MONITORING AND RESEARCH DEPARTMENT

REPORT NO. 09-27

Monitoring and Research

2008

Annual Report

April 2009

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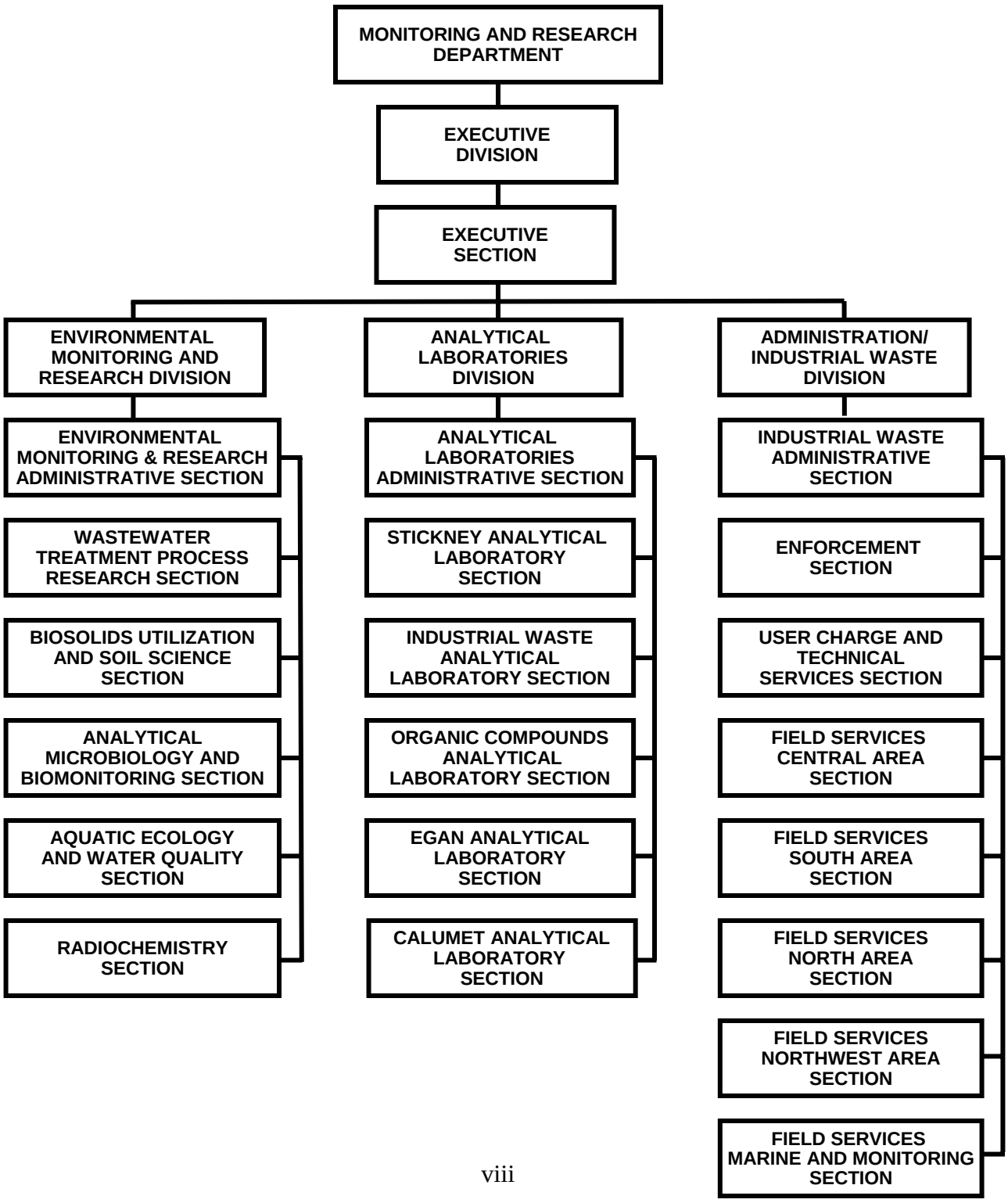
DISCLAIMER

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

MONITORING AND RESEARCH DEPARTMENT
ORGANIZATION CHART FOR 2008



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 309 budgeted positions during 2008 with an adjusted total salary and wage appropriation of $22,867,400.00. 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 2008, the Department reviewed personnel actions relative to 11 separations, including six retirements. In addition, five existing positions were eliminated through attrition when vacated during 2007, while three new positions were added in 2008, resulting in a net increase of two positions in the Department. This decrease in positions led to a 2008 salary expenditure-to-appropriation ratio of 98 percent.

Greater Chicago Pollution Prevention Program

In January 1994, the Greater Chicago Pollution Prevention Program (GCP3) was initiated as a cooperative project between the Metropolitan Water Reclamation District of Greater Chicago (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 2008, the Center provided onsite technical assistance to a metal finishing company and two food processors.

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 2008, 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 2008 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 2008 budget using this system.

Budget Administration

A comparison of appropriations to expenditures for 2008 shows the following:

	Appropriation	Expenditure
Personnel (Line Item 101) (Adjusted)	$22,867,400	$22,404,559
Other Line Items	7,192,100	4,131,191
Total	$30,059,500	$26,535,750

Purchasing Administration

During 2008, about 357 requisitions were reviewed and processed by the Administration Division, prior to being forwarded to the Procurement and Materials Management 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 2008, the Division was involved in the preparation and administration of 27 contracts for a total cost of approximately $1,525,614.10, including multiyear contracts. This total includes seven (7) contracts equal to $101,400.50 to furnish and deliver equipment between $10,000.00 and $25,000.00. 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 $9,000.00 or more and having a total value of approximately $11,977,858.17 during 2008. The Division also prepared and administered 20 maintenance agreements with individual values of $10,000.00 or more and a total value of $1,130,367.79. 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 2008, the seven Monitoring and Research (M&R) 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, John E. Egan (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 (IEMA), Division of Nuclear Safety 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 Waterway 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 2008, the Department published 67 formal reports dealing with various aspects of the District's operations. A list of these reports is given in Table 1.

TABLE 1: MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS PUBLISHED DURING 2008

Report No.	Report Title	Author(s)	Date	Organization or Conference
2008-1	Ground-Water Quality in the Vicinity of Coal-Refuse Areas Reclaimed with Biosolids in Fulton County, Illinois	U.S. Department of the Interior, U.S. Geological Survey, Morrow, W. S.	January 2008	Internal District Report
2008-2	Ambient Water Quality Monitoring in the Chicago Area Waterway System: A Summary of Biological, Habitat, and Sediment Quality Data Between 2001 and 2004	M&R Department Wasik, J., Minarik, T., Sopcak, M. and Dennison, S.	January 2008	Illinois Environmental Protection Agency (IEPA)
2008-3	Report of the Fulton County Environmental Protection System, December 2007	M&R Department Tian, G. and Cox, A.	January 2008	IEPA
2008-4	Annual Biosolids Management Report for 2007	M&R Department Cox, A., Lindo, P., Patel, M., and Granato, T. C.	February 2008	United States Environmental Protection Agency (USEPA), Region V
2008-5	Report of the Fulton County Environmental Protection System, January 2008	M&R Department Tian, G. and Cox, A.	February 2008	IEPA
2008-6	Calumet East Solids Management Area Monitoring Report for Fourth Quarter 2007	M&R Department Lindo, P.	March 2008	IEPA
2008-7	Calumet West Solids Management Area Monitoring Report for Fourth Quarter 2007	M&R Department Lindo, P.	March 2008	IEPA
2008-8	Harlem Avenue Solids Management Area Monitoring Report for Fourth Quarter 2007	M&R Department Lindo, P.	March 2008	IEPA
2008-9	Lawndale Avenue Solids Manage-ment Area Monitoring Report for Fourth Quarter 2007	M&R Department Lindo, P.	March 2008	IEPA

TABLE 1 (Continued): MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS PUBLISHED DURING 2008

Report No.	Report Title	Author(s)	Date	Organization or Conference
2008-10	Ridgeland Avenue Solids Management Area Monitoring Report for Fourth Quarter 2007	M&R Department Lindo, P.	March 2008	IEPA
2008-11	122nd and Stony Island Avenue Solids Management Area Monitoring Report for Fourth Quarter 2007	M&R Department Lindo, P.	March 2008	IEPA
2008-12	Egan Solids Management Area Monitoring Report for Fourth Quarter 2007	M&R Department Cox, A.	March 2008	IEPA
2008-13	Monthly Controlled Solids Distribution Report, October 2007	M&R Department Kumar, K.	February 2008	IEPA
2008-14	Hanover Park Water Reclamation Plant Fischer Farm Monitoring Report, Fourth Quarter 2007	M&R Department Lindo, P. and Cox, A.	March 2008	IEPA
2008-15	Description of the Chicago Waterway System for the Use Attainability Analysis	M&R Department	March 2008	IEPA
2008-16	Report of the Fulton County Environmental Protection System, February 2007	M&R Department Tian, G. and Cox, A.	March 2008	IEPA
2008-17	Reporting Requirements for Site-Specific Equivalency to PFRP Designation of MWRDGC Biosolids Processing Trains at the Stickney and Calumet Water Reclamation Plants, August – December 2007	M&R Department Cox, A.	March 2008	USEPA, Region V
2008-18	Biomonitoring Report 2008, Acute Whole Effluent Toxicity Test Results for the James C. Kirie Water Reclamation Plant, Des Plaines, Illinois, NPDES Permit No. IL0047741, February 2008	M&R Department Rijal, G.	March 2008	IEPA

TABLE 1 (Continued): MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS PUBLISHED DURING 2008

Report No.	Report Title	Author(s)	Date	Organization or Conference
2008-19	Monthly Controlled Solids Distribution Report, November 2007	M&R Department Kumar, K.	April 2008	IEPA
2008-20	Monthly Controlled Solids Distribution Report, December 2007	M&R Department Kumar, K.	April 2008	IEPA
2008-21	Report of the Fulton County Environmental Protection System, March 2008	M&R Department Tian, G. and Cox, A.	April 2008	IEPA
2008-22	Research and Development 2007 Annual Report	M&R Department	April 2008	Internal District Report
2008-23	Analysis of Target Levels for 40 CFR Part 503 Metals in Biosolids	M&R Department Kozak, J., McNamara, J., and O'Connor, C.	May 2008	IEPA
2008-24	Report of the Fulton County Environmental Protection System, April 2008	M&R Department Tian, G. and Cox, A.	May 2008	IEPA
2008-25	Egan Solids Management Area Monitoring Report for First Quarter 2008	M&R Department Cox, A.	June 2008	IEPA
2008-26	Hanover Park Water Reclamation Plant Fischer Farm Monitoring Report, First Quarter 2008	M&R Department Lindo, P. and Cox, A.	June 2008	IEPA
2008-27	122nd and Stony Island Avenue Solids Management Area Monitoring Report for First Quarter 2008	M&R Department Lindo, P.	June 2008	IEPA
2008-28	Ridgeland Avenue Solids Management Area Monitoring Report for First Quarter 2008	M&R Department Lindo, P.	June 2008	IEPA
2008-29	Harlem Avenue Solids Management Area Monitoring Report for First Quarter 2008	M&R Department Lindo, P.	June 2008	IEPA

TABLE 1 (Continued): MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS PUBLISHED DURING 2008

Report No.	Report Title	Author(s)	Date	Organization or Conference
2008-30	Lawndale Avenue Solids Management Area Monitoring Report for First Quarter 2008	M&R Department Lindo, P.	June 2008	IEPA
2008-31	Calumet East Solids Management Area Monitoring Report for First Quarter 2008	M&R Department Lindo, P.	June 2008	IEPA
2008-32	Calumet West Solids Management Area Monitoring Report for First Quarter 2008	M&R Department Lindo, P.	June 2008	IEPA
2008-33	Ambient Water Quality Monitoring in the Chicago, Calumet, and Des Plaines River Systems: A Summary of Biological, Habitat, and Sediment Quality during 2005	M&R Department Wasik, J., and Minarik, T.	June 2008	IEPA
2008-34	Monthly Controlled Solids Distribution Report, January 2008	M&R Department Kumar, K.	June 2008	IEPA
2008-35	Monthly Controlled Solids Distribution Report, February 2008	M&R Department Kumar, K.	June 2008	IEPA
2008-36	Monthly Controlled Solids Distribution Report, March 2008	M&R Department Kumar, K.	July 2008	IEPA
2008-37	Monthly Controlled Solids Distribution Report, April 2008	M&R Department Kumar, K.	July 2008	IEPA
2008-38	Salt Creek Phosphorus Reduction Demonstration Project Interim Report: Comparison of Pre- and Post-Phosphorus Reduction Conditions during 2005 – 2007 (Revised)	M&R Department Wasik, J.	August 2008	IEPA
2008-39	Continuous Dissolved Oxygen Monitoring in the Deep-Draft Chicago Waterway System during 2007	M&R Department Minarik, T., Wasik, J., Sopcak, M., and Dennison, S.	August 2008	IEPA

TABLE 1 (Continued): MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS PUBLISHED DURING 2008

Report No.	Report Title	Author(s)	Date	Organization or Conference
2008-40	Odor Monitoring Program at Metropolitan Water Reclamation District Facilities during 2007	M&R Department Oskouie, A. and Lordi, D.	August 2008	IEPA
2008-41	Biomonitoring Report 2008, Acute Whole Effluent Toxicity Test Results for the James C. Kirie Water Reclamation Plant, Des Plaines, Illinois, NPDES Permit No. IL0047741, May 2008	M&R Department Rijal, G.	August 2008	IEPA
2008-42	Potential for Development of a Market for Topsoil Product from Biosolids at the Metropolitan Water Reclamation District of Greater Chicago	Dr. Sally Brown, University of Washington, Cox, A. and Granato, T. C.	August 2008	IEPA
2008-43	Calumet East Solids Management Area Monitoring Report for Second Quarter 2008	M&R Department Lindo, P.	August 2008	IEPA
2008-44	Calumet West Solids Management Area Monitoring Report for Second Quarter 2008	M&R Department Lindo, P.	August 2008	IEPA
2008-45	Hanover Park Water Reclamation Plant Fischer Farm Monitoring Report, Second Quarter 2008	M&R Department Lindo, P. and Cox, A.	August 2008	IEPA
2008-46	Harlem Avenue Solids Management Area Monitoring Report for Second Quarter 2008	M&R Department Lindo, P.	August 2008	IEPA
2008-47	Lawndale Avenue Solids Management Area Monitoring Report for Second Quarter 2008	M&R Department Lindo, P.	August 2008	IEPA
2008-48	Ridgeland Avenue Solids Management Area Monitoring Report for Second Quarter 2008	M&R Department Lindo, P.	August 2008	IEPA

TABLE 1 (Continued): MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS PUBLISHED DURING 2008

Report No.	Report Title	Author(s)	Date	Organization or Conference
2008-49	122nd and Stony Island Avenue Solids Management Area Monitoring Report for Second Quarter 2008	M&R Department Lindo, P.	August 2008	IEPA
2008-50	Tunnel and Reservoir Plan, Calumet Tunnel System 2007 Annual Groundwater Monitoring Report	M&R Department Jain, J. S. and MacDonald, D.	September 2008	IEPA
2008-51	Tunnel and Reservoir Plan, Des Plaines Tunnel System 2007 Annual Groundwater Monitoring Report	M&R Department Jain, J. S. and MacDonald, D.	September 2008	IEPA
2008-52	Tunnel and Reservoir Plan, Mainstream Tunnel System 2007 Annual Groundwater Monitoring Report	M&R Department Jain, J. S. and MacDonald, D.	September 2008	IEPA
2008-53	Tunnel and Reservoir Plan, O'Hare CUP Reservoir Water Quality Monitoring Wells 2007 Annual Groundwater Monitoring Report	M&R Department Jain, J. S. and MacDonald, D.	September 2008	IEPA
2008-54	Tunnel and Reservoir Plan, Thornton Transitional Flood Control Reservoir Water Quality Monitoring Wells 2007 Annual Groundwater Monitoring Report	M&R Department Jain, J. S. and MacDonald, D.	September 2008	IEPA
2008-55	Tunnel and Reservoir Plan, Upper Des Plaines Tunnel System 2007 Annual Groundwater Monitoring Report	M&R Department Jain, J. S. and MacDonald, D.	September 2008	IEPA
2008-56	2007 Annual Summary Report Water Quality Within the Waterways System of the Metropolitan Water Reclamation District of Greater Chicago	M&R Department Abedin, Z.	September 2008	IEPA

TABLE 1 (Continued): MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS PUBLISHED DURING 2008

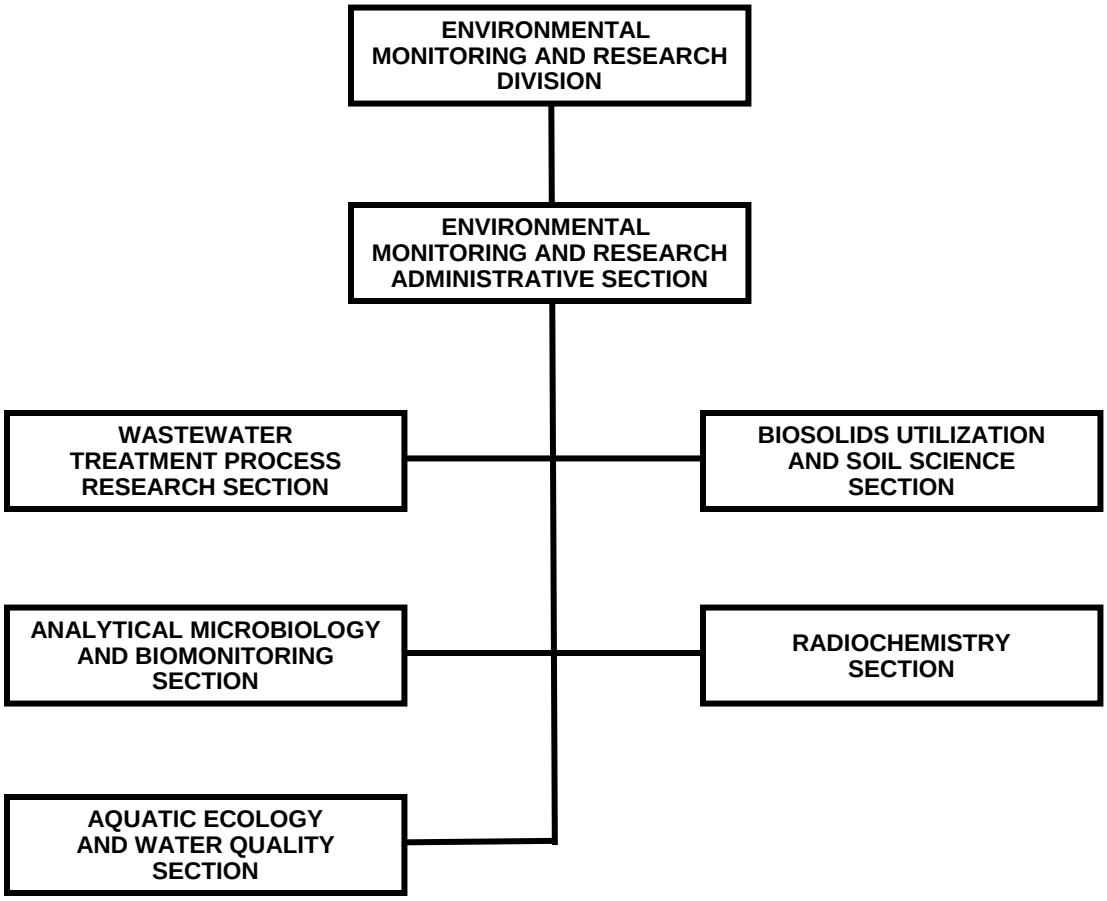
Report No.	Report Title	Author(s)	Date	Organization or Conference
2008-57	Reporting Requirements for Site-Specific Equivalency to PFRP Designation of MWRDGC Biosolids Processing Trains at the Stickney and Calumet Water Reclamation Plants, January – July 2008	M&R Department Cox, A.	September 2008	USEPA, Region V
2008-58	Biomonitoring Report 2008, Acute Whole Effluent Toxicity Test Results for the James C. Kirie Water Reclamation Plant, Des Plaines, Illinois, NPDES Permit No. IL0047741, August 2008	M&R Department Rijal, G.	October 2008	IEPA
2008-59	Continuous Dissolved Oxygen Monitoring in Chicago Area Wadeable Streams during 2007	M&R Department Minarik, T., Wasik, J. Sopcak, M., and Dennison, S.	October 2008	IEPA
2008-60	Effect of Nu Earth Biosolids Application on Accumulation of Trace Metals in Edible Tissue of Garden Vegetables	M&R Department Minarik, T. A., Wasik, J., Sopcak, M., and Dennison, S.	October 2008	IEPA
2008-61	Water and Sediment Quality Along the Illinois Waterway from the Lockport Lock to the Peoria Lock during 2007	M&R Department Wasik, J. and Minarik, T.	October 2008	IEPA
2008-62	Monthly Controlled Solids Distribution Report, May 2008	M&R Department Kumar, K.	November 2008	IEPA
2008-63	Biomonitoring Report 2008, ChronicWhole Effluent Toxicity Test Results for the Hanover Park Water Reclamation Plant, Hanover Park, Illinois, NPDES Permit No. IL0036137, September 2008	M&R Department Rijal, G.	November 2008	IEPA

TABLE 1 (Continued): MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS PUBLISHED DURING 2008

Report No.	Report Title	Author(s)	Date	Organization or Conference
2008-64	Monthly Controlled Solids Distribution Report, June 2008	M&R Department Kumar, K.	December 2008	IEPA
2008-65	Environmental Monitoring and Research Division Radiological Monitoring of the Raw Sewage, Final Effluent, Sludges, and Biosolids of the Metropolitan Water Reclamation District of Greater Chicago 2007 Annual Report	M&R Department Khalique, A. and Abdussalam, T.	December 2008	IEPA
2008-66	Biomonitoring Report 2008, Acute Whole Effluent Toxicity Test Results for the James C. Kirie Water Reclamation Plant, Des Plaines, Illinois, NPDES Permit No. IL0047741, November 2008	M&R Department Rijal, G.	December 2008	IEPA
2008-67	Environmental Monitoring and Research Division 2007 Annual Report	M&R Department	December 2008	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 63 employees, and is comprised of six Sections, viz.,

1. Administrative
2. Wastewater Treatment Process Research
3. Biosolids Utilization and Soil Science – Stickney
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 management 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 2008, 1,736 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. This group has 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 2008, 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 Wastewater Treatment Process Research and Aquatic Ecology Sections on the evaluation of chlorophyll *a* and dissolved oxygen (DO) in Salt Creek before and after phosphorus removal at the Egan Water Reclamation Plant (WRP).

2. Statistical support was provided to the Biosolids Utilization and Soil Science Section on the carbon content of biosolids amended soils.

3. Detailed statistical analysis of ammonia, total and dissolved metal, DO, alkalinity and temperature in the CAWS was provided to support District testimony to the IPCB regarding the promulgation of water quality standards.

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

Water Quality Data. Each year, the Experimental Design and Statistical Evaluation Group summarize results of the District's Ambient Water Quality Monitoring (AWQM) program for the CAWS. Surface water quality data for 2008 was evaluated regarding compliance with water quality standards set by the IPCB.

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 some aspect of a wastewater treatment process.

Studies of new technologies 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 2008 included the following.

Odor Management and Corrosion Control in James C. Kirie Water Reclamation Plant Interceptors. This preliminary study was initiated by the EM&R Division at the request of the M&O and Engineering Departments to identify the locations where corrosive conditions occur in interceptors upstream of Drop Shaft 5 (DS5) in the James C. Kirie (Kirie) WRP service area, so an informed decision could be made on the proper location for Bioxide injection, and the dosage of the Bioxide along these interceptors to mitigate the odors, as well preventing further corrosion in the interceptors. This study will also serve as a knowledge base for future design of odor control systems at DS5. The results of the laboratory analysis, the details of statistical analysis of the data, and the findings of this full-scale test will be summarized in a report in 2009.

Characterization of Recycle Streams at the Stickney and Calumet Water Reclamation Plants. In July 2008, the WTPR Section began sampling the recycle streams at Stickney and Calumet WRPs in order to evaluate the nutrient load to the headwork contributed by these recycle streams. The parameters analyzed in this study have been chosen such that a range of nutrient treatment strategies may be considered to address potential nutrient regulations for total nitrogen (TN) and total phosphorus (TP). Following this characterization, the feasibility of different technologies for removal of TN and/or TP from recycle streams will be evaluated.

Ultraviolet Disinfection Study at the Hanover Park Water Reclamation Plant. The District is conducting a side-by-side evaluation of three different ultraviolet light (UV) disinfection technologies at the Hanover Park WRP manufactured by leading manufacturers (Trojan Technologies, Inc., ITT Wedeco, Inc., and Severn Trent Water Purification, Inc.) under Engineering Department Contract No. 07-527-AP. Systems from ITT Wedeco, Inc., and Severn Trent

Water Purification, Inc., were installed in October 2008 outside the tertiary treatment building at the Hanover Park WRP. These two systems became operational in November 2008. The Trojan Technologies system will be installed in 2009.

Each system is designed to treat 0.5 million gallons per day (MGD) of secondary unfiltered effluent (approximately 4.2 percent of the 12 MGD average design plant flow). Manual grab and plant composite samples are collected from upstream and downstream sampling points for physical, chemical, and microbial analysis. In addition to the plant data, records will be kept on such factors as power requirements and maintenance costs in order to evaluate the cost-effectiveness of each system.

At the conclusion of the study, an appropriate system will be recommended and necessary design criteria will be established for full-scale system implementation.

Ultraviolet Disinfection Laboratory Study. The WTPR Section conducted a number of laboratory-scale studies in 2007 and 2008 to determine the UV dose-response relationship for the effluent from all seven WRPs. At six of the seven WRPs, a 2-log reduction in fecal coliform (FC) for each effluent was achieved with a UV dose of 10 mJ/cm^2. However, at the John E. Egan (Egan) WRP a 2-log reduction in FC was not achieved for the secondary effluent at any dose tested (0–40 mJ/cm^2).

At the Egan WRP, a phosphorus (P) removal study using ferric chloride ($FeCl_3$) coincided with this preliminary UV study. It was suspected that $FeCl_3$ or a residual product had inhibited UV disinfection of the unfiltered secondary effluent. In spring 2008, a laboratory collimated beam evaluation was performed to examine the effects of $FeCl_3$ on UV disinfection with respect to Egan secondary effluent prior to filtration (unfiltered secondary effluent) and final effluent after filtration (filtered secondary effluent). The raw samples were exposed to a UV dose range of 0–40 mJ/cm^2. In addition, the doses needed to achieve a 2-log reduction in FC were >40 mJ/cm^2 and 20 mJ/cm^2 for unfiltered and filtered secondary effluent, respectively. Based on these results, it was clear that lower total solids, lower iron, and higher UV transmittance in a water sample require a lower UV dose for disinfection.

The addition of $FeCl_3$ was discontinued at the end of 2008, and a second evaluation repeating the 2008 study is planned for 2009 to verify the above results. A specific laboratory evaluation to examine the effects of iron concentration on UV disinfection is also planned.

Wastewater Disinfection with Quaternary Ammonium Chloride Coated Sand. Disinfection using quaternary ammonium chloride (QAC) could be a cost-effective disinfection technology for wastewater. QAC is used as a disinfectant in hospitals and industrial applications. The QAC disinfectant has been incorporated into a coating and applied to sand. A bench-scale experiment was carried out to determine if the technology could be used to disinfect wastewater. Stickney WRP final effluent was filtered through QAC-coated sand, and sand with identical properties without the QAC coating was used as a control. Disinfection efficiency was determined by

microbial analysis of *Escherichia coli (E. Coli)* and FC. The results will be summarized as an internal report.

Chemical Phosphorus Removal at the John E. Egan Water Reclamation Plant. For the Salt Creek Phosphorus Reduction Demonstration Project, the P concentrations in the final effluent of the Egan WRP was reduced to a target level of 0.5 mg/L of TP. Chemical precipitation of P with $FeCl_3$ was used. Full-scale chemical P removal was conducted from February 2007 through December 24, 2008. During 2008, $FeCl_3$ injection was moved from the end of the aeration tanks (January 1 through May 20, 2008) to immediately upstream of the primary clarifiers at the exit end of the aerated grit chambers (May 21, 2008, through December 24, 2008). The average TP concentration in the final effluent of the Egan WRP from January 1 to December 24, 2008, was 0.43 mg/L with a range from 0.09 to 1.38 mg/L. The WTPR Section monitored impacts of chemical P removal on treatment plant operations, solids production, and solids management. Two interim reports summarizing the monitoring results for this project were prepared in 2008. An M&R report describing this project in detail and presenting the results from the entire study will be prepared in 2009.

Evaluating Two Different Aeration Systems at the John E. Egan Water Reclamation Plant. This project was initiated to compare operational efficiency of two different aeration systems at the Egan WRP. The aeration system in the North Aeration Battery consists of full floor coverage fine-bubble disc ceramic diffusers, while the South Aeration Battery 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. The major field testing, including process oxygen transfer efficiency (OTE) measurement using the off-gas technique and profile sampling along the aeration tanks to evaluate oxygen uptake rates (OURs), nitrification, and DO distribution, was completed in 2007. In 2008, supplemental field tests on process OTE measurement were conducted. An M&R report describing this project in detail and presenting the results from the study will be prepared in 2009.

Comparison of John E. Egan Water Reclamation Plant South Aeration Tank Profiles. The Egan WRP South Battery has two aeration tanks. Field sampling was conducted at seven locations along the tanks. The samples were analyzed for SS, volatile SS, DO, OUR, and nutrient concentrations. The results will be used to compare the profiles of the two tanks. The profile comparison will aid in determining if there is a difference between the tanks due to leaky valves along the return sludge line, which will be repaired under a future Engineering contract. The results will be provided to M&O and Engineering in an interdepartmental memorandum.

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).

As such, a short-term monitoring plan to evaluate the rate of emissions of CH_4, N_2O, and a third greenhouse gas, carbon dioxide (CO_2), was initiated at the Stickney WRP in the fall of 2008. As an initial exploratory approach, a number of samples were collected from within the plant as follows: (1) gas emissions from the water surfaces of the aeration batteries, primary and secondary clarifiers, aerated grit chambers, and Imhoff tanks, (2) fugitive gas emissions from the floating cover anaerobic digesters and sludge concentration tanks, (3) gas emissions from the exhaust points of the Coarse Screen Building, Fine Screen and Concentration Tank Building, Pre-Centrifuge Building, Post-Centrifuge Building, and Digester Building, (4) gas emissions from the Harlem Avenue Solids Management Area (HASMA) biosolids drying bed, and (5) gas samples at the perimeter of the WRP.

Due to the high variability of the sampled gas concentrations, both spatially and temporally, and the limited number of samples collected, no firm value can be provided for the annual fluxes of the three greenhouse gases. In 2009, a comprehensive monitoring study will be proposed in order to truly assess the greenhouse gas flux from the Stickney WRP.

Chicago Department of Transportation Blue Island Sustainable Streetscape Project. In order to minimize the impacts of urban nonpoint source pollution and associated costs of control associated with wet-weather flows, stormwater runoff volumes and pollutant loads must be reduced through stormwater management. In August 2009, the Chicago Department of Transportation will begin construction of a Sustainable Streetscape Project (SSP) located on West Cermak Road between South Halsted Street and South Ashland Avenue, and South Blue Island Avenue between South Ashland Avenue and South Western Avenue. This SSP will include a number of control strategies referred to as best management practices (BMPs) to mitigate runoff volumes and associated pollution due to wet-weather flow. More specifically, it is hoped that the SSP will provide the following: (1) CSO abatement, (2) reduction of overall flow and pollutant loading to treatment plants, and (3) improved aesthetics of the urban environment. The SSP BMPs include permeable pavers, infiltration basins, planters, and bioswales. These BMPs were designed to absorb the flow of a two-year storm event.

In 2008, the WTPR Section developed a long-term monitoring plan to assess the performance, effectiveness, and efficiency of a collection of BMPs and, if possible, individual BMPs relative to stormwater flow and pollutant load reduction in the streetscape corridor.

Beginning in 2008, the District in collaboration with the United States Geological Survey (USGS) is monitoring rainfall, stormwater runoff, combined sewer flow, and groundwater at select locations in the project area for a background evaluation. In 2009, modeling efforts to characterize the pre- and post-BMP conditions will be initiated and water quality monitoring of runoff and combined sewer flow will begin.

Stickney Water Reclamation Plant Preliminary Sludge and North Side Water Reclamation Plant Sludge Settling Evaluation. Eight 80-foot diameter tanks for primary solids concentration are planned for the Stickney WRP. In order to assess if North Side WRP sludge (NSS) and Stickney WRP preliminary sludge (SPS) can effectively be blended together into a combined sludge (CS) at a ratio of 1:7 prior to settling in these tanks, the settling characteristics of the CS were studied in 2008.

WTPR completed three preliminary evaluations of the settling and thickening effects on SPS, NSS, and CS in 2008. A fourth evaluation to further examine the effects of diameter-to-height ratios and polymer addition is planned for early 2009, and the results of this study will be reported in spring 2009.

Additional Digestion Tests for the Calumet and John E. Egan Water Reclamation Plants. 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 percent 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. In 2008, a total of 15 additional anaerobic digestion tests were performed in the M&R WTPR laboratory for the digester draw from the Calumet WRP and a total of 25 tests were conducted for the Egan WRP throughout a 12-month period. 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 2008.

Emission of Hazardous Air Pollutants from District Water Reclamation Plants. As part of the NPDES permits and regulations under the Clean Air Act, emission of hazardous air pollutants (HAPs) from the wastewater treatment processes was estimated. 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 HAPs of concern for WRPs**.** Using the Bay Area Sewage Toxics Emissions 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 Market System reporting requirement.

Odor Monitoring Programs. As part of the District's continuing odor surveillance program, the EM&R Division conducts odor monitoring at HASMA, Vulcan, Lawndale Avenue

Solids Management Area, the Marathon Sludge Drying Area, and the Calumet Solids Drying Areas. A similar odor monitoring program was initiated in the spring of 2001 at the Stony Island Sludge Drying Area and the Ridgeland Avenue Solids Management Area. The programs are required by NPDES permits for the Solids Management Areas. Odor monitoring is also conducted at the Calumet WRP, the Egan WRP, the Stickney WRP, the Kirie WRP, and the North Side WRP.

A similar protocol for monitoring odors is used at each location. Either the M&R Department or M&O Department personnel (at some WRPs) visit various stations at each site on a regular basis. The frequency of odor monitoring 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 2008.

Calumet Water Reclamation Plant Continuous Ambient Hydrogen Sulfide Monitors. Two hydrogen sulfide (H_2S) monitoring stations were set up in October 2002 to continuously monitor and record ambient air H_2S concentration at the Calumet WRP. One station is located at the northern boundary of the Calumet WRP, and the second station is located outside of the plant fence line near 130th Street. Each station consists of a hydrogen sulfide (H_2S) analyzer in a temperature-controlled shelter. The monitors are single-point monitors made by Honeywell Analytics. Lead acetate impregnated tape is used to measure H_2S with a concentration range of 0–90 parts per billion. Measurements are recorded every two minutes. The monitors were operational from June to September 2008. The results of the monitoring will be summarized in the 2008 EM&R Division annual report.

Polymer Tests at the Stickney Water Reclamation Plant. Full-scale tests at the Stickney Post-Digestion Centrifuge Complex were conducted during January 2008 for the selection and purchase of winter polymer used in the centrifugal dewatering of anaerobically digested sludge. The testing procedure is repeated twice at Stickney, once in summer and once in winter, as the change in sludge characteristics during these seasons requires different polymers at this WRP. The laboratory tests were conducted as a precursor to full-scale tests. The test procedures are described in M&R Department Report No. 01-13.

All polymers that do not produce a minimum of 95 percent solids capture are disqualified from competing for the Stickney dewatering polymer contract.

The polymer that passes the test performance criteria as described in the bid documents and has the lowest cost for conditioning per unit mass of sludge is the polymer of choice for purchase. The above full-scale and bench-scale tests are conducted once every other year, a few months before the polymer purchase contracts are up for renewal after a two-year life.

Tunnel and Reservoir Plan Groundwater Monitoring Reports. Groundwater monitoring reports for the year 2008 will be prepared for the six Tunnel and Reservoir Plan (TARP) systems, which included the Mainstream, Calumet, Des Plaines, and Upper Des Plaines Tunnel Systems, the O'Hare Chicago Underflow Plan Reservoir, and the Thornton Transitional Flood Control Reservoir (Reservoir). One report for each system will be published as an M&R report. All six reports will be submitted to the IEPA as well as the USEPA in the first half of 2009.

Thornton Transitional Flood Control Reservoir Fill Events for 2008. One of the reporting requirements for the Reservoir as specified by the IEPA is to prepare a narrative report of fill events that have occurred during the year.

There were five fill events at the Reservoir during the year 2008: January 8, 2008; February 17–18, 2008; May 11–12, 2008; September 12–15, 2008; and December 30–31, 2008. In all fill events 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 determinations from these wells.

An M&R report summarizing these analyses will be published and submitted to the IEPA and the USEPA in 2009.

Pollutants Captured by Tunnel and Reservoir Plan. The purpose of building the TARP system was to prevent CSOs from entering Lake Michigan and the CAWS. The M&R Department annually calculates the removal of certain pollutants, including SS, both carbonaceous and nitrogenous oxygen-demanding substances, and the volume of CSOs collected by the TARP system.

Calculating pollution removal gives an indication how well TARP is serving its function, since the pollutants diverted to TARP would have otherwise been discharged into area waterways.

The results of the calculations will be published in the 2008 EM&R Division annual report.

Support to the Engineering Department for the Hanover Park Water Reclamation Plant Master Plan Study. The WTPR Section provided support to the Engineering Department for the Hanover Park WRP Master Plan Study. The study was commissioned to evaluate alternatives for improving and updating the infrastructure and process facilities to meet future needs. The support has included data mining of historical data, participating in workshops, coordinating sample collection, analysis, and review of documents.

Support for Maintenance and Operation Department Plant Operations. The WTPR Section provides support to M&O plant operations on both a routine and emergency basis.

Routine support to M&O plant operations includes weekly microscopic examination of mixed liquor samples from the Stickney, Calumet, North Side, Kirie, Egan and Lemont WRPs, and weekly or monthly personal visits to the Calumet, North Side, Kirie, and Lemont WRPs.

Emergency support to M&O in 2008 included technical support to the Hanover Park WRP after an incident in which a tank storing approximately 2,000 gallons of sodium bisulfite failed and the flow was diverted into a drain and eventually discharged to Batteries A and B of the WRP. Technical advice was provided for the plant to cope with elevated ammonia and FC concentrations following the sodium bisulfite diversion event.

Also during 2008, the Calumet WRP exhibited a series of upsets resulting in an inhibition of nitrification. Assistance was given to M&O to establish nitrification, and in conjunction with the Industrial Waste Division it was determined that most likely the inhibition was due to a discharge of thiourea into the sewer system.

To assist M&O in dealing with foaming and elevated sludge volume index in the north aeration tank of the Egan WRP in the first few months of 2008, WTPR and the Analytical Microbiology and Biomonitoring Section of the EM&R Division provided technical services by conducting more frequent microscopic analyses of mixed liquor and field profile sampling. The causes of the problems in the Egan aeration tank were investigated, and a control strategy was recommended to M&O.

Biosolids Utilization and Soil Science Section

The role of the Biosolids Utilization and Soil Science Section is to provide scientific information and technical support to continuously improve the environmental stewardship and cost-effectiveness of the District's biosolids management programs in accordance with all applicable regulations and permit requirements, and to support the green initiatives relevant to the District's operations. The overall goals of the section are:

1. To document compliance with permits and regulations governing the biosolids management programs and file all relevant reports in a timely manner.

2. To promote beneficial use of biosolids and provide technical support to the biosolids users.

3. To conduct applied research and demonstrations to evaluate the environmental impacts of land application of biosolids, to showcase the benefits of land application of biosolids, and to evaluate the impacts of regulations on the District's biosolids land application programs.

4. Keep up-to-date with and review relevant regulatory issues to evaluate impacts on the District's operations, and assist with the development of technically sound regulations.

5. To provide technical support on green initiatives relevant to the District's operations.

These goals are accomplished through monitoring, research and demonstrations, and biosolids marketing activities.

The 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 2008, the Section submitted 45 permit-required reports to the IEPA and three reports to the USEPA. 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 and demonstration 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 is beneficial and 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, the fate of organic contaminants in the soil environment, and plant availability of biosolids nitrogen.

The Section 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 1,080 dry tons of biosolids per acre (maximum-amended plots) from 1973 through 2008. 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 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 provided technical support in 2008 to the District's Native Prairie Landscape initiative and the District's new stormwater management program.

Analytical Microbiology and Biomonitoring Section

In 2008, the Analytical Microbiology and Biomonitoring Section was involved in a number of large research studies to support emerging public health and regulatory issues. The Section continued analytical microbiology monitoring programs to support the District's treatment process operations and biosolids utilization program to meet regulatory and permit requirements; monitored microbiological quality of Lake Michigan and area rivers and canals to document the effectiveness of the District's wastewater treatment program and to assess compliance with state water quality standards; and provided technical assistance and research services for treatment process improvement and emergency response. Monitoring of Chicago's lakefront harbor was conducted during river reversals to Lake Michigan on two occasions. The reversals were the result of two major rainstorm events in the Chicago land area. Additionally, the Section participated before the IPCB in the matter of IEPA's rulemaking for the CAWS water quality standards and effluent limitations. Responsibility in this civil/judiciary/legislative process included the review of testimonial documents and preparation of testimony; position statements; questions; and comments.

Professionally, the Section was involved in the USEPA and Water Environment Research Foundation's issue area team research in the fields related to microconstituents; biosolids risk assessment; and critical research and science needs for the development of recreational water quality criteria. 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 vs. No Disinfection; (2) Epidemiological Study of Recreational Use of the CAWS; (3) Monitoring Antibiotic Resistant Bacteria (ARB) in Final Effluents (FE) and the CAWS; and (4) Sources and Ecology of *E. coli* in the North Shore Channel (NSC) and the North Branch of the Chicago River (NBCR). The Section also conducted analysis and provided technical counsel for the following: (1) Monitoring for FC and *E. coli* to Evaluate New Disinfection Technologies - UV Light and Titanium Oxide; (2) Monitoring Microbial Densities on Farm Soil after Application of Biosolids; (3) Master Planning for the Stickney, Calumet and North Side WRPs; (4) Lemont WRP Expansion Permit; and (5) the Salt Creek Nutrient Reduction Demonstration Project.

The Section is comprised of the following sub-groups which performed specific monitoring or research activities: Analytical Microbiology, Biomonitoring, Parasitology and Virology. The specific activities of the sub-groups in 2008 are summarized below.

Analytical Microbiology Sub-Group. The Analytical Microbiology group's facilities, equipment and procedures were the subject of the bi-annual on-site evaluation for certification by the IDPH and were found to be in general compliance. In addition, the microbiology laboratory completed proficiency testing and evaluation programs with acceptable results for the Discharge Monitoring Report – Quality Assurance (DMR-QA) Study 28 and 7 microbe procedures for the examination of water from public water supplies and their sources.

FC, *E. coli* and other microbiological analyses were conducted for the following: Illinois Waterway; CAWS AWQM Program; Disinfection Study; Biosolids Monitoring for Part 503 Compliance; Biosolids Land Application Project; Solids Management Areas Monitoring Wells;

TARP Groundwater Monitoring Wells; and TARP Reservoir Monitoring. Potable water at District facilities was also monitored for total coliforms (TC), *E. coli* and total heterotrophic bacteria.

A third phase of an ARB research study entitled, "Monitoring the Total Numbers, Percentages and Antibiotic Resistance Patterns of Antibiotic Resistant Fecal Coliforms in the Chicago Waterway System" was continued. The monitoring of the density of ARB in the CAWS upstream and downstream of the Calumet WRP, as well as the FE from this plant was completed. Scheduled samples, along with event response samples, were analyzed which included wet weather samples collected from the waterways, WRP FE and pumping station monitoring.

As part of the UAA study of the CAWS, the District initiated a multi-phase research program for a systematic technical and scientific assessment of recreational health risks to protect the identified uses of the CAWS. The District, working with consultants, completed and published a report titled, "Dry and Wet Weather Risk Assessment of Human Health Impacts of Disinfection vs. No Disinfection of the Chicago Area Waterway System." The risk assessment study found that the microbial health risks associated with incidental contact recreational practices on the CAWS are below the risk threshold that USEPA applies to criteria for primary contact recreation. The USEPA experts indicated in their comments to the District that the risk assessment methodology is appropriate; however, the modeling required some assumptions which introduce an element of uncertainty. To address these uncertainties, the District has embarked on an epidemiological study known as the Chicago Health, Environmental Exposure and Recreation Study (CHEERS) in collaboration with a multidisciplinary team at the University of Illinois at Chicago School of Public Health. The health survey and data collection, which commenced in 2007, is scheduled to be completed in 2009 with the project final report anticipated in the spring of 2010.

The public health studies which are being conducted by the District focus on microbial health risks and have not directly addressed the contribution of non-point sources to the bacterial indicator load to the CAWS. Therefore, in July 2008, an inter-agency agreement between the District and the USGS, Great Lakes Science Center, Porter, Indiana was initiated to investigate the occurrence, distribution and potential sources of *E. coli* along the NSC section of the CAWS. The sampling began in August 2008, and the study is scheduled to be completed in 2009.

Biomonitoring Sub-Group. Chronic whole effluent toxicity (WET) tests with fathead minnows (*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 FE. Acute WET tests were performed on four sets of effluent samples from the Kirie WRP. No acute toxicity was associated with the FE.

Biomonitoring reports for Hanover Park and Kirie were submitted to IEPA in compliance with the NPDES permits. Also, the DMR-QA Study 28 for WET as required under the Clean Water Act's NPDES was completed.

The *Selenastrum capricornutum* Printz Algal Growth Test (AGT) was conducted to study the biologically available P in the Egan and Lemont WRPs FE and in upstream and downstream locations in conjunction with a planned demonstration project to study river response to P reduction. The results of the AGTs are important in the District's effort to maintain the biotic integrity of the waterways (Salt Creek and Chicago Sanitary and Ship Canal [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 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 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 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 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 (TMDLs) for Salt Creek and the West Branch of the DuPage River, and development of nutrient standards.

Field monitoring activities conducted during 2008 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 29 monitoring stations in the Chicago, Calumet, and Des Plaines River Systems during the period June through October of 2008. Samples were collected from eight stations located on the deep-draft waterways and 21 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 out 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 during June through November of 2008 at 31 stations in the Chicago, Calumet, and Des Plaines River Systems. Eight stations were located on the deep-draft waterways and 23 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.

Habitat and Sediment Quality Monitoring. During June through October of 2008, a physical habitat assessment was conducted at 29 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 20 monitoring stations in the Des Plaines 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 2008, 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. Continuous DO monitoring continued during 2008 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 2007 DO monitoring results were published in August and October of 2008. The 2008 reports are planned for publication in the first quarter of 2009.

Illinois Waterway Monitoring. During May, August, and October of 2008, water samples were collected from 49 stations in six navigational pools along 133 miles of the Illinois Waterway System from the Lockport Lock 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 selected monitoring stations. An annual summary report for the 2007 Illinois Waterway Monitoring was published in October 2008.

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 phosphorus removal began in February of 2007. The project concluded December 2008. 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 relative constituents. The Aquatic Ecology and Water Quality Section conducted full-scale biological sampling at each of three locations once per year, including benthic invertebrate and fish collections, sediment chemistry analyses, and habitat assessments. An interim report on the Salt Creek Nutrient Demonstration Project was published in August 2008.

Sidestream Elevated Pool Aeration Study. In 2008, the Aquatic Ecology and Water Quality Section assisted on a project to investigate the potential of the sidestream elevated pool aeration (SEPA) stations to meet the proposed water quality standards for the Calumet-Sag Channel and CSSC. The new standards proposed by the IEPA for the CAWS include a seasonal DO standard that is more stringent than the current DO standard assigned to the Calumet-Sag Channel. Continuous DO monitoring was conducted from May through October at nine monitoring stations along the Calumet-Sag Channel and CSSC to evaluate the ability of the SEPA stations to meet the proposed standards. The SEPA stations were operated under various conditions during the study to determine if the proposed DO standard could be met. A report on the results of this study is expected to be completed in the first quarter of 2008.

Illinois Waterway Nitrate Nitrogen Isotope Ratio Study. Stable nitrogen and oxygen isotope ratio analysis was conducted once per year during 2004-2006 at a number of main channel locations on the Illinois Waterway (ILWW) between Lockport and Peoria. Results of these analyses indicated that during the spring and early summer a significant amount of non-point source nitrate nitrogen enters the ILWW between the Kankakee River and Peoria Lake. In order to identify the source of this nitrate, seven tributaries to the ILWW and nine main channel locations were sampled monthly between March and October 2008. Water samples were collected by Aquatic Ecology & Water Quality Section staff using a small boat and from bridge locations. Samples were filtered in the field using a 0.45 µm groundwater filter and frozen while awaiting analysis. Nitrate nitrogen and oxygen, and water hydrogen and oxygen isotope ratios were determined by the Department of Earth and Environmental and Environmental Sciences Laboratory at University of Illinois, Chicago. A summary of results of the 2008 analyses is expected to be delivered during the second quarter of 2009.

Chicago Area Waterway System Habitat Evaluation and Improvement Study. In order to provide aquatic habitat information for a UAA of the CAWS, the District conducted a CAWS habitat evaluation and improvement study which will formulate a habitat index that is applicable to the deep draft waterways of the CAWS. For development of this habitat index, the District's consultant LimnoTech is using fish, macroinvertebrate, and habitat data sampled by the District during the period 2001 through 2007 from the District's 26 sampling stations on the CAWS. During 2008, 25 District sample stations were sampled using expanded habitat procedure plus five additional stations not previously described; three of these additional stations are on the Calumet-Sag Channel and two are on the CSSC. Eight CAWS stations were sampled by the District in 2008 for fish and macroinvertebrates and LimnoTech collected fish and macroinvertebrates from 14 stations, not sampled by the District during 2008. LimnoTech is also including the analysis of collected digital video of bank conditions, habitats, as well as high resolution aerial imagery and bathymetry, to support the assessment of the habitat conditions and index development. LimnoTech is conducting an examination of the potential of navigational effects to adversely affect habitat.

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 3,071 tests in 2008.

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.

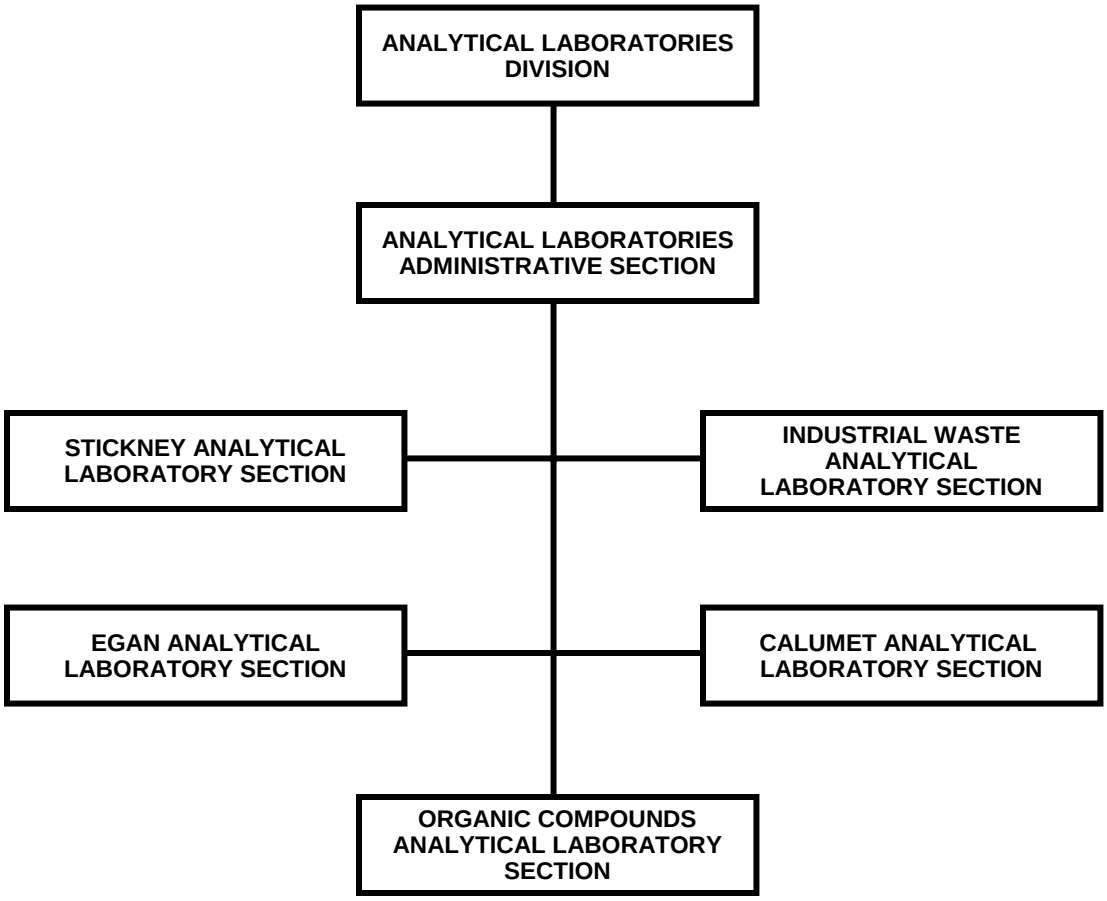
The Section also performs radiological monitoring of biosolids from the seven WRPs, Hanover Park WRP lagoons, and from the solids drying sites of the District. The monitoring

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, operational checks of radiation survey meters, physical inventory of licensed radioactive materials, testing for leakage and contamination of nickel-63 detectors in gas chromatographs at the M&R 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.

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 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 M&R 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 2008 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 2008. The fourth round of audit inspections of the laboratories was completed during 2008. Each laboratory is in compliance with the requirements of the CHP.

The five analytical laboratories maintained laboratory accreditation by the IEPA during 2008 in accordance with NELAP.

Stickney Analytical Laboratory (SAL)

This laboratory is located at the Cecil Lue-Hing R&D Complex and performed 638,986 analyses for solids, nutrients, and metals on 57,485 samples in providing analytical services for the following:

TABLE 2: TOTAL NUMBER OF ANALYSES PERFORMED IN 2008

Program	Nutrients	Oxygen Demands	Metals	Solids	Organic Compounds	Others	Total Program
4652 Liquid Monitoring	113,161	74,803	167,567	53,439	24,414	60,687	494,071
TARP	4,331	1,409	4,060	703	0	4,669	15,172
Treatment Facilities	108,830	73,394	163,507	52,736	24,414	56,018	478,899
4653 Solids Monitoring	15,558	1,025	48,942	133,976	9,073	34,799	243,373
4666 Sewage & Waste Control	1,469	89	272,176	368	29,970	11,884	315,956
4663 User Charge	139	62,026	20,686	17,105	0	33,459	133,415
4671 Lake Michigan	1,090	327	2,297	391	0	445	4,550
4672 Waterways	16,453	2,783	63,621	3,732	83,502	17,958	188,049
4681 Assistance to M&O	2,206	4	3,245	4,412	8,312	13,179	31,358
4682 Assistance to Others	0	1,011	52	1,051	0	173	2,288
4690 Operations & Research	29,653	7,163	107,482	5,674	8,657	3,908	162,537
Totals	179,729	149,231	686,068	220,148	163,928	176,492	1,575,596

M&O Department.

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

2. Solids management areas at Harlem Avenue and Lawndale Lagoons.

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

4. 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. Lysimeter samples from 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. Salt Creek Nutrient Demonstration Project.

7. Chemical Phosphorus Removal at the Egan WRP.

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

9. Fish Kill Response.

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

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

12. Egan Biosolids Phosphorus Removal Study.

13. Hanover Park Fischer Farm Biosolids Study.

14. Nitrogen Availability Comparative Study.

15. Hanover Park WRP Side by Side UV Disinfection Systems Evaluation.

16. Hanover Park WRP Master Plan diurnal sampling.

17. Potential Nitrogen Mineralization from Centrifuge Cake and Air-dried Biosolids.

18. Lab Scale Disinfection Study.

19. Characterization of Centrate and other recycle streams.

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, polymer, 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 191,437 analyses on 20,835 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, Stony Island, and Calumet.

3. TARP Groundwater Monitoring Program.

4. Racine Avenue Pump Station Flood Event.

EM&R Division. Various long-term 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 Pretreatment 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 2008, the OCAL performed 163,928 analyses on 698 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 bi-monthly 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 samples.

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

6. Culture or toxicity water samples from the Analytical Microbiology and Biomonitoring Section.

7. Organic compounds including diazinon in 503 biosolids samples.

8. Low levels of diazinon in final effluents from four specific WRPs annually.

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 269,760 analyses on 35,377 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. Solids Monitoring of the Processing and Use of Sewage Biosolids.

11. 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 WRP UV Disinfection System Evaluation.

3. Hanover Park Master Plan Analyses.

4. Hanover Park Fischer Farm Wells and Biosolids.

5. Comparing Two Aeration Systems at the Egan WRP.

6. Odor and Corrosion Control at Kirie Interceptors.

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 311,485 analyses on 32,317 samples in 2008 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 to the SAL to coordinate the sampling for Low Level Mercury of the Calumet and Lemont WRP effluents.

3. Calumet and Lemont WRP Wet Weather Events.

4. WEFTEC Operators Challenge BOD event.

5. Drying Bed samples from Stony Island at the request of LASMA.

6. District's Environmental Management System.

EM&R Division.

1. Calumet Biosolids Processing Operations and the Fulton County Prairie Plan Project.

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

3. Sulfate analyses of Waterways, TARP, and Lysimeter samples.

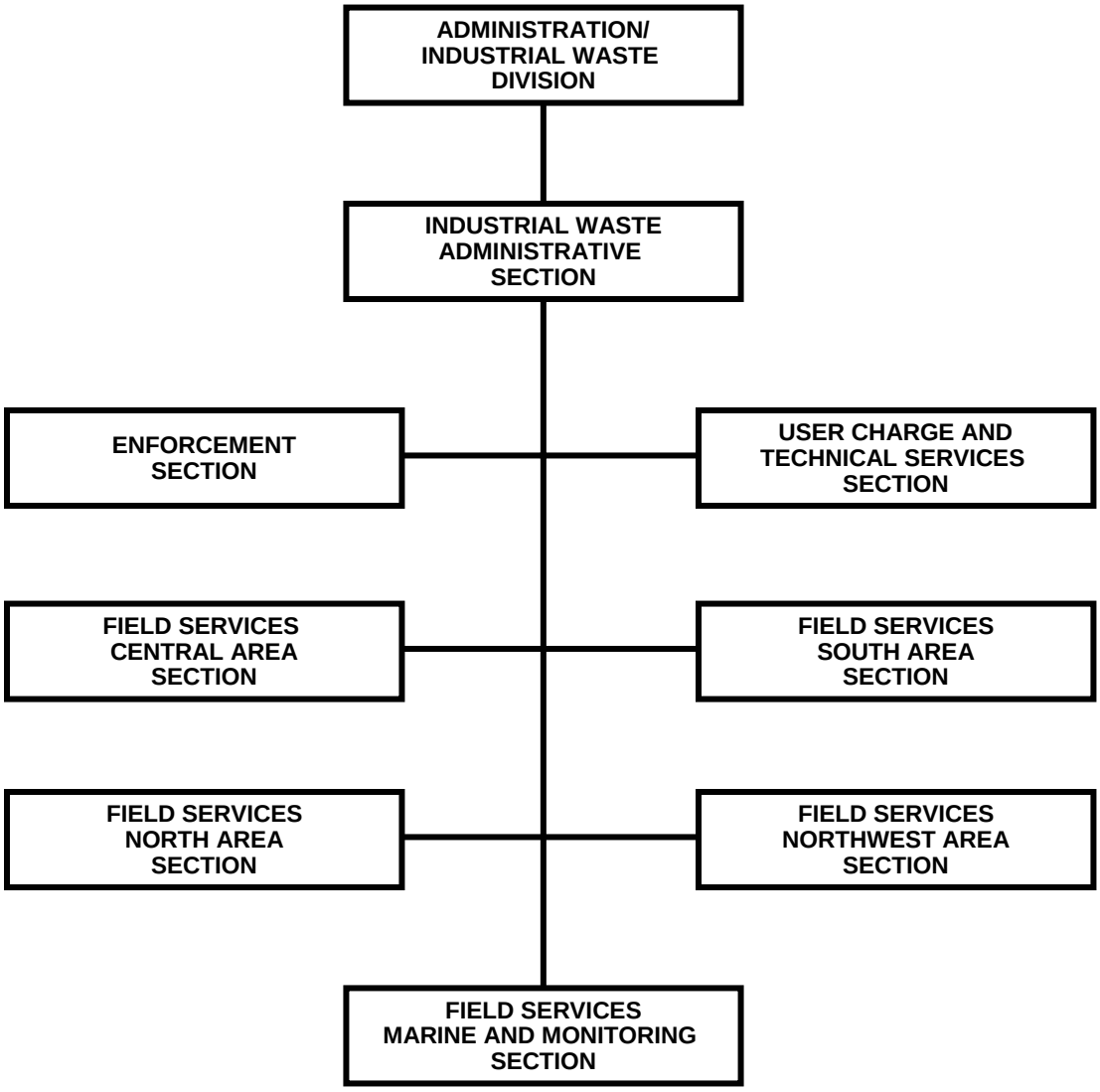
4. Sulfate and Trace Metals analyses for the Stickney Greenhouse samples.

5. Characterization of Centrate and Other Recycle Streams Projects.

6. Materials testing for polymer and sodium hypochlorite purchased by the District for verification of Contract requirements.

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 2008 included the issuance or renewal of 87 Discharge Authorizations; the review of 786 Continued Compliance Reports; and the review of 10 Spill Prevention, Containment and Countermeasure Plans. Enforcement activities for the period from 2003 through 2008 are depicted in the following table.

Year	Cease and Desist Orders	Board Orders	Legal Actions
2003	406	1	18
2004	284	11	4
2005	152	2	0
2006	149	1	0
2007	132	1	0
2008	122	1	3

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 2003 through 2008 is depicted in the following table.

Publication Year[1]	Effluent Limitations	Reporting Requirements	Other Requirements[1]	Total Number of Industrial Users Published
2003	15	49	0	62
2004	18	64	2	76
2005	21	55	0	72
2006	11	54	0	61
2007	12	44	0	51
2008	10	25	1	33

[1] For prior year's actions.

[2] 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 2008, the Section manually reviewed 2,174 reports, including delinquent filings, for 2,042 users (811 commercial-industrial and 1,231 tax-exempt users) containing calculations of their User Charge liabilities under the UCO and documentation corroborating their data. The Section utilized an automated clearing process for 1,575 tax-exempt users approved to file under Section 7f of the UCO, which required no report submittal from the user or manual review by the District. The Section classified 48 new Large Commercial-Industrial and Tax-Exempt Users and 21 Small Nonresidential Commercial-Industrial Users in 2008.

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 2008, the Section reviewed 738 District inspection and sampling reports from the Field Services Section; 41 user proposals for sampling, monitoring and/or installations; sealed 53 privately owned water meters used for reporting volume deductions or discharge volumes; and conducted 714 field inspections to verify user data and/or compliance with the UCO. As of the end of 2008, the Section had also identified 296 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 2003 through 2008.

Year	User Charge Receipts
2003	$50,474,317
2004	$48,007,510
2005	$44,571,653
2006	$53,616,772
2007	$50,828,451
2008	$54,442,493

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 2008, 1,338 SWCO and 1,186 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 2008, 13,909 water quality samples were collected. Further, all groundwater monitoring wells installed for the District's TARP were routinely sampled. In 2008, 1,062 samples were obtained at 125 TARP groundwater monitoring wells. Chemical toilet service companies who, under District permit, discharge cleanings at the Stickney WRP are also monitored and sampled. During 2008, six chemical toilet service companies made 785 disposals at the Stickney WRP. For these disposal events, 147 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 2008, 183 investigations were conducted in response to requests from federal, state and local agencies, municipalities and private citizens; 61 investigations were conducted in response to self-reported industrial activities; and 42 investigations were conducted in response to requests from the District's M&O Department.

APPENDIX I

MEETINGS AND SEMINARS 2008

1. Illinois Association of Park Districts/Illinois Parks and Recreation Association Conference, Chicago, Illinois, *January 2008.*

2. Illinois Association of Wastewater Agencies, Nutrient Subcommittee Meeting (and follow-up committee meetings throughout the year), Starved Rock, Utica, Illinois, *January 2008*.

3. Illinois Pollution Control Board, Use Attainability Analysis Hearings (and follow-up hearings throughout the year), Chicago, Illinois, *January 2008.*

4. Illinois Water Environment Association/Central States Water Environment Association, Government Affairs in Water Pollution Control Seminar (and follow-up laboratory committee meetings throughout the year), Willowbrook, Illinois, *January 2008*.

5. Industrial Water, Waste, and Sewage Group Meeting (and follow-up committee meetings throughout the year), Chicago, Illinois, *January 2008.*

6. Midwest Water Analysts Association, 25th Winter Expo 2008 (and follow-up committee meetings throughout the year), Kenosha, Wisconsin, *January 2008*.

7. United States Department of Agriculture, Regional Research Committee W-1170 Annual Meeting, Las Vegas, Nevada, *January 2008*.

8. United States Environmental Protection Agency, Aquatic Nuisance Species Barrier Panel Meeting (and follow-up committee meetings throughout the year), Chicago, Illinois, *January 2008*.

9. CITGO Petroleum Corporation, Refinery Incident Drill, Lemont, Illinois, *February 2008.*

10. Multi-Stakeholder Engagement on New/Revised Recreational Water Quality Criteria, Washington, D. C., *February 2008.*

11. National Association of Clean Water Agencies, 2008 Winter Conference, Phoenix, Arizona, *February 2008.*

12. Illinois Nutrient Standard Workgroup, Springfield, Illinois, *March 2008.*

13. Illinois Water Environment Association, 29th Annual Conference and Exhibition (and follow-up committee meetings throughout the year), Peoria, Illinois, *March 2008*.

14. Pittsburgh Conference and Expo 2008, New Orleans, Louisiana, *March 2008.*

APPENDIX I

MEETINGS AND SEMINARS 2008

15. United States Environmental Protection Agency, Regional Technical Assistance Group, Nutrient Workgroup Meeting, Chicago, Illinois, *March 2008*.

16. United States Environmental Protection Agency, Surface Water Monitoring and Standards (SWiMS), 7th Annual Meeting, Chicago, Illinois, *March 2008*.

17. United States Fish and Wildlife Service, Hines Emerald Dragonfly Critical Habitat Planning Meeting (and follow-up committee meetings throughout the year), Romeoville, Illinois, *March 2008*.

18. Water Environment Federation, Residuals and Biosolids 2008: Traditions, Trends, and Technologies, Philadelphia, Pennsylvania, *March 2008*.

19. American Chemical Society, 235th National Meeting, New Orleans, Louisiana, *April 2008.*

20. Calumet Government Working Group Meeting (and follow-up committee meetings throughout the year), Chicago, Illinois, *April 2008*.

21. Central States Water Environment Association, 13th Annual Education Seminar, Madison, Wisconsin, *April 2008.*

22. Chicago Chromatography Discussion Group, 45th Annual Introductory Course in Gas Chromatography, Schaumburg, Illinois, *April 2008.*

23. City of Chicago, Earth Day Celebration, Chicago, Illinois, *April 2008*.

24. DuPage River, Salt Creek Watershed Workgroup Meeting (and follow-up committee meetings throughout the year), Elmhurst, Illinois, *April 2008*.

25. Fox River Ecosystem Partnership, Linking Watersheds Conference 2008, Hoffman Estates, Illinois, *April 2008.*

26. Perkin Elmer Open House, Oakbrook, Illinois, *April 2008.*

27. Purdue University, Tour of Purdue University Laboratory, Designed by HDR Architecture, West Lafayette, Indiana, *April 2008.*

28. Thermo Scientific, 2008 Trace Elemental Seminars, Downers Grove, Illinois, *April 2008.*

29. Water Environment Federation/Air and Waste Management Association, Odors and Air Emissions 2008 Joint Conference, Phoenix Arizona, *April 2008.*

APPENDIX I

MEETINGS AND SEMINARS 2008

30. CEM Corporation, Analytical Workshop, Downers Grove, Illinois, *May 2008.*

31. CITGO Petroleum Corporation, Refinery Incident Drill, Lemont, Illinois, *May 2008.*

32. City of Chicago/United States Army Corps of Engineers, Laborer's International Union of North America, Local 4, Bubbly Creek Ecosystem Restoration Public Meeting, Chicago, Illinois, *May 2008.*

33. Dow Chemical Company, Transportation Community Awareness and Emergency Response Training, Bedford Park, Illinois, *May 2008.*

34. Lake Michigan Watershed Academy Conference, Hammond, Indiana, *May 2008.*

35. Midwest Emergency Preparedness and Response Conference, Rockford, Illinois, *May 2008.*

36. Mirta Ramirez High School, Seminar Presentation, Chicago, Illinois, *May 2008.*

37. National Clean Water Policy 2008 Forum, Washington, D.C., *May 2008.*

38. Toxic Inhalation Hazard, Tank Car Emergency Response Roundtable, Chicago, Illinois, *May 2008.*

39. Agilent Technologies, Experience Breakthroughs in Mass Spec Technologies: LC/MS Workshop Series for Small Molecules, Schaumburg, Illinois, *June 2008.*

40. Air and Waste Management Association, 101th Annual Conference, Portland, Oregon, *June 2008*.

41. American Society for Microbiology, 108th General Meeting and Workshops, Boston, Massachusetts, *June 2008*.

42. American Society of Mining and Reclamation, 25th Annual Meeting, Richmond, Virginia, *June 2008.*

43. City of Chicago, Department of Environment, Bubbly Creek Active Sediment Capping Committee Meeting (and follow-up committee meetings throughout the year), Chicago, Illinois, *June 2008*.

44. Illinois Terrorism Task Force Training, Des Plaines, Illinois, *June 2008.*

APPENDIX I

MEETINGS AND SEMINARS 2008

45. Illinois Water Environment Association, 2008 Joint Laboratory Seminar, Crystal Lake, Illinois, *June 2008*.

46. Midwest Water Analysts Association, 2008 Spring Meeting, Wheaton, Illinois, *June 2008*.

47. Underground Storage Tank Training, Chicago, Illinois, *June 2008.*

48. Water Environment Federation/United States Environmental Protection Agency, Sustainability 2008 Conference, Green Practice for the Water Environment, National Harbor, Maryland, *June 2008*.

49. Agilent Technologies, Agilent GC-MSD Troubleshooting and Maintenance, Alpharetta, Georgia, *July 2008.*

50. Illinois Emergency Management Agency, Incident Command/Emergency Operations Center, Interface Seminar, Springfield, Illinois, *July 2008.*

51. National Association of Clean Water Agencies, 38th Annual Meeting, Anchorage, Alaska, *July 2008*.

52. Water Environment Federation Meeting, Washington, D.C., *July 2008.*

53. LabServe, Standard Methods for the Examination of Water and Wastewater, Springfield, Illinois, *August 2008.*

54. NELAC Institute, National Environmental Monitoring Conference, Washington, D. C., *August 2008.*

55. Chicago Fire Department, Public Safety Training, Biological Sampling, Chicago, Illinois, *September 2008.*

56. Environmental Laboratories Annual Seminar, Springfield, Illinois, *September 2008.*

57. Great Lakes Beach Association Annual Conference, Indiana Dunes National Lakeshore, Porter County, Indiana, *September 2008.*

58. Illinois Emergency Management Agency Annual Conference, Springfield, Illinois, *September 2008.*

59. iPACS (internet POTW Administrative and Compliance System) User Group Conference, Lawrenceville, New Jersey, *September 2008.*

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MEETINGS AND SEMINARS 2008

60. Smith Root Electrofishing Training and Certification, Grand Rapids, Michigan, *September 2008.*

61. Chicago Fire Department, Public Safety Training, Biological Sampling, Chicago, Illinois, *October 2008.*

62. Chicago Metropolitan Agency for Planning, Workshop on Water Reuse and Water Efficiency; Options for Industry, Chicago, Illinois, *October 2008*.

63. Illinois Environmental Protection Agency, Pharmaceutical Disposal Summit, Springfield, Illinois, *October 2008.*

64. International Conference on Soil, Sediments, and Water, 24th Annual, Amherst, Massachusetts, *October 2008.*

65. Midwest Water Analysts Association, 2008 Fall Meeting, Milwaukee, Wisconsin, *October 2008*.

66. Northwestern University Society of Women Engineers, Career Day, Evanston, Illinois, *October 2008.*

67. Thermo Scientific, Thermo Informatics World Conference 2008, Las Vegas, Nevada, *October 2008.*

68. Treatment Wetland Interagency Meeting, Woodridge, Illinois, *October 2008.*

69. United States Environmental Protection Agency, Integrated Nitrogen Committee Workshop, Washington, D.C., *October 2008*.

70. University of Illinois, 2008 Illinois Water Conference, Champaign, Illinois, *October 2008.*

71. Water Environment Federation, 81st Annual Technical Exhibition and Conference, Chicago, Illinois, *October 2008*.

72. Water Environment Research Foundation, Workshop on Advanced Whole Plant Modeling, Chicago, Illinois, *October 2008.*

73. American Water Works Association, Water Quality Technical Conference, Cincinnati, Ohio, *November 2008.*

74. Indian Creek Watershed Project Summit, Long Grove, Illinois, *November 2008.*

APPENDIX I

MEETINGS AND SEMINARS 2008

75. Lake Michigan Air and Waste Management Association, 2008 Air Quality Management Conference, Downers Grove, Illinois, *November 2008.*

76. Maine Benzodiazepine Study Group, Annual Conference, South Portland, Maine, *November 2008.*

77. Midwest Institute of Park Executives Meeting, Schaumburg, Illinois, *November 2008.*

78. Northern Illinois Pipeline Association Seminar, Elmhurst, Illinois, *November 2008.*

79. Northern Illinois University, Graduate Geography Department Colloquium, DeKalb, Illinois, *November 2008.*

80. People to People Citizen Ambassador Program, China, *November 2008.*

81. Perkin Elmer, ICP, ICPMS Users Group Meeting, Oak Brook, Illinois, *November 2008.*

82. Society of Environmental Toxicology and Chemistry, North America, 29th Annual Conference, Tampa, Florida, *November 2008*.

83. Soil Science Society of America, Annual Meeting, Houston, Texas, *November 2008*.

84. University of Illinois Chicago, Chicago Wilderness Congress, Chicago, Illinois, *November 2008.*

85. Illinois Sports Turf Managers Association, Illinois Professional Turf Conference, Schaumburg, Illinois, *December 2008*.

86. Midwest Environmental Laboratory, Stakeholders Summit, Chicago, Illinois, *December 2008.*

87. University of Illinois at Chicago, Department of Earth and Environmental Sciences Lunch Seminar, Chicago, Illinois, *December 2008.*

88. Water Environment Research Foundation, Research Forum, Clearwater Beach, Florida, *December 2008*.

APPENDIX II

PRESENTATIONS 2008

1. "Simple Retrofitting for Phosphorus Removal and Its Impact on Plant Performance." Presented at the Midwest Water Analysts Association, Winter Expo 2008, Kenosha, Wisconsin, by H. Zhang, J. S. Jain, C. O'Connor, T. C. Granato, J. Wasik, M. Brand, K. Lai, J. Ford, and S. Carmody. *January 2008.* PP

2. "Antibiotics in the Terrestrial Environment: What's the Scoop with Animal and Human Poop?" Presented at the Illinois Water Environment Association, 29th Annual Conference and Exhibition, Peoria, Illinois, by K. Kumar, L. S. Hundal, A. E. Cox, T. C. Granato, L. Kollias, and R. Lanyon. *March 2008.* PP

3. "Concerns about Endocrine Disrupting Chemicals in Land-Applied Biosolids – Media Hype or Reality." Presented at the Illinois Water Environment Association, 29th Annual Conference and Exhibition, Peoria, Illinois, by L. S. Hundal, K. Xia, A. E. Cox, T. C. Granato, L. Kollias, R. Lanyon, K. Armbrust, and K. Kumar. *March 2008.* PP

4. "Dry Weather Microbial Risk Assessment of Human Health Impacts of the Chicago Area Waterway System." Presented at the Illinois Water Environment Association, 29th Annual Conference and Exhibition, Peoria, Illinois, by G. Rijal. *March 2008.* PP

5. "Potential Effects of Ferric Chloride on GBT Performance at Egan Water Reclamation Plant." Presented at the Illinois Water Environment Association, 29th Annual Conference and Exhibition, Peoria, Illinois, by J. A. Kozak and K. Patel. *March 2008.* PP

6. "The Application of Microscopic Image Analysis Technology to the Enumeration of Ascaris Ova in Biosolids." Presented at the Illinois Water Environment Association, 29th Annual Conference and Exhibition, Peoria, Illinois, by R. Gore. *March 2008.* PP

7. "The Carbon and Energy Footprint of Water Reclamation and Waterway Management in Greater Chicago." Presented at the American Chemical Society, 235th National Meeting, New Orleans, Louisiana, by C. O'Connor, J. A. Kozak, K. Kumar, T. C. Granato, L. Kollias, and R. Lanyon. *April 2008.* B

8. "Metropolitan Water Reclamation District of Greater Chicago's Role in Protecting Public Health and Chicago Area Waterways." Presented at the American Society for Microbiology, 108th General Meeting and Workshops, Boston, Massachusetts, by G. Rijal. *June 2008.* PP

9. "Soil Nitrogen Replenishment Resulting from Long-Term Application of Biosolids for Reclamation of Strip-Mined Land." Presented at the American Society of Mining and

Reclamation, 25th Annual Meeting, Richmond, Virginia, by G. Tian, T. C. Granato, A. E. Cox, R. I. Pietz, and C. R. Carlson, Jr. *June 2008.* PP

10. "Enterococci qPCR: Implications for POTWs." Presented at the Great Lakes Beach Association, Annual Conference, Indiana Dunes National Lakeshore, Porter County, Indiana, by A. Glymph. *September 2008.* PP

11. "Activated Sludge and BNR Process Control – Hands-On in the Real World. Station: 'Microscopy (The Bugs)'." Presented at the Water Environment Federation, 81st Annual Technical Exhibition and Conference, Chicago, Illinois, by A. Glymph. *October 2008.* PS

12. "Current Practice of Water Reuse by the Metropolitan Water Reclamation District of Greater Chicago." Presented at the Chicago Metropolitan Agency for Planning, Chicago, Illinois, by C. O'Connor, T. C. Granato, L. Kollias, and R. Lanyon. *October 2008.* PP

13. "Dissolved Oxygen in the Chicago Area Waterway System, Using a Continuous Dissolved Oxygen Monitoring Program to Support Water Quality Improvement Efforts." Presented at the Water Environment Federation, 81st Annual Technical Exhibition and Conference, Chicago, Illinois, by T. Minarik. *October 2008.* PS

14. "Impact of $FeCl_3$ Addition for Phosphorus Removal on Solids Processing at the John E. Egan Water Reclamation Plant." Presented at the Water Environment Federation, 81st Annual Technical Exhibition and Conference, Chicago, Illinois, by K. Patel, J. A. Kozak, D. T. Lordi, C. O'Connor, and T. C. Granato. *October 2008.* B

15. "Innovative Recycling of Biosolids: No Problem with Metals." Presented at the International Conference on Soil, Sediments, and Water, 24th Annual, Amherst, Massachusetts, by P. Lindo, T. C. Granato, and A. E. Cox. *October 2008.* PS

16. "Metropolitan Water Reclamation District of Greater Chicago's Support of the Use Attainability Analysis for the Chicago Area Waterways." Presented at the Water Environment Federation, 81st Annual Technical Exhibition and Conference, Chicago, Illinois, by L. Kollias. *October 2008.* PP

17. "Simple Retrofitting for Phosphorus Removal and Its Impact on Plant Performance at the John E. Egan Water Reclamation Plant." Presented at the Water Environment Federation, 81st Annual Technical Exhibition and Conference, Chicago, Illinois, by H. Zhang, J. S. Jain, C. O'Connor, T. C. Granato, M. Brand, K. Lai, J. Ford, and S. Carmody. *October 2008.* B

APPENDIX II

PRESENTATIONS 2008

18. "Stream Response to Phosphorus Reduction at the Metropolitan Water Reclamation District of Greater Chicago, John E. Egan Water Reclamation Plant." Presented at the Water Environment Federation, 81st Annual Technical Exhibition and Conference, Chicago, Illinois, and DuPage River, Salt Creek Watershed Workgroup Meeting, Elmhurst, Illinois, by J. Wasik. *October 2008.* PP

19. "The Carbon and Energy Footprint of Water Reclamation and Waterway Management in Greater Chicago." Presented at the Illinois Water Conference 2008, Champaign, Illinois, by J. A. Kozak, C. O'Connor, T. C. Granato. *October 2008.* PP

20. "Water Environment Federation/Water Environment Research Foundation: Getting Prepared for 'New' Pathogen Standards." Presented at the Water Environment Federation, 81st Annual Technical Exhibition and Conference, Chicago, Illinois, by G. Rijal. *October 2008.* PP

21. "Overview of Emerging Issues: Wastewater Treatment and Water Resource Management." Presented at Northern Illinois University, Graduate Geography Department Colloquium, DeKalb, Illinois, by T. C. Granato. *November 2008.* PP

22. "Regulatory Update: Pretreatment and User Charge Issues." Presented at the Industrial Water, Waste, and Sewage Group Meeting, Chicago, Illinois, by L. Kollias. *November 2008.* PP

23. "Save with Biosolids as a Fertilizer Substitute and as a Soil Amendment." Presented at the Midwest Institute of Park Executives Meeting, Schaumburg, Illinois, by A. E. Cox and D. Collins. *November 2008.* PP

24. "Wastewater Treatment Opportunities at the Metropolitan Water Reclamation District." Presented at University of Illinois at Chicago, Department of Earth and Environmental Sciences Lunch Seminar, Chicago, Illinois, by J. A. Kozak. *December 2008.* PP

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

APPENDIX III

PAPERS PUBLISHED 2008

1. Hundal, L. S., A. E. Cox, T. C. Granato, and Z. Abedin. "Levels of Dioxin in Soils and Corn Tissues after 30 Years of Biosolids Application." *Journal of Environmental Quality,* 37: 1497-1500. *2008.*

2. Koo, B. J., A. C. Chang, A. L. Page, T. C. Granato, and R. H. Dowdy. "Assessing Long-Term Plant Availability of Biosolids-Borne Heavy Metals Accumulated in Cropland Soils." Proceedings of Water Environment Federation, 21st Annual Residuals and Biosolids Management Conference, Philadelphia, Pennsylvania. *2008.*

3. Koo, B. J., W. Chen, T. C. Granato, R. H. Dowdy, A. L. Page, and A. C. Chang. "New Approach to Assess Plant-Availability of Soil-Borne Heavy Metals." Proceedings of 14th International Conference on Heavy Metals in the Environment, Department of Agricultural Chemistry, National Taiwan University, Taipai, Taiwan, *2008.*

4. Oskouie, A. K., D. T. Lordi, T. C. Granato, and L. Kollias. "Plant-Specific Correlations to Predict the Total VOC Emissions from Wastewater Treatment Plants." *Atmospheric Environment,* 42: 4530-4539. *2008.*

5. Tian, G., T. C. Granato, F. D. Dinelli, and A. E. Cox. "Effectiveness of Biosolids in Enhancing Soil Microbial Populations and N Mineralization in Golf Course Putting Greens." *Applied Soil Ecology,* 40: 381-386. *2008.*

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO
MONITORING AND RESEARCH DEPARTMENT 2008 SEMINAR SERIES

January 25, 2008 ***The Antibiotic Paradox: What's the Scoop with Animal and Human Poop?*** Dr. Kuldip Kumar, Soil Scientist, Monitoring and Research (M&R) Department, Metropolitan Water Reclamation District of Greater Chicago (District), Cicero, IL

February 29, 2008 ***Direct Electricity or Hydrogen Generation from Wastewater and other Waste Biomass using Microbial Fuel Cell Technologies*** Dr. Bruce Logan, Pennsylvania State University, College Station, PA

March 28, 2008 ***Chicago Health, Environmental Exposure, and Recreation Study***
Dr. Samuel Dorevitch, University of Illinois at Chicago, Chicago, IL

April 25, 2008 ***Life Cycle Inventory and Impacts of Reactive Nitrogen in Agroecosystems***
Dr. Thomas Theis, University of Illinois at Chicago, Chicago, IL

May 30, 2008 ***An Exploration of Emerging Contaminants in the Chicago Waterways: Ongoing Collaborative Research between USEPA and the District*** Mr. Todd Nettesheim, United States Environmental Protection Agency, Chicago, IL

June 27 2008 ***Occurrence and Fate of Microconstituent Chemicals in Biosolids***
Dr. Edward Topp, Agriculture and Agri-Food Canada, Ottawa, Ontario, CAN

July 25, 2008 ***The District's Global Warming Initiatives*** Dr. Catherine O'Connor, Research Scientist, M&R Department, District, Cicero, IL

August 22, 2008 ***Total Nitrogen Removal in the Hybrid Membrane-Biofilm Process***
Dr. Robert Nerenberg, University of Notre Dame, South Bend, IN

September 26, 2008 ***Update of the Proposed State of Illinois Nutrient Standards***
Mr. Robert Mosher, Illinois Environmental Protection Agency, Springfield, IL

October 17, 2008 ***Full-Scale Removal of Struvite from Biosolids Centrate for Production of Commercial Fertilizer at the City of Edmonton's Gold Bar Water Reclamation Plant*** Mr. Vince Corkery, City of Edmonton, Edmonton, Alberta, CAN

November 21, 2008 ***Effect of Full-Scale Chemical Phosphorus Removal at the John E. Egan Water Reclamation Plant on Treatment Process Performance, Sludge Dewatering, Biosolids Management, and Water Quality in Salt Creek***
Ms. Jennifer Wasik, Biologist; Dr. Heng Zhang, Research Scientist; Mr. Kamlesh Patel, Research Scientist; and Dr. Guanglong Tian, Soil Scientist; M&R Department, District, Cicero, IL

December 12, 2008 ***Update on the District's Biosolids Management Program***
Dr. Albert Cox, Soil Scientist, M&R Department, District, Cicero, IL; Ms. Manju Sharma, Assistant Chief Engineer and Mr. Daniel Collins, Principal Civil Engineer, Maintenance and Operations Department, District, Chicago, IL

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