolids marketing.

5. Illinois Waterways Monitoring Program.

6. CFAR Nutrient Study.

7. Salt Creek Nutrient Demonstration Project.

8. Chemical Phosphorus Removal at the Egan WRP.

9. Full-scale evaluation for GBT at Hanover Park WRP.

10. Fish Kill Response.

11. Notice and Necessary Information (NANI) Biosolid Study.

12. Full-scale evaluation for centrifuge dewatering at Calumet and Stickney WRPS.

13. Egan Biosolids Phosphorus Removal Study.

IW Division. Metals analyses are conducted on regulated categorical industrial discharges to determine compliance with the SWCO. The following 15 metals are regulated: arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver, vanadium and zinc.

Other Services. In addition to typical water, wastewater, and biosolids analyses, this laboratory also performs analyses on materials purchased by the District (such as lubricants, sodium hypochlorite, and $FeC1_3$) for verification of contract requirements.

Analytical services for certain essential processes at the Stickney WRP are provided seven days a week. The following critical areas are supported: (1) monitoring of mixed liquor and return sludge concentrations, (2) the raw sludge thickening process, and (3) the biosolids dewatering operation.

Industrial Waste Analytical Laboratory (IWAL)

Located at the Lue-Hing R&D Complex, this laboratory performed 194,122 analyses on 21,821 samples. The laboratory performs analyses for fats, oils and greases (collectively, FOG); several species of cyanide (total, amenable to chlorination, and weak acid dissociable); phenols; total organic carbon (TOC); total and suspended solids; biochemical, carbonaceous biochemical, and chemical oxygen demands (BOD_5, $CBOD_5$ and COD) and all required support analyses; residual chlorine; pH; and DO in support of the following:

M&O Department.

1. Process Control, Operations Monitoring, and NPDES Permit Compliance Monitoring for the District's seven WRPs.

2. Solids management areas at Harlem Avenue, Lawndale Lagoons, Ridgeland Avenue, Stony Island, and Calumet.

3. TARP Groundwater Monitoring Program.

EM&R Division. Various environmental monitoring and research programs, such as: (1) AWQMN Program, (2) Illinois Waterways Monitoring Program, (3) CFAR Nutrient Study, and (4) Fulton County Retention Basin Monitoring.

IW Division. The Section continued to provide analytical assistance for the administration of the District's SWCO and the User Charge Ordinance (UCO), in addition to compliance testing related to the categorical pretreatment limits. This includes: (1) maintaining evidentiary laboratory chain of custody for all samples obtained from various industrial dischargers; (2) providing records as required for various legal proceedings, hearings and/or Freedom of Information

Act requests; (3) providing responses of a technical nature to dischargers' inquiries related to analytical methodologies. Vital technical and programming assistance continued to be provided for the interfacing of the new Sample Manager for Windows (SMW) LIMS upgrade to the Pre-treatment Information Management System (PIMS).

Organic Compounds Analytical Laboratory (OCAL)

The OCAL is located at the Egan WRP and is responsible for the organic compounds analysis in samples primarily from the District's WRPs, industrial waste discharges, and Illinois Waterways.

During 2007, the OCAL performed 177,392 analyses on 733 samples in providing analytical services to the following:

M&O Department.

1. Organic Compounds in raw sewage, sludge, and final effluent samples from the seven District WRPs for monitoring NPDES compliance semi-annually.

2. Organic compounds in District samples as needed.

EM&R Division.

1. Emission of volatile organic compounds in District raw sewage samples from the seven District WRPs semiannually.

2. Nonylphenols in Chicagoland and Illinois Waterways samples, either bimonthly or quarterly.

3. Organic priority pollutants/BETX in Chicagoland and Illinois Waterway samples, including aqueous and sediment samples.

4. Organic priority pollutants in Kankakee County lysimeters, cake, and biosolids soil samples.

5. Organic compounds including herbicides in Lockport Powerhouse drinking water samples annually.

6. Organic priority pollutants in the Kirie WRP Tunnel and Reservoir Drop Shaft samples.

7. Organic compounds including diazinon in 503 biosolids samples.

8. Low levels of diazinon in final effluents from the seven WRPs semiannually.

9. Coordination of the semi-annual analysis of triclosan and triclocarban in District WRP samples (effluent, raw sewage, and sludge) by Johns Hopkins University.

IW Division.

1. Organic priority pollutants in discharges from industrial users as part of the District's Pretreatment Program to ensure compliance with Discharge Authorizations and USEPA categorical standards. Types of wastes included: electroplating, organic chemicals and plastics, cold forming, metal finishing, metal molding and casting, aluminum forming, and pharmaceuticals.

John E. Egan Analytical Laboratory (EAL)

This laboratory is located at the Egan WRP and performed 281,758 analyses on 32,374 samples in providing analytical services for the following:

M&O Department.

1. Process Control Analyses and NPDES Compliance Monitoring for Egan, Kirie, Hanover Park, and North Side WRPs.
2. USEPA and IEPA Split Sampling Program.
3. Materials and Boiler Water Testing Programs.
4. Soluble Phosphorus Study at the four North Area WRPs.
5. Process Stream Evaluations of Suspected Incidents of Toxic Interferences or Pass-Through Events.
6. Polymer Testing for Raw Sludge Dewatering at the Egan and Hanover Park WRPs.
7. Development, Implementation and Support of LIMS Reports for use by M&O Personnel at the four North Area WRPs.
8. Soluble Metals Analyses of the Influent and Outfall of the four North Area WRPs.
9. 503 Compliance Monitoring of Sludge from the four North Area WRPs.
10. Control of Nocardia and Microthrix Parvicella Filaments Analytical Support at the Egan WRP.

EM&R Division.

1. Study of Chemical Phosphate Removal at Egan WRP.

2. Hanover Park Fischer Farm Wells and Biosolids.

3. Comparing Two Aeration Systems at the Egan WRP.

IW Division.

1. Determination of pHs for grab samples collected by IW Division personnel.

2. Screen and preserve cyanide grab samples before holding time is exceeded.

Calumet Analytical Laboratory (CAL)

This laboratory is located at the Calumet WRP and performed 344,244 analyses on 29,975 samples in 2007 by providing analytical services for the following:

M&O Department.

1. Process Control, Operations Monitoring, and NPDES Compliance Monitoring for the Calumet and Lemont WRPs.

2. Provided assistance with the UV disinfection study as part of the UAA Study.

3. Provided assistance to the SAL to coordinate the sampling for low level mercury of the Calumet and Lemont WRP effluents.

4. Provided analytical support for the Calumet Master Plan.

5. Provided support during the Calumet and Lemont WRP wet weather events.

6. Provided support for the WEFTEC Operators Challenge BOD event.

7. Began analyzing the Drying Bed samples from Stony Island at the request of LASMA.

8. Provided support to the District's Environmental Management System and the goal of accreditation with the National Biosolids Partnership.

EM&R Division.

1. Calumet Biosolids Processing Operations and the Fulton County Prairie Plan Project, sulfate analysis of Waterways and TARP.

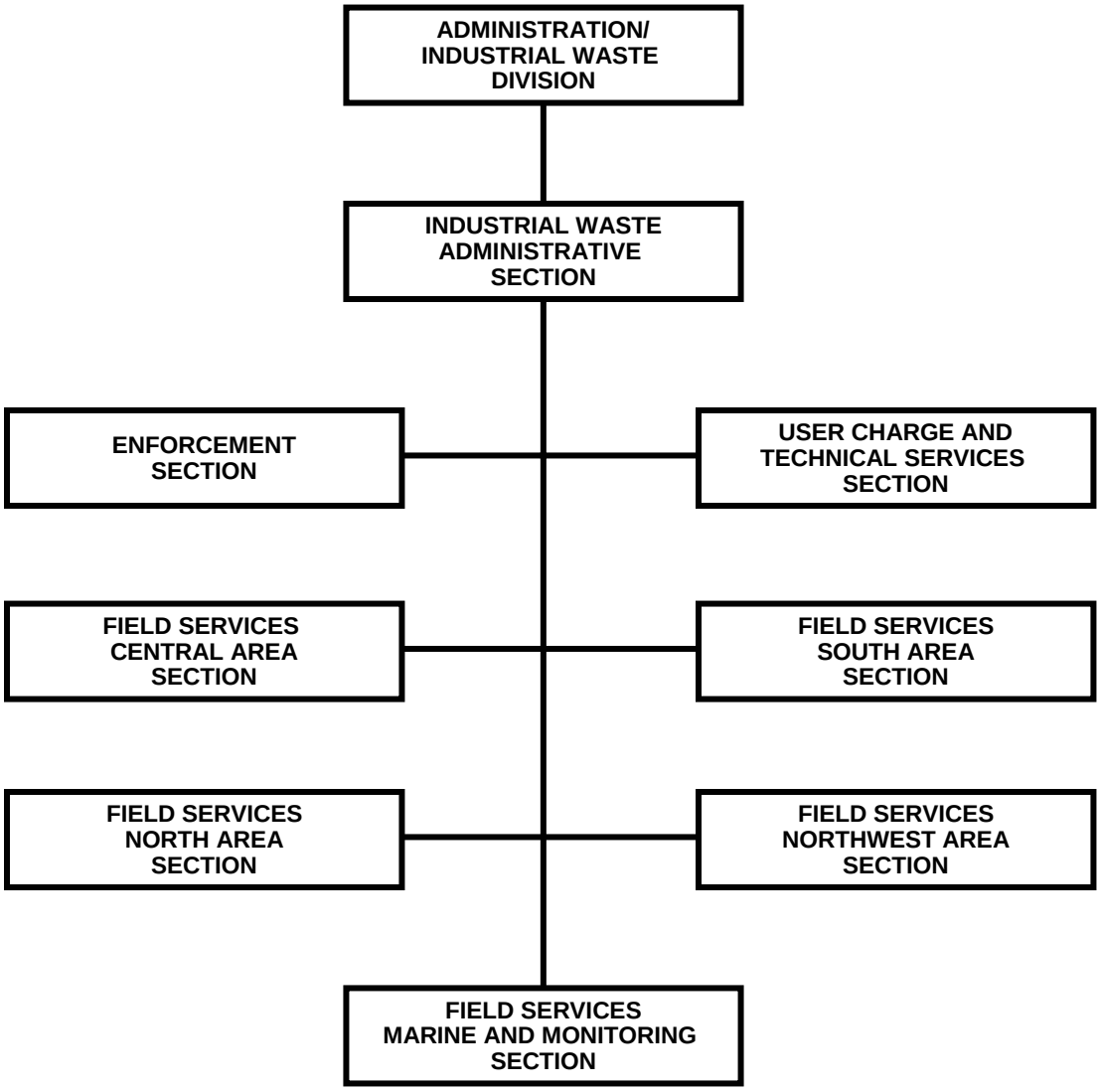
2. Provided assistance to Wastewater Research by measuring hydrogen sulfide in the profile study of the influent for Stickney and Calumet WRPs.

3. Sulfate and trace metals analyses for the Stickney greenhouse samples.

4. Provided analytical and LIMS assistance for the Octopus Study at the Centrifuge complex.

FIGURE 3

ADMINISTRATION / INDUSTRIAL WASTE DIVISION ORGANIZATION CHART



INDUSTRIAL WASTE DIVISION

The Industrial Waste Division consists of four sections: Administrative, Enforcement, User Charge and Technical Services, and Field Services. The Division's primary responsibilities are the administration of the District's SWCO and UCO. It is responsible for the compilation and presentation of data pertaining to industrial user discharges to the District's sewerage system. Additionally, the Division executes the District's responsibility as a primary response agency for hazardous materials emergencies in Cook County.

Administrative Section

This Section is responsible for the general administration of the Division and for coordination and direction of the work of the Enforcement, User Charge and Technical Services, and Field Services Sections. It is responsible for budgetary preparations and control, and prepares and maintains Division procedural manuals. The Section reviews and comments on pretreatment and wastewater regulations proposed by federal and state agencies.

The Administrative Section also coordinates the supply of technical data, technical support activities, and recommendations provided by the Division to other divisions of the R&D Department, and to other departments of the District. It presents data in report form for a variety of purposes and prepares illustrative charts and tables pertinent to those reports.

Enforcement Section

The Enforcement Section is responsible for the routine administration and enforcement of the SWCO, which incorporates the federal pretreatment regulations for certain industrial categories and specifies limits for concentrations of contaminants discharged to the District's sanitary sewerage system and to the waterways within the District's boundaries.

Administrative activities performed by the Enforcement Section during 2007 included the issuance or renewal of 121 Discharge Authorizations; the review of 900 Continued Compliance Reports; and the review of 33 Spill Prevention, Containment and Countermeasure Plans. Enforcement activities for the period from 2002 through 2007 are depicted in the following table.

Year	Cease and Orders	Board Orders	Legal Actions
2002	429	0	11
2003	406	1	18
2004	284	11	4
2005	152	2	0
2006	149	1	0
2007	132	1	0

The Enforcement Section also prepares the District's list of significant violators of applicable pretreatment regulations, which is required to be published annually in a newspaper that provides meaningful public notice within the jurisdiction of the District. The trend for the period from 2002 through 2007 is depicted in the following table.

Year	Effluent Limitations	Reporting Requirements	Other Requirements[1]	Total Number of Industrial Users Published
2002	15	49	0	62
2003	18	64	2	76
2004	21	55	0	72
2005	11	54	0	61
2006	12	44	0	51
2007	10	35	4	43

[1] Other violations included dilution, failure to provide access for inspection purposes, failure to install adequate sampling facilities, failure to provide adequate spill containment, failure to install and maintain adequate pretreatment facilities.

User Charge and Technical Services Section

The User Charge and Technical Services Section administers the District's federally-approved User Charge system as authorized under the UCO.

In 2007, the Section received and reviewed reports filed by 3,350 users (840 commercial-industrial and 2,510 tax-exempt users) containing calculations of their User Charge liabilities under the UCO and documentation corroborating their data. The Section classified 46 new large commercial-industrial and tax-exempt users and 4,140 small nonresidential-commercial users in 2007.

The Section requests verification sampling of certain facilities by the Field Services Section, and determines the acceptability of the user's proposed sampling methodology. In 2007, the Section reviewed 934 District inspection and sampling reports from the Field Services Section; 69 user proposals for sampling, monitoring and/or installations; sealed 59 privately owned water meters used for reporting volume deductions or discharge volumes; and conducted 1,008 field inspections to verify user data and/or compliance with the UCO. As of the end of 2007, the Section had also identified 310 Users who were eligible for reduced reporting and self-monitoring requirements under Sections 7g, 7h, and 7i of the UCO. Granting reduced reporting requirements reduces the cost to industrial users for determining their fair share of User Charges and reduces the District's oversight costs related to these industrial users.

The costs for the administration of the SWCO and UCO are recovered from industrial users, through Minimum Pretreatment Requirements (MPR) charges, Noncompliance Enforcement (NCE) charges and User Charge Verification (UCV) charges. The recovery of MPR and UCV charges is administered through the UCO and the recovery of NCE charges is administered through the SWCO.

The following table shows the User Charge revenue, as reported by the District's Finance Department, collected over the period from 2002 through 2007.

Year	User Charge Receipts
2002	$47,061,518
2003	$50,474,317
2004	$48,007,510
2005	$44,571,653
2006	$53,616,772
2007	$54,888,933

Field Services Section

The Field Services Section investigates and surveys industrial facilities within the jurisdiction of the District, and samples their effluent discharges to determine their compliance with the SWCO and as verification of user data as required by the UCO. During 2007, 1,395 SWCO and 1,368 UCO inspections and sampling programs were performed.

The Section also performs the collection of samples to monitor the quality of Lake Michigan and District waterways, in order to detect and reduce the incidence of pollution.

In 2007, 15,450 water quality samples were collected. Further, all groundwater monitoring wells installed for the District's TARP were routinely sampled. In 2007, 1,069 samples were obtained at 131 TARP groundwater monitoring wells. Chemical toilet service companies who, under District permit, discharge cleanings at the Stickney WRP are also monitored and sampled. During 2007, six chemical toilet service companies made 673 disposals at the Stickney WRP. For these disposal events, 199 samples were randomly obtained.

The Section is also responsible for the investigation of spills and discharges of pollutants and hazardous, toxic or volatile materials to sewer systems and waterways within the District's boundaries, and initiates containment and cleanup activities pertaining to such events. Through such actions, Section personnel execute the District's role as primary response agency for hazardous materials emergencies in suburban Cook County, provide support to the Chicago Fire Department for such emergencies, and provide support to the Cook County Department of Environmental Control for toxic gas release incidents.

In 2007, 210 investigations were conducted in response to requests from federal, state and local agencies, municipalities and private citizens; 52 investigations were conducted in response to self-reported industrial activities; and 63 investigations were conducted in response to requests from the District's M&O Department.

APPENDIX I

APPENDIX I

MEETINGS AND SEMINARS 2007

1. Illinois Water Environment Association, Government Affairs in Water Pollution Control Seminar, Lisle, Illinois, *January 2007*.

2. Industrial Water, Waste, and Sewage Group Meeting (and follow-up committee meetings throughout the year), Chicago, Illinois, *January 2007*.

3. Mid-America Horticultural Trade Show, Chicago, Illinois, *January 2007*.

4. Midwest Water Analysts Association, Winter Expo 2007, Kenosha, Wisconsin, *January 2007*.

5. National Association of Clean Water Agencies, 2007 Conference, St. Petersburg, Florida, *January 2007*.

6. United States Department of Agriculture, Regional Research Committee W-1170 Annual Meeting, Savannah, Georgia, *January 2007*.

7. United States Environmental Protection Agency, 2007 Midwest Surface Water Monitoring and Standards (SWiMS) Workshop, Chicago, Illinois, *January 2007*.

8. United States Environmental Protection Agency, Aquatic Nuisance Species Barrier Panel Meeting (and follow-up committee meetings throughout the year), Chicago, Illinois, *January 2007*.

9. United States Environmental Protection Agency, Regional Technical Assistance Group, Nutrient Workgroup Meeting, Chicago, Illinois, *January 2007*.

10. United States Fish and Wildlife Service, Hines Emerald Dragonfly Critical Habitat Planning Meeting (and follow-up committee meetings throughout the year), Romeoville, Illinois, *January 2007*.

11. DuPage River, Salt Creek Watershed Workgroup Annual Meeting (and follow-up committee meetings throughout the year), Elmhurst, Illinois, *February 2007*.

12. Greater Chicago Pollution Prevention Alliance Meeting, Chicago, Illinois, *February 2007*.

13. Illinois Chapter of American Fisheries Society, Annual Meeting, Findlay, Illinois, *February 2007*.

14. Illinois River, Coordinating Council Meeting, Aurora, Illinois, *February 2007*.

APPENDIX I

MEETINGS AND SEMINARS 2007

15. Illinois Water Environment Association, Industrial Pretreatment Meeting, Lombard, Illinois, *February 2007*.

16. United States Department of Agriculture, Fourth Greenhouse Gas Conference: Positioning Agriculture and Forestry to Meet the Challenges of Climate Change, Baltimore, Maryland, *February 2007*.

17. University of Illinois, WaterCAMPWS Advisory Board Meeting, Urbana, Illinois, *February 2007.*

18. Water Environment Research Foundation, Specialty Conference Disinfection 2007, Pittsburg, Pennsylvania, *February 2007.*

19. American Chemical Society, 233rd National Meeting, Chicago, Illinois, *March 2007*.

20. Chicago Electroplaters Association Meeting, Arlington Heights, Illinois, *March 2007*.

21. Illinois Association of Wastewater Agencies, Spring Mini-Conference (and follow-up committee meetings throughout the year), Springfield, Illinois, *March 2007*.

22. Illinois Environmental Protection Agency, Use Attainability Analysis Stakeholder's Meeting (and follow-up committee meetings throughout the year), Chicago, Illinois, *March 2007*.

23. Illinois Pollution Control Board, Total Dissolved Solids Sulfate Hearing, Springfield, Illinois, *March 2007*.

24. Illinois Water Environment Association, 28th Annual Conference (and follow-up committee meetings throughout the year), Bloomington, Illinois, *March 2007*.

25. National Association of Clean Water Agencies, 2007 Water and Wastewater Leadership Center, Chapel Hill, North Carolina, *March 2007*.

26. Pittsburg Conference, 58th Annual Conference, Chicago, Illinois, *March 2007*.

27. Water Environment Federation and International Water Association, Specialty Conference, Nutrient Removal 2007, Conference, Baltimore, Maryland, *March 2007*

28. City of Chicago, Department of Environment, Bubbly Creek Active Sediment Capping Committee Meeting (and follow-up committee meetings throughout the year), Chicago, Illinois, *April 2007*.

APPENDIX I

MEETINGS AND SEMINARS 2007

29. City of Chicago, Earth Day Celebration, Chicago, Illinois, *April 2007*.

30. Illinois Water Environment Association, Young Professional Summit, Chicago, Illinois, *April 2007*.

31. Water Environment Federation, Joint Residuals and Biosolids Specialty Conference, Denver, Colorado, *April 2007*.

32. Water Environment Federation, WEFMAX Regional Meeting, Chicago, Illinois, *April 2007*.

33. Agilent Technologies, Next Generation GC and GC/MS Solutions – All the Elements for Perfect Chemistry, Schaumburg, Illinois, *May 2007*.

34. American Society for Microbiology, 107th General Meeting, Toronto, Ontario, Canada, *May 2007*.

35. Illinois River Coordinating Council Meeting, Springfield, Illinois, *May 2007*.

36. Midwest Emergency Preparedness and Response Conference, Rockford, Illinois, *May 2007*.

37. National Association of Clean Water Agencies and Water Environment Federation, 2007 National Clean Water Policy Forum, Washington, D. C., *May 2007*.

38. Air and Waste Management Association, 100th Annual Conference, Pittsburg, Pennsylvania, *June 2007*.

39. American Water Resources Association, Emerging Contaminants of Concern Conference, Vail, Colorado, *June 2007*.

40. Calumet Government Working Group Meeting (and follow-up committee meetings throughout the year), Chicago, Illinois, *June 2007*.

41. Midwest Water Analysts Association, 2007 Spring Meeting, Milwaukee, Wisconsin, *June 2007*.

42. Perkin Elmer Seminar, Oak Brook, Illinois, *June 2007*.

43. United States Environmental Protection Agency, Epidemiology Study Briefing, Washington, D. C., *June 2007*.

APPENDIX I

MEETINGS AND SEMINARS 2007

44. Water Environment Federation, TMDL Conference, Seattle, Washington, *June 2007*.

45. Water Environment Federation and International Water Association, Moving Forward, Wastewater Biosolids Sustainability: Technical, Managerial, and Public Synergy Conference, Moncton, New Brunswick, Canada, *June 2007*.

46. Greater DuPage Chapter, Wild Ones, Native Plants, Natural Landscapes, 27th National Wild Ones Conference, Naperville, Illinois, *July 2007*.

47. International Union of Soil Science, 18th World Congress of Soil Science, Philadelphia, Pennsylvania, *July 2007*.

48. National Association of Clean Water Agencies, 2007 Summer Conference, Cleveland, Ohio, *July 2007*.

49. PRZ Sports Turf Seminar, Joliet, Illinois, *July 2007*.

50. Water Environment Federation, Compounds of Emerging Concern Conference, Providence, Rhode Island, *July 2007*.

51. Water Environment Research Foundation, Epidemiology Study Meeting, Urbana, Illinois, *July 2007*.

52. Illinois Chapter of American Fisheries Society, Mussel Identification Workshop, Monticello, Illinois, *August 2007*.

53. Illinois Water Environment Association, Illinois State Fair Booth Volunteer, Springfield, Illinois, *August 2007*.

54. National Environmental Monitoring Conference, 23rd Annual Conference, Cambridge, Massachusetts, *August 2007*.

55. Agilent Technologies, Open House, Schaumburg, Illinois, *September 2007*.

56. Chemical Industry Council of Illinois, Greenhouse Gas Emissions Seminar, Willow Springs, Illinois, *September 2007*.

57. Illinois Emergency Management Agency, Annual Conference, Springfield, Illinois, *September 2007*.

APPENDIX I

MEETINGS AND SEMINARS 2007

58. International Water Association, 14th International Symposium on Health Related Water Microbiology, Tokyo, Japan, *September 2007*.

59. Northern Illinois Pipeline Association, Seminar, Elmhurst, Illinois, *September 2007*.

60. Thermo Fisher, Enabling GC and GC/MS Technologies for Improved Productivity in Environmental Testing, Rolling Meadows, Illinois, *September 2007*.

61. ChemSW Inc., Laboratory Chemical Inventory Seminar, Skokie, Illinois, *October 2007*.

62. Illinois Environmental Protection Agency, 2007 Governor's Conference on Management of the Illinois River System, Peoria, Illinois, *October 2007*.

63. Illinois Environmental Protection Agency, CFAR Nutrient Standards Update, Springfield, Illinois, *October 2007*.

64. Keep America Playing, National Sports Field Management Seminar, Bourbonnais, Illinois, *October 2007*.

65. Midwest Water Analysts Association, 2007 Fall Meeting, Gurnee, Illinois, *October 2007*.

66. National Association of Clean Water Agencies, 2007 Pretreatment Conference, New Orleans, Louisiana, *October 2007*.

67. Thermo Informatics, World Conference 2007 (LIMS), Miami, Florida, *October 2007*.

68. Water Environment Association of Ontario, Biosolids Management Beyond 2010, Burlington, Ontario, Canada, *October 2007*.

69. Water Environmental Federation, 80th Annual Technical Exhibition and Conference, San Diego, California, *October 2007*.

70. Accelerated Technology Laboratories, Inc., LIMS: The Key to Streamlining Lab Operations and Staying Compliant, Downers Grove, Illinois, *November 2007*.

71. Air and Waste Management Association, Midwest Chapter, Air Quality Management Conference, Oak Brook, Illinois, *November 2007*.

72. Illinois Chapter of American Fisheries Society, Fish Passage on Midwestern Streams Conference, Naperville, Illinois, *November 2007*.

APPENDIX I

MEETINGS AND SEMINARS 2007

73. Illinois Geographic Information Systems Association, Fall Conference, Oakbrook, Illinois, *November 2007*.

74. Illinois Sports Turf Managers Association, Illinois Professional Turf Conference, St. Charles, Illinois, *November 2007*.

75. National Association of Clean Water Agencies, 2007 National Pretreatment and Pollution Workshop, Denver, Colorado, *November 2007*.

76. Society of Environmental Toxicology and Chemistry, North America, 28th Meeting, Milwaukee, Wisconsin, *November 2007*.

77. Soil Science Society of America, Annual Meeting, New Orleans, Louisiana, *November 2007*.

78. United States Geological Survey, Streamgage Meeting, Upper Mississippi River Basin States Cooperator's Roundtable for the United States Geological Survey Cooperative Water Program, Dubuque, Iowa, *November 2007*.

79. Water Environment Research Foundation, Issue Area Team Member Meeting on Pathogen Challenge, Alexandria, Virginia, *November 2007*.

80. Chicago Metropolitan Agency for Planning, Symposium on Climate Change, Chicago, Illinois, *December 2007*.

81. Illinois Water Environmental Association, Meeting on Tiered Aquatic Life Use Standards, Downers Grove Sanitary District, Downer's Grove, Illinois, *December 2007*.

82. Midwest Environmental Laboratory, Stakeholders Summit, Chicago, Illinois, *December 2007*.

APPENDIX II

APPENDIX II

PRESENTATIONS 2007

1. "Triclosan and Triclocarban: Uses, Effectiveness, Do We Know the Fate?" Presented at the Illinois Water Environment Association, Government Affairs in Water Pollution Control Seminar, Lisle, Illinois, by C. O'Connor. *January 2007*. PP

2. "Biosolids: CO_2 Source or Sink." Presented at the United States Department of Agriculture, Fourth Greenhouse Gas Conference, Baltimore, Maryland, by G. Tian, T. C. Granato, and A. E. Cox. *February 2007*. PP

3. "Survey of Large Ultraviolet Disinfection Installations." Presented at the Water Environment Research Foundation, Specialty Conference Disinfection 2007, Pittsburg, Pennsylvania, by D. Bernstein, J. S. Jain, and C. O'Connor. *February 2007*. B

4. "Computer Simulation Development of the Stickney Water Reclamation Plant Imhoff Tank Process." Presented at the Illinois Water Environment Association, 28th Annual Conference, Bloomington, Illinois, by D. Bernstein, D. MacDonald, and J. S. Jain. *March 2007*. PP

5. "Plant Availability of Phosphorus in Biosolids-amended Soil." Presented at the Illinois Water Environment Association, 28th Annual Conference, Bloomington, Illinois, by A. E. Cox, K. Kumar, G. Tian, T. C. Granato, G. A. O'Connor, H. A. Elliott, and J. Hutton. *March 2007*. PP

6. "Potential for Phosphorus Runoff and its Control in Biosolids-amended Soil." Presented at the Illinois Water Environment Association, 28th Annual Conference, Bloomington, Illinois, by K. Kumar, G. Tian, A. E. Cox, T. C. Granato, G. A. O'Connor, H. A. Elliott, and J. Hutton. *March 2007*. PP

7. "Sewage Treatment by Metropolitan Water Reclamation District of Greater Chicago." Presented at the Illinois Water Environment Association, 28th Annual Conference, Bloomington, Illinois, by G. K. Rijal. *March 2007*. PP

8. "Antibiotic Resistant Bacteria in Wastewater Processed by the Metropolitan Water Reclamation District of Greater Chicago System." Presented at the American Society for Microbiology, 107th General Meeting, Toronto, Ontario, Canada, by G. K. Rijal. *May 2007*. PS

9. "Compounds of Emerging Concern: An Overview." Presented at the Metropolitan Water Reclamation District of Greater Chicago, Board Room, Chicago, Illinois, by L. Kollias. *May 2007*. PP

APPENDIX II

PRESENTATIONS 2007

10. "Environmental Issues in the United States: Past, Present, Projections into the Future." Presented at the Industrial Water, Waste, and Sewage Group Meeting, Chicago, Illinois, by C. O'Connor. *May 2007*. PP

11. "An Information Briefing, Metropolitan Water Reclamation District Studies Update." Presented at the United States Environmental Protection Agency, Epidemiology Study Briefing, Washington, D. C., by G. K. Rijal. *June 2007*. PP

12. "Thornton Transitional Reservoir Water Quality and Safety." Presented at the Thornton Quarry, Chicago, Illinois, by R. Gore and G. K. Rijal. *June 2007*. PP

13. "Pharmaceutical Wastes Disposal Methods and Practices." Presented at the Metropolitan Water Reclamation District of Greater Chicago, Board Room, Chicago, Illinois, by L. Kollias. *July 2007*. PP

14. "Antibiotic Resistant Bacteria in Wastewater Processed by the Metropolitan Water Reclamation District of Greater Chicago System." Presented at the International Water Association, 14th International Symposium on Health Related Water Microbiology, Tokyo, Japan, by G. K. Rijal. *September 2007*. PS

15. "Beneficial Use of Biosolids on Urban Land in Metropolitan Chicago." Presented at the Water Environment Association of Ontario, Biosolids Management Beyond 2010, Burlington, Ontario, Canada, by L. S. Hundal. *October 2007*. PP

16. "Fecal Coliform Reactivation and Regrowth Experience at the Chicago's Stickney and Calumet Water Reclamation Plants: Operational and Process Perspectives." Presented at the Water Environment Federation, 80th Annual Technical Exhibition and Conference, San Diego, California, by G. K. Rijal, C. Lue-Hing, T. C. Granato, D. Lordi, K. Patel, and R. Gore. *October 2007*. PP

17. "Agronomic and Environmental Liability of Phosphorus in Biosolids Applied to Farmland." Presented at the Soil Science Society of America, Annual Meeting, New Orleans, Louisiana, by G. Tian, A. E. Cox, T. C. Granato, G. A. O'Connor, and H. A. Elliott. *November 2007*. PP

18. "Beneficial Use of Biosolids in the Chicago Metro Area." Presented at the Chicago State University, Biology Department Seminar Series, Chicago, Illinois, by A. E. Cox, *November 2007*. PP

APPENDIX II

PRESENTATIONS 2007

19. "Chicago Area Waterways Use Attainability Analysis Public Health Studies." Presented at the Water Environment Research Foundation, Issue Area Team Member Meeting on Pathogen Challenge, Alexandria, Virginia, by G. K. Rijal. *November 2007*. PP

20. "Environmental Management: Perspectives of a Regulated and Regulatory Agency." Presented at the Illinois Institute of Technology, Stuart School of Business, Environmental Monitoring and Compliance Course, Chicago, Illinois, by L. Kollias. *November 2007*. PP

21. "Regulatory Update: Pretreatment and User Charge Issues." Presented at the Industrial Water, Waste, and Sewage Group Meeting, Chicago, Illinois, by L. Kollias. *November 2007*. PP

22. "Response of Turf and Agronomic Crops to Ni." Presented at the Soil Science Society of America, Annual Meeting, New Orleans, Louisiana, by P. V. Lindo, T. C. Granato, and A. E. Cox. *November 2007*. PS

23. "What's the Scoop on Chicago Poop? Local Communities Benefit from it!" Presented at the American Chemical Society, Joliet Chapter Seminar Series, Joliet, Illinois, by L. S. Hundal. *November 2007*. PP

---

*P = Available as a paper
B = Available as both a paper and PowerPoint Presentation
PP = Available as PowerPoint Presentation
PS = Poster Presentation

APPENDIX III

APPENDIX III

PAPERS PUBLISHED 2007

1. Granato, T. C., A. Khalique, A. Cox, and R. I. Pietz, "Assessment of Radioactivity in Chicago Biosolids and its Transfer to Soil and Crops from Long Term Application." *Water Practice, 1: 1-11, 2007.*

2. Rijal, G. K., J. T. Zmuda, R. Gore, Z. Abedin, T. Granato, L. Kollias, and R. Lanyon, "Antibiotic Resistant Bacteria in Wastewater Processed by the Metropolitan Water Reclamation District of Greater Chicago System." Proceedings of the International Water Association, 14th International Symposium on Health Related Water Microbiology, Tokyo, Japan and *Water, Science, and Technology, Tokyo, Japan, 2007.*

APPENDIX III

PAPERS PUBLISHED 2007

1. Granato, T. C., A. Khalique, A. Cox, and R. I. Pietz, "Assessment of Radioactivity in Chicago Biosolids and its Transfer to Soil and Crops from Long Term Application." *Water Practice, 1: 1-11, 2007.*

2. Rijal, G. K., J. T. Zmuda, R. Gore, Z. Abedin, T. Granato, L. Kollias, and R. Lanyon, "Antibiotic Resistant Bacteria in Wastewater Processed by the Metropolitan Water Reclamation District of Greater Chicago System." Proceedings of the International Water Association, 14th International Symposium on Health Related Water Microbiology, Tokyo, Japan and *Water, Science, and Technology, Tokyo, Japan, 2007.*

APPENDIX IV

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO
RESEARCH AND DEVELOPMENT DEPARTMENT 2007 SEMINAR SERIES

Date	Subject
January 26, 2007	***Nutrient Farming and Traditional Removal: An Economic Comparison*** Dr. Donald Hey, The Wetlands Initiative, Chicago, IL
February 23, 2007	***Watershed-Wide Distribution of Escherichia Coli: Implications for Meeting Water Quality Standards*** Dr. Richard Whitman, United States Geological Survey, Porter, IN
March 30, 2007	***Fundamental and Practical Studies on Enhanced Biological Phosphorus Removal (EBPR): Identifying the Polyphosphate Accumulating Organisms and Achieving Very Low Effluent Phosphorus Concentrations*** Dr. Daniel Noguera, University of Wisconsin, Madison, WI
April 27, 2007	***Toward Understanding Dynamic Microbial Responses to Chemical Stress: Elucidating Biomarkers for Use in Upset Early Warning Systems*** Dr. Nancy Love, Virginia Tech, Blacksburg, VA
May 18, 2007	***Development of an Integrated Water Quality Strategy for the Chicago Area Waterways*** Dr. David R. Zenz, CTE/AECOM Engineers, Chicago, IL
June 29, 2007	***Antibiotic Resistant Bacteria in Wastewater Processed by the Metropolitan Water Reclamation District of Greater Chicago System*** Dr. Geeta Rijal, Microbiologist, Research and Development Department, Metropolitan Water Reclamation District of Greater Chicago (District), Cicero, IL
July 27, 2007	***Greenhouse Gases to Greenbacks – Carbon Sequestration and Nutrient Management*** Dr. Prakasam Tata, Tata Consulting International, Naperville, IL
August 24, 2007	***Risk Assessment for Recreational Use of the Chicago Area Waterways*** Drs. Chriso Petropoulou and Keith Tolson, Geosyntec Consulting, Inc., Chicago, IL
September 28, 2007	***USEPA's Part 503 Regulations: Using Historical Developments as a Guide to Address Future Rulemaking*** Dr. Cecil Lue-Hing, Cecil Lue-Hing and Associates, Burr Ridge, IL
October 26, 2007	***Impact of Water on Sustainability: Nexus to the Economy, Energy, and the Environment*** Dr. Mark Shannon, University of Illinois (WATER CAMPQS), Urbana, IL
November 16, 2007	***An Update on the Implementation of the Stickney, Calumet, and North Side Water Reclamation Plant's Master Plans*** Mr. Thomas Kunetz, Assistant Chief Engineer, Engineering Department, District, Chicago, IL
December 7, 2007	***Metropolitan Water Reclamation District of Greater Chicago's New Heat Drying Facility for Biosolids*** Mr. Steve Waters, Veolia Water North America, Evanston, IL

RESERVATIONS REQUIRED (at least 24 hours in advance)
CONTACT: Dr. Thomas C. Granato, Assistant Director of Research and Development, EM&R Division, (708) 588-4264 or (708) 588-4059
LOCATION: Stickney Water Reclamation Plant, Lue-Hing Research and Development Complex, 6001 West Pershing Road, Cicero, IL 60804
TIME: 10:00 A.M. (Picture ID required for plant entry)
(Note: These seminars are eligible for Professional Development Credits/CEUs)