Metropolitan Water Reclamation District of Greater Chicago

RESEARCH AND DEVELOPMENT DEPARTMENT

REPORT NO. 07-19

RESEARCH AND DEVELOPMENT

2006

Annual Report

APRIL 2007

Metropolitan Water Reclamation District of Greater Chicago
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RESEARCH AND DEVELOPMENT
2006
ANNUAL REPORT

Research and Development Department
Louis Kollias, Director

April 2007

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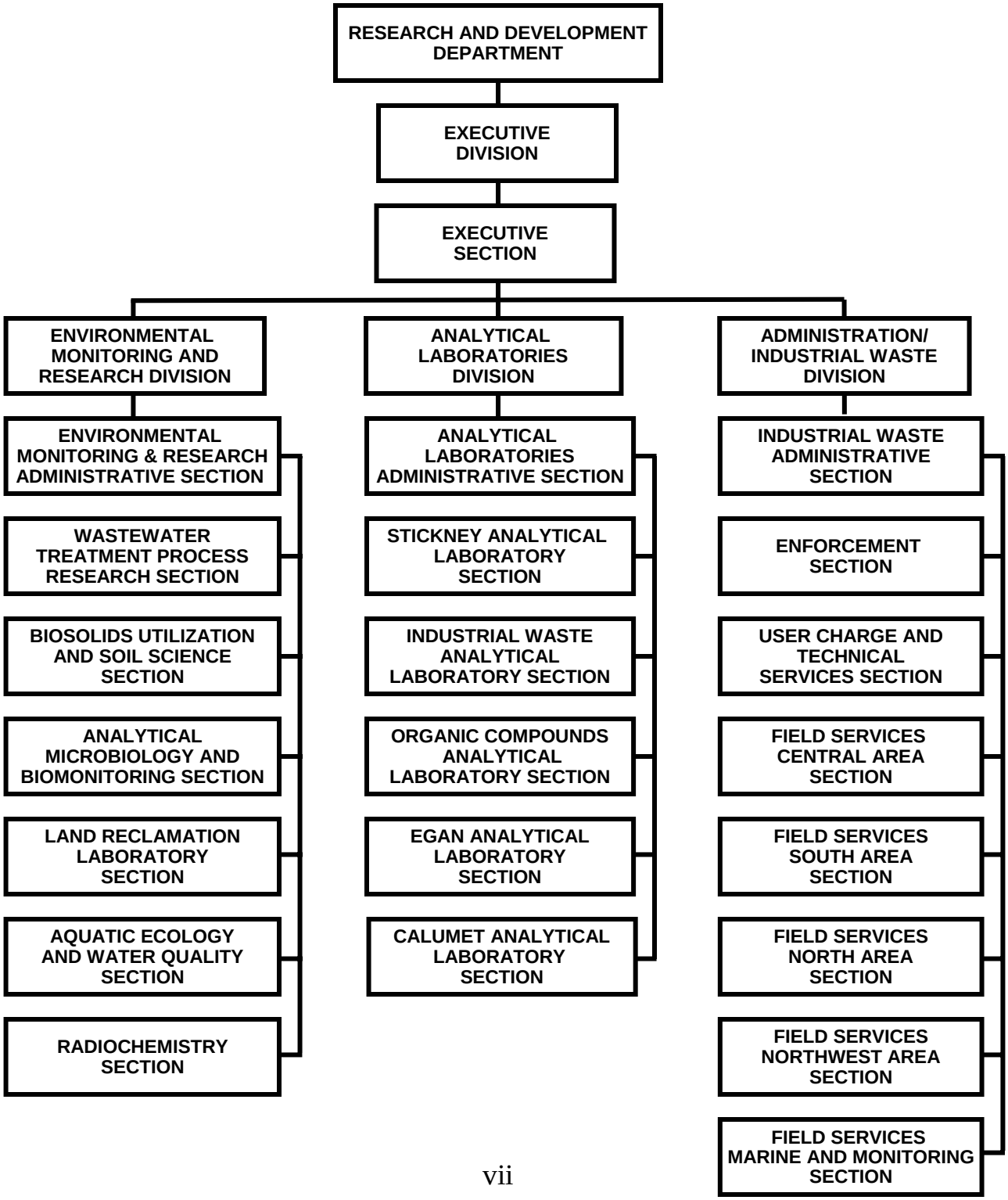
DISCLAIMER

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

RESEARCH AND DEVELOPMENT DEPARTMENT
ORGANIZATION CHART FOR 2006



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 317 budgeted positions during 2006 with an adjusted total salary and wage appropriation of $21,403,900. 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 2006, the Department reviewed personnel actions relative to five retirements. In addition, as part of adopting the 2006 Budget and the District's attrition program, four existing positions were eliminated when vacated during 2005. This decrease in positions led to a 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 2006, the Center provided onsite technical assistance to a golf course, a truck washing facility and a metal finishing company. The Center worked extensively with the metal finisher and made 70 recommendations to improve compliance with safety regulations, optimize their pretreatment system and reduce their water usage. By the end of 2006, the metal finishing company had begun implementing a few of these recommendations.

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 2006, 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 2006 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 2006 budget using this system.

Budget Administration

A comparison of appropriations to expenditures for 2006 shows the following:

	Appropriation	Expenditure
Personnel (Line Item 101) (Adjusted)	$21,403,900	$21,078,053
Other Line Items	5,056,100	3,374,600
Total	$26,460,000	$24,452,653

Purchasing Administration

During 2006, about 387 requisitions were reviewed and processed by the Administration Division, prior to being forwarded to the Purchasing Department. This review verified the availability and proper use of department funds for all requisitioned items. The Division ensures that all departmental purchase orders are properly closed out at year's end and processes purchase order decreases or increases as appropriate.

Contract Administration

During 2006, the Division was involved in the preparation and administration of 22 contracts for a total cost of approximately $873,751, including multiyear contracts. This involved the preparation of detail specifications, Board letters, advertisements, coordination of the receipt and review of bids, recommendations to award, processing of purchase requisitions, change orders, payment of invoices, and release of bid deposits.

The Division prepared and administered 24 consulting services agreements with individual values of $9,000 or more and having a total value of approximately $2,825,670 during 2006. The Division also prepared and administered 24 maintenance agreements with individual values of $10,000 or more and a total value of $1,270,419. 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 2006, the seven Research and Development (R&D) Department laboratories previously accredited or certified with the State of Illinois maintained their status. The participation of our laboratories in these programs helps to ensure that the laboratories are operated in a manner that meets or exceeds the standards established by the applicable accreditation or certification program. Some benefits of maintaining the high standards required by these programs are better documentation of procedures, increased quality control and quality assessment, improved analyst training, and increased accuracy of test results.

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

In 2002, the State of Illinois created an advisory committee to review and evaluate the IEPA management of the NELAP accreditation program. Under the enabling Public Act, the District maintains a permanent member on the nine-person committee. The fee schedule for accredited laboratories established in 2002 remained unchanged in 2006. Fees for the five accredited District laboratories range from $3,400 to $4,400.

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

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

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

Use Attainability Analysis Study

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

Departmental Reports

During 2006, the Department published 84 formal reports dealing with various aspects of the District's operations. A list of these reports is given in Table 1.

TABLE 1: RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2006

Report No.	Report Title	Author(s)	Date	Organization or Conference
2006-1	Calculation of 2006 User Charge Rates	R&D Department	January 2006	Internal District Report
2006-2	Monthly Controlled Solids Distribution Report, November 2005	R&D Department Tian, G.	January 2006	Illinois Environmental Protection Agency (IEPA)
2006-3	Calumet West Solids Management Area Monitoring Report, Fourth Quarter 2005	R&D Department Tian, G.	February 2006	IEPA
2006-4	Calumet East Solids Management Area Monitoring Report, Fourth Quarter 2005	R&D Department Tian, G.	February 2006	IEPA
2006-5	Biomonitoring Report 2005, Results of Acute Whole Effluent Toxicity (WET) Tests Conducted on Final Effluent Samples, Lemont WRP, Lemont, IL, NPDES Permit No. IL0028070, December 2005	R&D Department Zmuda, J.	January 2006	IEPA
2006-6	Annual Part 503 Biosolids Management Report 2005	R&D Department Cox, A.; Lindo, P.; Patel, M.; and Granato, T. C.	February 2006	United States Environmental Protection Agency (USEPA), Region V
2006-7	Monthly Controlled Solids Distribution Report, December 2005	R&D Department Tian, G.	February 2006	IEPA
2006-8	Monthly Report of the Fulton County Environmental Protection System, November 2005	R&D Department Tian, G.; and Cox, A.	February 2006	IEPA
2006-9	John E. Egan Solids Management Area Monitoring Report, Fourth Quarter 2005	R&D Department Cox, A.	February 2006	IEPA

TABLE 1 (Continued): RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2006

Report No.	Report Title	Author(s)	Date	Organization or Conference
2006-10	Harlem Avenue Solids Management Area Monitoring Report, Fourth Quarter 2005	R&D Department Lindo, P.	March 2006	IEPA
2006-11	122nd Street and Stony Island Avenue Solids Management Area Monitoring Report, Fourth Quarter 2005	R&D Department Lindo, P.	March 2006	IEPA
2006-12	Ridgeland Avenue Solids Management Area Monitoring Report, Fourth Quarter 2005	R&D Department Lindo, P.	March 2006	IEPA
2006-13	Hanover Park Fischer Farm Monitoring Report, Fourth Quarter 2005	R&D Department Lindo, P.	March 2006	IEPA
2006-14	Biomonitoring Report 2006, Results of Acute Whole Effluent Toxicity (WET) Tests Conducted on Final Effluent Samples John E. Egan WRP, Schaumburg, IL, NPDES Permit No. IL0036340, February 2006	R&D Department Zmuda, J.	March 2006	IEPA
2006-15	Research and Development 2005 Annual Report	R&D Department	March 2006	Internal Report
2006-16	Lawndale Avenue Solids Management Area Monitoring Report, Fourth Quarter 2005	R&D Department Lindo, P.	March 2006	IEPA
2006-17	Reporting Requirements for Site-Specific Equivalency to PFRP Designation of MWRDGC Biosolids Processing Trains at the Stickney and Calumet WRPs	R&D Department Cox, A.	March 2006	USEPA, Region V
2006-18	Monthly Report of the Fulton County Environmental Protection System, December 2005	R&D Department Tian, G.; and Cox, A.	April 2006	IEPA

TABLE 1 (Continued): RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2006

Report No.	Report Title	Author(s)	Date	Organization or Conference
2006-19	Monthly Controlled Solids Distribution Report, January 2006	R&D Department Kumar, K.	April 2006	IEPA
2006-20	Monthly Controlled Solids Distribution Report, February 2006	R&D Department Kumar, K.	April 2006	IEPA
2006-21	Monthly Report of the Fulton County Environmental Protection System, January 2006	R&D Department Tian, G.; and Cox, A.	April 2006	IEPA
2006-22	Biomonitoring Report 2006, Results of Acute Whole Effluent Toxicity (WET) Tests Conducted on Final Effluent Samples, Lemont WRP, Lemont, IL, NPDES Permit IL0028070, March 2006	R&D Department Zmuda, J.	April 2006	IEPA
2006-23	Biomonitoring Report 2002-2004: Chronic Whole Effluent Toxicity (WET) Assessment of Effluents from the Stickney, North Side and Calumet WRPs, 2002-2004, Conducted by the MWRDGC, the USEPA, Region V, and the IEPA	R&D Department Zmuda, J.	Dec. 2005	IEPA
2006-24	John E. Egan Solids Management Area Monitoring Report, First Quarter 2006	R&D Department Cox, A.	May 2006	IEPA
2006-25	Calumet West Solids Management Area Monitoring Report, First Quarter 2006	R&D Department Kumar, K.	May 2006	IEPA
2006-26	Calumet East Solids Management Area Monitoring Report, First Quarter 2006	R&D Department Kumar, K.	May 2006	IEPA
2006-28	Monthly Controlled Solids Distribution Report, March 2006	R&D Department Kumar, K.	May 2006	IEPA

TABLE 1 (Continued): RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2006

Report No.	Report Title	Author(s)	Date	Organization or Conference
2006-29	Hanover Park Fischer Farm Monitoring Report, First Quarter 2006	R&D Department Lindo, P.	May 2006	IEPA
2006-30	Ridgeland Avenue Solids Management Area Monitoring Report, First Quarter 2006	R&D Department Lindo, P.	May 2006	IEPA
2006-31	122nd and Stony Island Avenue Solids Management Area Monitoring Report, First Quarter 2006	R&D Department Lindo, P.	May 2006	IEPA
2006-32	The Effect of Secondary Sewage Treatment on the Total Numbers and Percentages of Antibiotic Resistant Fecal Coliforms in Raw Sewage Entering the Seven Water Reclamation Plants of the MWRDGC	R&D Department Zmuda, J.; Gore, R.; Abedin, Z.; and Granato, T. C.	May 2006	Internal District Report
2006-33	Lawndale Avenue Solids Management Area Monitoring Report, First Quarter 2006	R&D Department Lindo, P.	May 2006	IEPA
2006-34	Harlem Avenue Solids Management Area Monitoring Report, First Quarter 2006	R&D Department Lindo, P.	May 2006	IEPA
2006-35	Monthly Report of the Fulton County Environmental Protection System, March 2006	R&D Department Tian, G.; and Cox, A.	June 2006	IEPA
2006-36	Monthly Controlled Solids Distribution Report, April 2006	R&D Department Kumar, K.	June 2006	IEPA
2006-37	Biomonitoring Report 2006, Results of Acute Whole Effluent Toxicity (WET) Tests Conducted on Final Effluent Samples, John E. Egan WRP, Schaumburg, IL, NPDES Permit No. IL0036340, May 2006	R&D Department Rijal, G.	June 2006	IEPA

TABLE 1 (Continued): RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2006

Report No.	Report Title	Author(s)	Date	Organization or Conference
2006-38	Expert Review Report Regarding USEPA's Water Quality Criteria for Bacteria – 1986: Application to Secondary Contact Recreation	R&D Department Expert Review Panel, Drs. Allen, H.; El-Shaarawi, A.; Haas, C.; and Rose, J.	July 2006	IEPA
2006-39	Monthly Report of the Fulton County Environmental Protection System, April 2006	R&D Department Tian, G.; and Cox, A.	July 2006	IEPA
2006-40	Monthly Controlled Solids Distribution Report, May 2006	R&D Department Kumar, K.	July 2006	IEPA
2006-41	Monthly Report of the Fulton County Environmental Protection System, May 2006	R&D Department Tian, G.; and Cox, A.	August 2006	IEPA
2006-42	Groundwater Monitoring Report, Tunnel and Reservoir Plan, Calumet Tunnel System 2005 Annual Report	R&D Department Jain, J. S.; and MacDonald, D.	August 2006	IEPA
2006-43	Groundwater Monitoring Report, Tunnel and Reservoir Plan, Thornton Transitional Flood Control Reservoir 2005 Annual Report	R&D Department Jain, J. S.; and MacDonald, D.	August 2006	IEPA
2006-44	Groundwater Monitoring Report, Tunnel and Reservoir Plan, Thornton Transitional O'Hare CUP Reservoir 2005 Annual Report	R&D Department Jain, J. S.; and MacDonald, D.	August 2006	IEPA
2006-45	Groundwater Monitoring Report, Tunnel and Reservoir Plan, Mainstream Tunnel System 2005 Annual Report	R&D Department Jain, J. S.; and MacDonald, D.	August 2006	IEPA

TABLE 1 (Continued): RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2006

Report No.	Report Title	Author(s)	Date	Organization or Conference
2006-46	Groundwater Monitoring Report, Tunnel and Reservoir Plan, Upper Des Plaines Tunnel System 2005 Annual Report	R&D Department Jain, J. S.; and MacDonald, D.	August 2006	IEPA
2006-47	Groundwater Monitoring Report, Tunnel and Reservoir Plan, Des Plaines Tunnel System 2005 Annual Report	R&D Department Jain, J. S.; and MacDonald, D.	August 2006	IEPA
2006-48	Water and Sediment Quality Along the Illinois Waterway from the Lockport Lock to the Peoria Lock During 2005	R&D Department Wasik, J.; and Minarik, T.	September 2006	Internal District Report
2006-49	Monthly Controlled SolidS Distribution Report, June 2006	R&D Department Kumar, K.	August 2006	IEPA
2006-50	John E. Egan Solids Management Area Monitoring Report, Second Quarter 2006	R&D Department Cox, A.	August 2006	IEPA
2006-51	Hanover Park Fischer Farm Monitoring Report, Second Quarter 2006	R&D Department Lindo, P.	August 2006	IEPA
2006-52	Calumet East Solids Management Area Monitoring Report, Second Quarter 2006	R&D Department Lindo, P.	August 2006	IEPA
2006-53	Calumet West Solids Management Area Monitoring Report, Second Quarter 2006	R&D Department Lindo, P.	August 2006	IEPA
2006-54	Harlem Avenue Solids Management Area Monitoring Report, Second Quarter 2006	R&D Department Lindo, P.	August 2006	IEPA
2006-55	Lawndale Avenue Solids Management Area Monitoring Report, Second Quarter 2006	R&D Department Lindo, P.	August 2006	IEPA

TABLE 1 (Continued): RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2006

Report No.	Report Title	Author(s)	Date	Organization or Conference
2006-56	122nd and Stony Island Avenue Solids Management Area Monitoring Report, Second Quarter 2006	R&D Department Lindo, P.	August 2006	IEPA
2006-57	Ridgeland Avenue Solids Management Area Monitoring Report, Second Quarter 2006	R&D Department Lindo, P.	August 2006	IEPA
2006-58	Radiological Monitoring of the Raw Sewage Final Effluent Sludges, and Biosolids of the MWRDGC, 2005 Annual Report	R&D Department Khalique, A.	August 2006	Internal District Report
2006-59	Monthly Report of the Fulton County Environmental Protection System, June 2006	R&D Department Tian, G.; and Cox, A.	September 2006	IEPA
2006-60	Biomonitoring Report 2006, Results of Acute Whole Effluent Toxicity (WET) Tests Conducted on Final Effluent Samples, Lemont WRP, Lemont, IL, NPDES Permit No. IL 0028070, August 2006	R&D Department Rijal, G.	September 2006	IEPA
2006-61	Monthly Report of the Fulton County Environmental Protection System, July 2006	R&D Department Tian, G.;and Cox, A.	September 2006	IEPA
2006-62	Monthly Controlled Solids Distribution Report, July 2006	R&D Department Kumar, K.	October 2006	IEPA
2006-63	Biomonitoring Report 2006, Results of Chronic Whole Effluent Toxicity (WET) Tests for the Hanover Park WRP, Hanover Park, IL, NPDES Permit No. IL 0036137, May 2006	R&D Department Rijal, G.	October 2006	IEPA
2006-64	Calculation of 2007 User Charge Rates	R&D Department	November 2006	Internal District Report

TABLE 1 (Continued): RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2006

Report No.	Report Title	Author(s)	Date	Organization or Conference
2006-65	Monthly Controlled Solids Distribution Report, August 2006	R&D Department Tian, G.;and Cox, A.	October 2006	IEPA
2006-66	Biomonitoring Report 2006, Acute Whole Effluent Toxicity (WET) Test Results for the Lemont Water Reclamation Plant, Lemont, Illinois, NPDES Permit No. IL 0028070, September 2006	R&D Department Rijal, G.	October 2006	IEPA
2006-67	Monthly Report of the Fulton County Environmental Protection System, August 2006	R&D Department Tian, G.;and Cox, A.	November 2006	IEPA
2006-68	John E. Egan Solids Management Area Monitoring Report, Third Quarter 2006	R&D Department Cox, A.	November 2006	IEPA
2006-69	Report on Biosolids Characteristics for 2005	R&D Department Lindo, P.; and Cox, A.	November 2006	IEPA
2006-70	Report on Commercial Laundries as Sources of Alkylphenol Ethoxylates to District Water Reclamation Plants	R&D Department Oskouie, A.; Lordi, D.; O'Connor, C; and Granato, T.	November 2006	IEPA
2006-72	Monthly Report of the Fulton County Environmental Protection System, September 2006	R&D Department Tian, G.;and Cox, A.	December 2006	IEPA
2006-73	Continuous Dissolved Oxygen Monitoring in Chicago Area Wadeable Streams During 2005	R&D Department Minarik, T.; Sopcak, M.; Wasik, J.; and Dennison, S.	November 2006	IEPA

TABLE 1 (Continued): RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2006

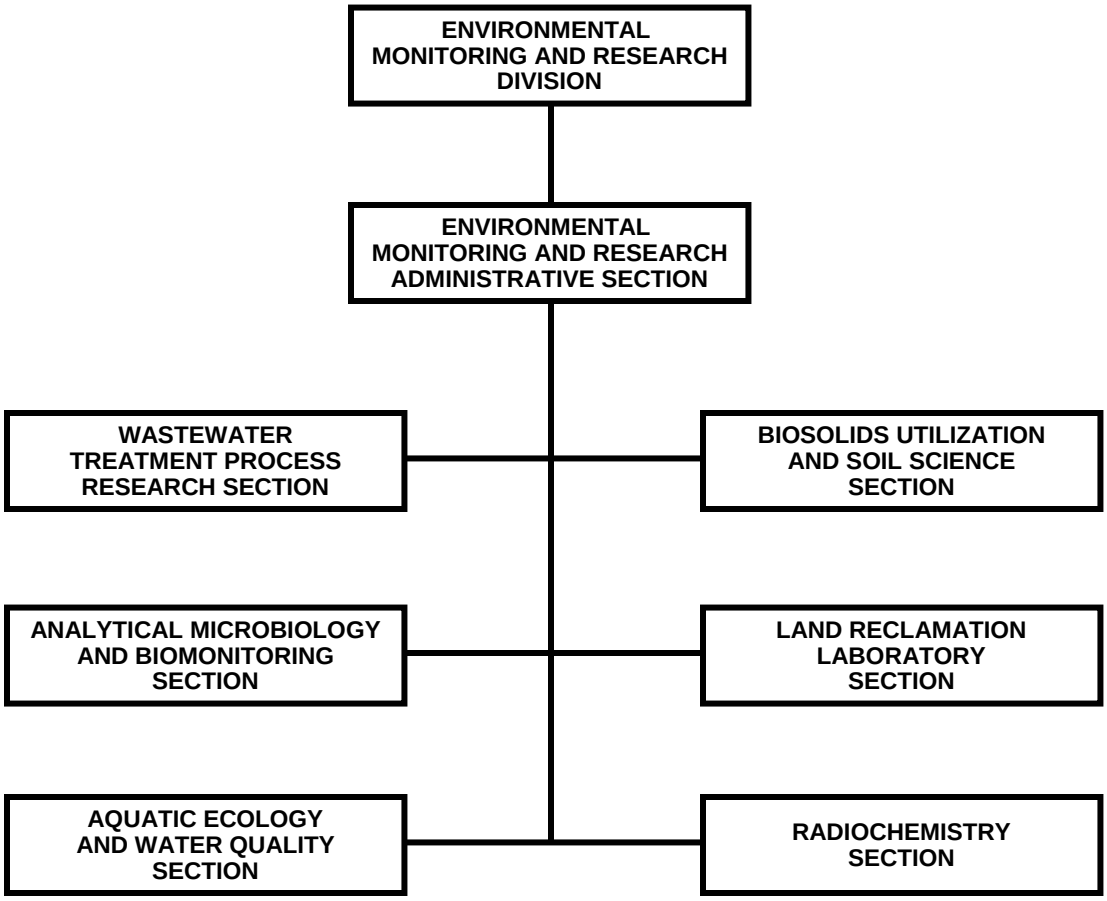
Report No.	Report Title	Author(s)	Date	Organization or Conference
2006-74	Continuous Dissolved Oxygen Monitoring in the Deep Draft Chicago Waterway System During 2005	R&D Department Minarik, T.; Sopcak, M.; Wasik, J.; and Dennison, S.	November 2006	IEPA
2006-75	Monthly Controlled Solids Distribution Report, September 2006	R&D Department Tian, G.;and Cox, A.	December 2006	IEPA
2006-76	Calumet East Solids Management Area Monitoring Report, Third Quarter 2006	R&D Department Lindo, P.	December 2006	IEPA
2006-77	Calumet West Solids Management Area Monitoring Report, Third Quarter 2006	R&D Department Lindo, P.	December 2006	IEPA
2006-78	Harlem Avenue Solids Management Area Monitoring Report, Third Quarter 2006	R&D Department Lindo, P.	December 2006	IEPA
2006-79	Lawndale Avenue Solids Management Area Monitoring Report, Third Quarter 2006	R&D Department Lindo, P.	December 2006	IEPA
2006-80	Ridgeland Avenue Solids Management Area Monitoring Report, Third Quarter 2006	R&D Department Lindo, P.	December 2006	IEPA
2006-81	122nd and Stony Island Avenue Solids Management Area Monitoring Report, Third Quarter 2006	R&D Department Lindo, P.	December 2006	IEPA
2006-82	Monthly Controlled Solids Distribution Report, October 2006	R&D Department Tian, G.;and Cox, A.	December 2006	IEPA

TABLE 1 (Continued): RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2006

Report No.	Report Title	Author(s)	Date	Organization or Conference
2006-83	2005 Annual Summary Report Water Quality Within the Waterways System of the Metropolitan Water Reclamation District of Greater Chicago	R&D Department Abedin, Z.	December 2006	IEPA
2006-84	Technical Report # 18, Calibration of a Model for Simulation of Water Quality During Unsteady Flow in the Chicago Waterway System and Application to Evaluate Use Attainability Analysis Remedial Actions	Institute for Urban Environmental Risk Management, Marquette University, Milwaukee, Wisconsin	December 2006	IEPA

FIGURE 1

ENVIRONMENTAL MONITORING AND RESEARCH DIVISION
ORGANIZATION CHART



ENVIRONMENTAL MONITORING AND RESEARCH DIVISION

The Environmental Monitoring and Research (EM&R) Division has 70 employees, and is comprised of seven Sections, viz.,

1. Administrative
2. Wastewater Treatment Process Research
3. Biosolids Utilization and Soil Science – Stickney
4. Land Reclamation Laboratory - Fulton County
5. Analytical Microbiology and Biomonitoring
6. Aquatic Ecology and Water Quality
7. Radiochemistry

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

- Monitoring the environmental quality of Lake Michigan, area rivers and canals, and the Illinois River to document the effectiveness of the District's wastewater treatment program.
- Assisting in the resolution of sewage treatment and solids disposal operation problems.
- Providing technical assistance to other departments and agencies with respect to issues related to wastewater treatment; combined sewer overflow (CSO) management; waterways management; and solids processing, utilization, and marketing.
- Conducting applied and operations research to achieve improvement and cost reductions in District wastewater treatment, waterways management, and solids processing and biosolids utilization activities.
- Assessing the impacts of new or proposed regulations on District activities.

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 2006, 1,894 people attended these seminars. A list of the seminar topics is shown in Appendix IV.

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

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

Statistical and Computing Support. During 2006, 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 Section on the evaluation of polymer addition tests. The results of this work will increase the efficiency of polymer testing.

2. Statistical support was provided to the Analytical Microbiology & Biomonitoring Section on a project entitled: “Effect of Secondary Sewage Treatment on the Total Numbers and Percentages of Antibiotic Resistant Fecal Coli forms in Municipal Raw Sewage.”

3. Detailed statistical analysis of dissolved oxygen (DO) concentrations in the Chicago Area Waterways (CAWs) was provided to support District testimony to the Illinois Pollution Control Board (IPCB) regarding the promulgation of DO water quality standards.

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

5. Statistical analysis of the nitrogen versus time to the Gulf of Mexico was provided to the Upper Mississippi River Subbasin Hypoxia Nutrient Committee; the analysis included annual nitrogen flux and flux during May of each year for twenty years.

Water Quality Data. Each year, the Experimental Design and Statistical Evaluation Group summarizes results of the District's Ambient Water Quality Monitoring (AWQM) Program for the Chicago Waterway System (CWS). Surface water quality data for 2005 were evaluated regarding compliance with water quality standards set by the IPCB. In 2005, 68 water quality parameters were analyzed and reported, 31 of these water quality parameters has IPCB standards. Twenty-one water quality parameters were in total compliance with the standards in all river systems.

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 water reclamation plant (WRP) operating problems. This Section also investigates innovative treatment processes for future use. The investigation of current operations may originate as the result of a WRP problem, or interest in arriving at new knowledge concerning certain aspects of a wastewater treatment process.

Studies of future operations are concerned with maximizing the efficiency of an existing process at the lowest cost or the development of new processes. Investigations may take the form of surveys, literature reviews, laboratory bench 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 2006 included the following.

Emission of Hazardous Air Pollutants from District WRPs. As part of the NPDES permits and regulations under the Clean Air Act, an estimate of the emission of hazardous air pollutants (HAPs) from the wastewater treatment processes was made. Raw sewage samples were collected twice during the year at each of the District's seven WRPs and analyzed by the Organic Compounds Analytical Laboratory Section for 87 compounds which are HAPs of concern for publicly owned treatment works. Using the BASTE fate model and the raw sewage concentrations, the emissions of HAPs from the wastewater treatment processes were determined. HAP emissions at each of the WRPs were below the 25 tons/year total HAP criterion and 10 tons/year for individual HAPs and, thus, not considered a major source.

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

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

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

A similar protocol for monitoring odors is used at each location. Either R&D or M&O Department personnel (at some WRPs) visit various stations at each site on a regular basis. Frequency can range from once per week (Egan WRP) to daily (Kirie WRP), depending on the program. The odor monitoring personnel make subjective observations regarding the character and intensity of odors at each of the stations. The odor intensities are ranked on a scale from 0, no odor, to 5, very strong odor. These data are tabulated monthly and summarized in an annual report, R&D Report 07-2, Odor Monitoring Program at Metropolitan Water Reclamation District Facilities During 2005.

Phosphate Detergents. In view of pending requirements for the removal of phosphorus from WRP effluents, the District has supported a bill introduced in the Illinois General Assembly by the Illinois Association of Wastewater Agencies. This legislation is to limit phosphorus in automatic dishwasher detergents (ADWDs) and other cleaning products used in business and homes. It has been estimated that phosphorus loading due to ADWDs District-wide accounts for 6.2 percent of the total phosphorus (TP) load to all the District's WRPs. Discussions with the Soap and Detergent Manufacturers' Association regarding the proposed ban were initiated in 2006.

Characterization of Solids in Primary Effluent at Calumet and Stickney WRPs. At the request of the Engineering Department, laboratory-scale settling tests were conducted to determine the settleable solids portion and bulk settling velocity of the influent to the primary settling tanks at the Calumet WRP. Samples were also submitted to the Illinois Institute of Technology for determination of the influent particle size distribution. Similar tests at the Stickney WRP will be carried out in February 2007.

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

Under Engineering Department Contract 02-818-2P, six new mechanical digester sludge mixers have been installed on an experimental basis in Digester No. 5 at the Calumet WRP for the evaluation of the performance of the mixing system. A full-scale performance evaluation study has been proposed in response to a request by the Engineering Department during 2006,

with the cooperation of the M&O Department staff at the Calumet WRP. An approved study plan was completed and will be implemented during 2007.

UV Disinfection. The Master Plan consultants recommended UV disinfection for all three major WRPs in anticipation of future NPDES permit requirements. The EM&R Division of the R&D Department compiled published and nonpublished literature on the applicability of UV disinfection at the District's WRPs. A survey of numerous wastewater treatment plants in North America was also conducted and information on maintenance and operation of various UV systems was obtained. A paper based on the study, "Survey of Large UV Installations," was accepted for publication for the Water Environment Federation Disinfection 2007 Conference.

A sampling program was carried out at six District WRPs (all but the Lemont WRP) for one year beginning in November 2005 to characterize the effluent with respect to the applicability of UV disinfection and evaluate whether filtration before UV disinfection would have any benefit.

In order to evaluate the impact of filtration on UV disinfection, plant effluent samples composited over a 24-hour period were collected during November 2005 through November 2006 and analysis of specific parameters such as carbonaceous oxygen demand (COD), UV transmittance, and inorganic chemistry was conducted. Grab samples of secondary effluent (at the Egan and Hanover Park WRPs only) and plant effluent were also collected on the same day as the composite samples for conducting microbiological analyses (total coliforms, *E. coli*, and fecal coliforms). Both composite and grab samples were analyzed before and after laboratory-scale filtration. The effluent characterization of microbiological and physicochemical parameters indicated that all District plant effluents would be suitable for UV disinfection. However, neither laboratory-scale nor full-scale filtration significantly improves UV transmittance.

In cooperation with the Engineering and M&O Departments, a pilot-scale study at the Hanover Park WRP is planned for 2007 to compare side by side various UV systems available in the market.

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

In anticipation of an analogous long-term phosphorus removal study to be conducted at the Egan WRP during 2007, the Egan M&O Department staff were concerned about the potential for similar poor performance of the GBTs. In addition, the Engineering Department is concerned

about the influence of $FeCl_3$ on the thickening of WAS by the GBTs. These concerns have been raised in light of GBTs being designed for both the Stickney and Calumet WRPs in which $FeCl_3$ may be used for phosphorus removal.

With a view to verifying the likely interference of $FeCl_3$ with GBT performance, laboratory filtration experiments on WAS were conducted. The results suggested that the application of $FeCl_3$ during the WERF study at the Egan WRP may have negatively influenced the performance of the GBTs as the operators suspected.

A full-scale monitoring program is planned to verify the laboratory test results during the 2007 phosphorus removal study at the Egan WRP.

Synergistic Inhibitory Effects of Heavy Metals Mixture on Activated Sludge Nitrification. The Calumet WRP experienced inhibited nitrification during April 2005. The nitrification-inhibiting substance(s) responsible for the interference could not be identified based on our intensive analytical and investigative efforts. Analytes such as cyanide, phenol, influent ammonia, heavy metals, and other various organic pollutants were not found at high enough levels to cause such an upset. This left the possibility that a mixture of heavy metals, a metal cocktail (MC), may have exerted a synergistically inhibitive effect on the nitrifying activated sludge process.

A literature review did not reveal any study that specifically addressed synergism of heavy metals on the nitrification process. Several studies with a wide range of experiments using combinations of metals with respect to nitrification inhibition showed mixed results.

Laboratory-scale tests were conducted during 2006 to evaluate the possible effects of various combinations of heavy metals on nitrification. The heavy metals of concern based on analysis of data in the Calumet WRP upset were cadmium (Cd), hexavalent chromium (Cr^{+6}), copper (Cu), nickel (Ni), lead (Pb), and zinc (Zn). The test results showed that Zn was observed to have the least inhibitory effect on nitrification or oxygen consumption. Cr^{+6} was observed to have the greatest inhibition of nitrification and oxygen uptake among the individual metals. Of the MCs tested, the MC concentration that mimics that observed at the Calumet WRP during the April 2005 upset event (Cal MC) was observed to have only a small effect on oxygen uptake and nitrification. A report on this investigation will be generated in 2007.

Calumet WRP and North Side WRP Master Plans. The District hired consulting firms to conduct studies on future infrastructure and process needs for the Calumet and North Side WRPs. These studies are referred to as the Calumet Master Plan Study and the North Side Master Plan Study. The WTPR Section involvement included attending workshops conducted by the consultant teams to discuss and evaluate the alternatives for improving and updating the infrastructure and process facilities of these WRPs to meet future needs. Also, the WTPR Section coordinated sample collection and analysis to provide any requested data to aid the consultants. Another major task of each project was to review and provide comments on the documents generated by the consultant teams. The Calumet WRP Master Plan Study has been completed

and the North Side WRP Master Plan Study is ongoing. Two workshops were attended and 19 documents from these studies were reviewed in 2006.

Thornton Transitional Reservoir Fill Events for 2006. One of the reporting requirements for the Thornton Transitional Reservoir as specified by the IEPA is a written, narrative reports of fill events that have occurred during the year.

The first fill event began on April 17, 2006, and ended on April 19, 2006, resulting in 1.88 billion gallons (BG) of CSO stored in the reservoir. The second fill event took place on August 28, 2006, and ended on August 30, 2006, resulting in 790 million gallons (MG) of CSO stored in the reservoir. The third fill event began on September 13, 2006, and ended on September 14, 2006, resulting in 660 MG of CSO stored in the reservoir. The fourth fill event took place on December 1, 2006, and ended on the same day, resulting in 442 MG of CSO stored in the reservoir.

In all fill events, samples were collected from the reservoir as well as from 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. The regulatory required report will be prepared in 2007.

Groundwater Monitoring Fill Event Experiments. Groundwater monitoring reports for the year 2005 were prepared in 2006 for the five Tunnel and Reservoir Plan (TARP) systems which included Mainstream, Calumet, Des Plaines, Upper Des Plaines, and the O'Hare CUP Reservoir. These reports were submitted to the IEPA as well as the USEPA.

Additional Digestion Tests for Calumet WRP. This is a continuous monitoring program that monitors whether the requirements for vector attraction reduction could be met in the biosolids processing at the Calumet WRP, using Option 2 of Section 503.33(b) of the 40 CFR Part 503 Regulations. The additional anaerobic digestion tests under Option 2 can be used if vector attraction reduction under Option 1 of Section 503.33(b) of the 503 Regulations cannot be consistently achieved. In 2006, fourteen additional anaerobic digestion tests were performed for the digester draw from the Calumet WRP in the R&D WTPR Section laboratory once or twice a month. The results of additional anaerobic digestion tests in 2006 indicated that the requirements for vector attraction reduction were met for the biosolids generated at the Calumet WRP.

Unsteady Flow Water Quality Modeling for the Chicago Waterway System. An unsteady flow water quality model for the Chicago Waterway System (CWS) was developed by Marquette University to simulate various scenarios related to the water quality concerns in the CWS. The water quality model for the CWS was built on the platform of Duflow modeling studio. The model was calibrated and verified using part of the 2001 and 2002 hydraulic and water quality monitoring data, respectively, and was delivered to the District in August 2005. In 2006, the model was used to study the impact of gravity CSO discharges and the use of lake

discretionary diversion at three locations on the water quality, particularly DO concentrations, in the CWS. The 2005 hydraulic data required for the model was collected, model input files were prepared, and hydraulic simulations with the model for 2005 were successfully performed.

Chemical Phosphorus Removal at the Egan WRP. Based on numerous discussions between the District and IEPA it has been agreed that the District will conduct a large-scale phosphorus removal demonstration project at the Egan WRP, and couple this study with a comprehensive water quality monitoring program in Salt Creek, the receiving stream for Egan WRP effluent. The primary goal of this study is to gain valuable preliminary information toward understanding the potential effects of lower concentrations of phosphorus in the Egan WRP's effluent on water and sediment chemistry and aquatic communities (macroinvertebrates, sestonic algae, aquatic macrophytes, and fish) in Salt Creek.

Phosphorus will be removed from Egan WRP's effluent via precipitation; $FeCl_3$ will be injected at the end of each of the aeration tanks and phosphorus will precipitate into the settled solids in the secondary clarifiers. The target treatment level will be 0.5 mg/L TP in the Egan WRP's effluent.

In anticipation of this study in 2007, the WTPR Section assisted the Engineering and M&O Departments in the design and testing of the $FeC1_3$ dosing system and developing an in-plant monitoring program.

Settleability Tests for District WRPs. To collect data on settling characteristics of mixed liquor, settling tests with mixed liquor samples from aeration tanks of the District WRPs were performed in a six-foot column located in the pilot plant room of the R&D WTPR Section Laboratory. The dynamic conditions in a secondary clarifier can be simulated in the settling column to measure interfacial settling velocities. Interfacial settling velocity is a useful parameter for process control and modeling. In 2006, twelve tests were conducted for the mixed liquor samples from the Hanover Park, Egan, Kirie, Stickney, and North Side WRPs. For the settling tests, mixed liquor samples from different batteries or tanks were collected under dry weather conditions. For each aeration battery or tank tested, duplicate tests were normally performed on two separate days. The settling tests will continue in the future to collect data to use it as a tool to characterize mixed liquor settling under various conditions.

Biological Phosphorus Reduction. Operational procedures were suspected of contributing to high phosphorus removal in secondary treatment at the Kirie WRP. It was theorized that the TARP tunnel, which is allowed to increase in water level overnight, then drawn down each morning, acted as an anaerobic process upstream of secondary treatment. Diurnal sampling of the raw influent was conducted. Hourly composites were analyzed for COD, total Kjeldahl nitrogen (TKN), TP, soluble phosphorus, and volatile fatty acids. The phosphorus removal at Kirie WRP was compared to the other District WRPs. The Kirie WRP phosphorus data and collection system dosing of calcium nitrate were evaluated to rule out any effect from collection system chemical dosing on the phosphorus removal.

Dynamic Model Development for the Stickney WRP Imhoff Tanks. The Hydromantis GPS-X software was used to develop a dynamic model of the Imhoff tanks. The model was calibrated to the 2005 plant data. The verified model was used to simulate the effect of removing one, two, and three Imhoff tanks from service.

Biosolids Utilization and Soil Science Section

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

The environmental monitoring component of the program includes the sampling and analysis of waters, soils, plant tissue, and biosolids at land application sites and biosolids drying facilities. The results of this monitoring program are reported to the IEPA and the USEPA. In 2006, the Section submitted 56 permit-required reports to the IEPA, three reports to the USEPA, and 12 reports to the M&O Department for reporting to the IEPA. The Section is responsible for maintaining the District's site-specific certification of biosolids processing trains at the Stickney and Calumet WRPs as being equivalent to processes that further reduce pathogens, which was awarded by the USEPA.

The research component of the program consists of studies to support the local marketing of biosolids such as: research plots in farmers' fields to demonstrate the safety of farmland application of biosolids, cooperative research with consulting soil scientists and the IEPA to study availability of biosolids phosphorus to plants and its environmental impacts, and evaluation of the beneficial effects of biosolids use on the growth of turf on golf courses and recreational fields. The research component also consists of studies to demonstrate that land application of biosolids according to the USEPA Part 503 biosolids rule provides protection to human health and the environment, such as: studying changes in the bioavailability of trace elements to plants over time in biosolids-amended soils, and studying the fate of biosolids organic contaminants in the soil environment.

The Section also conducts applied research at the District's land reclamation site in Fulton County to study the impact of land application activities at the site and of biosolids phosphorus on the environment. The studies include the experimental corn plots, which have received cumulative applications of 1,020 dry tons of biosolids per acre (maximum-amended plots) from 1973 through 2006. 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 phosphorus runoff in biosolids-amended soils.

The Section also assists in local marketing of biosolids and providing technical support to biosolids users. The biosolids marketing activities include preparation of promotional

documents and showcasing the District's biosolids management program at local trade shows and conferences. The Section also maintains continuous demonstrations of turfgrasses, prairie grasses, forage grasses, and wild flowers in a greenhouse at the Cecil Lue-Hing Research and Development Complex.

The Section also provided technical support in 2006 to the District's Native Prairie Landscape initiative and the District's new stormwater management program.

Analytical Microbiology and Biomonitoring Section

In 2006 the Analytical Microbiology and Biomonitoring Section was composed of 4 professional and 12 technical personnel. The Section was involved in the following studies designed to assess the future needs of the District: Master Planning for the Stickney, Calumet, and North Side WRPs; Risk Assessment of Human Health Impacts of Disinfection Versus No Disinfection; Review of the USEPA Water Quality Criteria for Bacteria; Review of the Chicago Area Waterways Use Attainability Analysis Study and the IEPA Proposed Standards for Bacteria; Monitoring Bacterial Densities on Farm Soil After Application of Biosolids; Monitoring Antibiotic Resistant Bacteria (ARB) in Final Effluents and Chicago Area Waterways (CAWs); Lemont WRP Expansion Permit; and the Salt Creek Nutrient Reduction Demonstration Project. The Section was comprised of the following sub-groups, which performed specific monitoring or research activities: Analytical Microbiology, Biomonitoring, Parasitology, and Virology. The activities of the Microbiology Section in 2006 are summarized below.

Analytical Microbiology Sub-Group. Fecal coliform (FC), *E. coli* (EC), and other microbiological analyses were conducted in support of the following monitoring studies: Illinois Waterway; Chicago Area Waterways; Disinfection Study; Biosolids Monitoring for Part 503 Compliance; Biosolids Land Application Project, Solids Drying Areas Monitoring Wells; TARP Groundwater Monitoring Wells; and TARP Reservoir Monitoring. Potable water at District facilities was monitored for total coliforms, *EC*, and total heterotrophic bacteria. The first phase of an antibiotic resistant bacteria (ARB) research study was completed. A report titled, "The Effects of Secondary Sewage Treatment on the Total Numbers and Percentages of Antibiotic Resistance Fecal Coliforms in Raw Sewage Entering the Seven Water Reclamation Plants of the Metropolitan Water Reclamation District of Greater Chicago," was published. A second phase of the study to monitor the density of ARB in the CWS upstream and downstream of the Stickney, Calumet, and North Side WRPs, as well as the final effluents from these plants continued. The wet weather waterways, WRP final effluent, and pumping station monitoring was completed.

Biomonitoring Sub-Group. Acute whole effluent toxicity (WET) tests with fish (*Pimephales promelas)* and daphnids (*Ceriodaphnia dubia)* were conducted on effluent samples from the Egan and Lemont WRPs. Chronic toxicity tests with these same organisms were conducted on effluent samples from the Hanover Park WRP. No acute or chronic toxicity was found to be associated with the final effluent from any of these WRPs. Biomonitoring reports were

submitted to the IEPA in compliance with the respective NPDES permits. The capability to conduct *Selenastrum capricornutum* Printz Algal Growth Test (AGT) was developed. Eight AGTs were conducted to measure biologically available phosphorus in Egan WRP effluent samples and Salt Creek samples from the following locations: Busse Reservoir Dam, Kennedy Blvd., and Thorndale Avenue. In addition, four AGTs were conducted on Lemont WRP final effluent and Chicago Sanitary & Ship Canal samples from upstream and downstream of the Lemont WRP. The results of the AGTs are important in the District's effort to maintain the biotic integrity of CAWs and the IEPA's effort to develop nutrient standards for the State of Illinois.

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

Virology Sub-Group. Air-dried biosolids (final product) were analyzed for culturable enteric viruses for compliance with the Part 503 Standards. All biosolids produced from the District's codified process were determined to be Class A biosolids with respect to pathogens (less than 1 enteric virus per four grams) as defined by the Part 503 Standards. Monitoring of virus densities in biosolids amended farmland research sites 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 CWS. 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 CWS. 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 2006 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 26 monitoring stations in the Chicago, Calumet, and Des Plaines River Systems during the period June through October of 2006. Samples were collected from 16 stations located on the deep-draft waterways and 10 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 October of 2006 at 30 stations in the Chicago, Calumet, and Des Plaines River Systems. Twenty stations were located on the deep-draft waterways (including four sidestream elevated pool aeration stations) and ten stations were on wadeable streams.

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

In cooperation with the IEPA, as part of the Illinois Fish Contaminant Monitoring Program, a total of 29 composite fish fillet samples, from 110 fish collected from nine sample stations, will be sent to IEPA for contaminant analyses.

Habitat and Sediment Quality Monitoring. During June through October of 2006, a physical habitat assessment was conducted at 26 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 14 monitoring stations in the northern area of the Chicago 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 2006, 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 (DO) Monitoring. Continuous DO monitoring continued during 2006 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 2005 DO monitoring results were published in November 2006. The 2006 reports are planned for publication in the first quarter of 2007.

Illinois Waterway Monitoring. During May, August, and October of 2006, 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.

Nitrogen Isotope Sampling. Water samples were collected from the 49 Illinois Waterway Monitoring stations during May, August, and October 2006 for nitrate nitrogen and oxygen isotope, and water hydrogen and oxygen isotope analysis by a University of Illinois, Chicago, collaborator. The objectives of this study were: (1) to determine if different sources of nitrate nitrogen (e.g., farm field run-off and water reclamation plant effluent) could be distinguished isotopically in the Illinois River, (2) to determine isotopic evidence for denitrification, and (3) to determine how different sources of nitrate and denitrification processes are related to tributary inputs and river characteristics along the waterway. Additional samples were also collected from seven selected stations along the Illinois Waterway during March, April, June, July, and September for nutrient and nitrate nitrogen-oxygen isotope analyses. The 2005 nitrate nitrogen-oxygen isotope ratio report was received in March 2006 and the 2005 report on water hydrogen-oxygen isotope ratios was received in November 2006.

Council for Food and Agricultural Research Nutrient Study. A cooperative study regarding nutrients in waterways throughout Illinois with the University of Illinois and the Illinois Council on Food and Agricultural Research (CFAR) was completed. The results of this study will be considered by IEPA when promulgating nutrient standards. Starting in 2004, three monitoring stations were chosen on the Des Plaines River, two on Salt Creek, and one on the North Branch of the Chicago River for this 3-year project. Water samples were collected two times per month through November, once in December (winter sampling only once per month), and on four consecutive days during three selected rain events. Water samples were analyzed for nutrients and other relevant constituents. The study ended in December 2006.

Salt Creek Nutrient Demonstration Project. In 2005, the District conferred with IEPA and agreed to conduct a large-scale phosphorus 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 behind schedule in February of 2007. Water samples were collected one time per month during January–March, and December, twice per month between April–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 the three locations once per year, including benthic invertebrate and fish collections, sediment chemistry analyses, and habitat assessments.

Fecal Coliform Density Sampling Study. In order to assess the distribution and die off of fecal coliform (FC) bacteria in District waterways, a FC density sampling study, initiated in 2004, was continued with waterway grab samples collected from January through December in both 2005 and 2006. During this period, there were 12 dry weather sampling events at each of 12 waterway stations per year. Six stations were located on the North Shore Channel and North Branch Chicago River and six stations were on the Little Calumet River and the Calumet-Sag Channel. Routine monthly monitoring samples were also collected at each of these 12 stations per year. Wet weather events required water sampling for a maximum of three days following a rain event. The results of this study may impact the current Chicago Area Waterways UAA study.

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 3,888 tests in 2006.

Radiological Monitoring of Waterways. The radiological monitoring of the Chicago area waterways system 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.

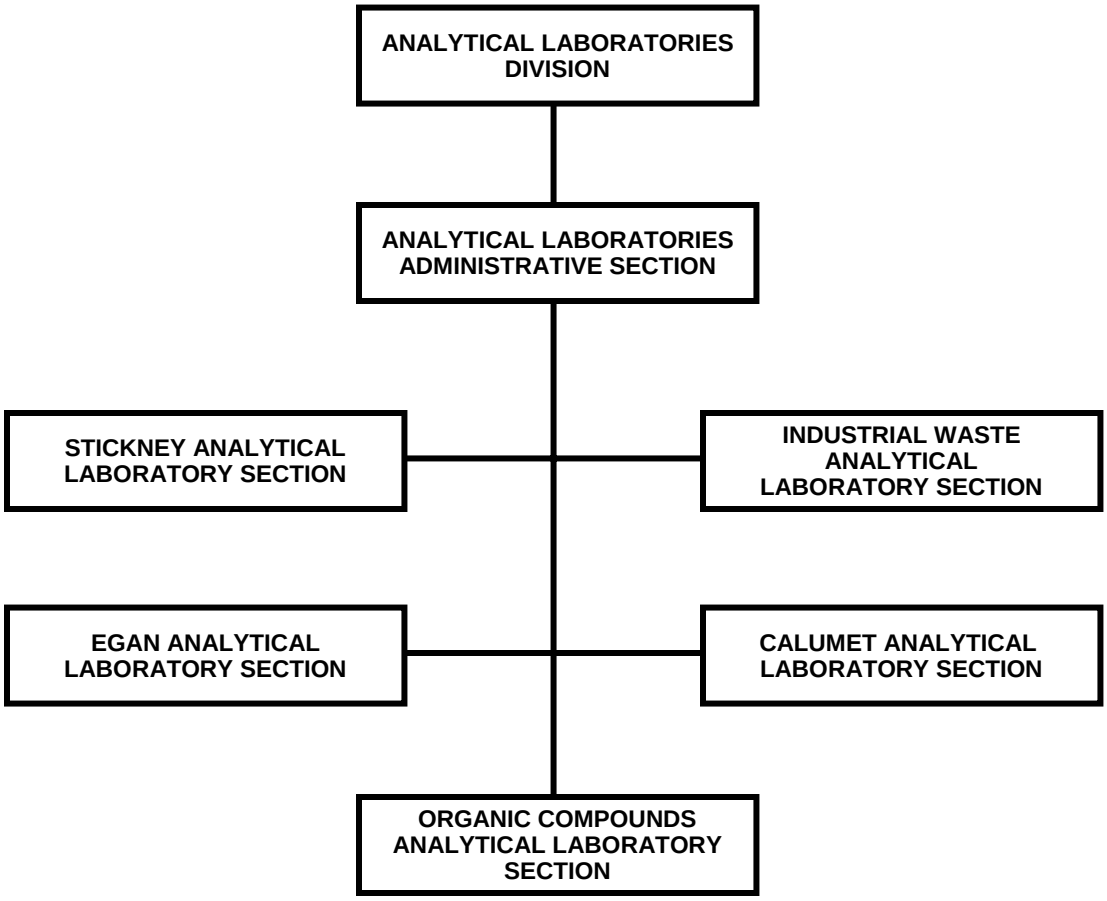
The Section also performs radiological monitoring of biosolids from the seven WRPs, Hanover Park WRP lagoons, and from the solids drying sites of the District. The monitoring data serves as a measure of present-day radioactivity levels in comparison to levels in the past years for gross alpha, gross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

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

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

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 and the USEPA-approved Pretreatment Program.

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

The large number of analyses performed by the ALD, as shown in Table 2 on page 33, could not be accomplished without automation and instrumentation. Staff from the R&D and IT Departments worked together to further improve the Laboratory Information Management System (LIMS) to increase data processing and reporting, and to enhance data acquisition from automated instruments. Through its LIMS team, the ALD provided ongoing support during 2006 to the EM&R Division, the IWD, and M&O Department personnel.

In mid-2003, the ALD implemented a chemical hygiene plan (CHP) for the District laboratories, which was revised in 2005. The second round of audit inspections of the laboratories was completed during 2006. Each laboratory is in compliance with the requirements of the CHP.

The five analytical laboratories maintained laboratory accreditation by the IEPA during 2006 in accordance with NELAP.

Stickney Analytical Laboratory (SAL)

This laboratory is located at the Lue-Hing R&D Complex and performed 588,540 analyses for solids, nutrients, and metals on 53,527 samples in providing analytical services for the following:

TABLE 2: TOTAL NUMBER OF ANALYSIS PERFORMED IN 2006

Program	Nutrients	Oxygen Demands	Metals	Solids	Organic Compounds	Others	Total Program
4652 Liquid Monitoring	90,342	76,162	184,151	58,433	34,405	59,117	502,610
TARP	3,016	1,234	3,052	530	0	3,268	11,100
Treatment Facilities	87,326	74,928	181,099	57,903	34,405	55,849	491,510
4653 Solids Monitoring	16,293	1,728	134,729	117,859	20,020	33,257	323,886
4666 Sewage & Waste Control	1,087	125	282,346	532	37,317	11,549	332,956
4663 User Charge	0	63,619	0	18,775	0	34,438	116,832
4672 Waterways	15,662	2,853	60,441	3,967	57,071	19,415	159,409
4681 Assistance to M&O	443	218	3,591	1,253	5,358	10,458	21,321
4682 Assistance to Others	1,266	2,008	69	513	0	759	4,615
4690 Operations & Research	8,240	183	16,488	638	21,524	922	47,995
Totals	133,333	146,896	681,815	201,970	175,695	169,915	1,509,624

M&O Department.

1. Process control, operations monitoring, and NPDES permit compliance monitoring for the Stickney WRP.

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

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

4. USEPA and IEPA split sampling program.

5. TARP Groundwater Monitoring Program.

EM&R Division.

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

2. Ambient Water Quality Monitoring Network Program (AWQMNP).

3. Solids management areas at LASMA, Calumet E&W Marathon, Vulcan, HASMA, Stony Island, and RASMA.

4. Analytical support for biosolids marketing.

5. Illinois Waterways Monitoring Program.

6. Hickory Hills Country Club: biosolids utilization.

7. Application to Farmland Studies: Nutrients & metals content of Class B biosolids.

8. CFAR Nutrient Study.

9. Salt Creek Nutrient Demonstration Project.

10. Regional Applied Research Effort (RARE) Project.

11. Impact of iron on gravity belt thickener (GBT) at Egan WRP.

12. Biosolids phosphorus runoff studies for Fulton County.

13. Imhoff Tank Diurnal Concentration Study.

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

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

Other Services. In addition to typical water, wastewater, and biosolids analyses, this laboratory also performs analyses on materials purchased by the District (such as lubricants, sodium hypochlorite, and ferric chloride) 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 197,208 analyses on 23,363 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 dissolved oxygen in support of the following:

M&O Department.

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

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

IWD. The section continued to provide analytical assistance for the administration of the District's Sewage and Waste Control Ordinance and the User Charge Ordinance, 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; and (2) providing records and expert witnesses, as required, for various legal proceedings, hearings and/or Freedom of Information Act requests. Vital technical and programming assistance continued to be provided for the interfacing of the Sample Manager for Windows

(SMW) LIMS to the Pretreatment Information Management System (PIMS). Assistance was provided in the development of a LIMS-based User Charge reporting system replacing the original UCIMS.

In 2006, the laboratory placed several major pieces of equipment into service and purchased other equipment to facilitate the laboratory's analytical work.

1. The section continued use of the robotic BOD analyzer to determine the final dissolved oxygen (DO) content of sample BOD_5 of a non-industrial origin. The section established that this system can be used for determining the final DO content of BOD_5 for industrial samples.

2. A midi-distillation system used for the manual total and amenable cyanide distillations was put on-line in 2006. This system has reduced costs due to decreased reagent consumption and reduced waste generation. Improvements in analytical recovery were obtained.

Organic Compounds Analytical Laboratory (OCAL)

The OCAL is located at the Egan WRP and is responsible for the analysis of samples for organic priority pollutants (including more than one hundred organic compounds listed by the USEPA) and many non-listed organic compounds, such as endocrine disruptors.

During 2006, the OCAL performed 175,694 analyses on 750 samples in providing analytical services to the following:

M&O Department.

1. Organic compounds in raw sewage, sludge, and final effluent from the seven District WRPs semiannually for monitoring NPDES compliance.

2. Low levels of diazinon in final effluent from the seven WRPs semiannually.

3. 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. Alkylphenol and alkylphenol ethoxylates in raw sewage and sludge samples from the seven District WRPs semiannually; EPA Region V analyzed for the same compounds in effluents.

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

4. Volatile organics, base neutral and acid extractable organic compounds, and pesticides/PCBs in Kankakee County lysimeters and cake samples.

5. Various land reclamation projects.

6. Organic compounds including diazinon in 503 Biosolids samples.

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

IWD.

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.

2. Monitoring the usage of endocrine disruptors by the laundry services industry.

John E. Egan Analytical Laboratory (EAL)

This laboratory is located at the Egan WRP and performed 239,433 analyses on 33,140 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. Materials and Boiler Water Testing Programs.

3. Soluble Phosphorus Study at the Four North Area WRPs.

4. Process Stream Evaluations of Suspected Incidents of Toxic Interferences or Pass-Through Events.

5. Polymer Testing for Raw Sludge Dewatering at the Egan and Hanover Park WRPs.

6. Development, Implementation and Support of LIMS Reports for use by M&O Personnel at the four North Area WRPs.

7. Soluble Metals Analyses of the Influent and Outfall of the four North Area WRPs.

8. 503 Compliance Monitoring of Sludge from the four North Area WRPs.

9. Sampling Procedure Audit at Hanover Park WRP.

EM&R Division.

1. Study of Chemical Phosphate Removal at Egan WRP.
2.

3. Hanover Park Fischer Farms wells and biosolids.

IWD.

1. Determination of pHs for grab samples collected by IWD personnel in the North Area.

2. Preservation of cyanide grab samples before holding time is exceeded.

Calumet Analytical Laboratory (CAL)

This laboratory is located at the Calumet WRP and performed 308,748 analyses on 31,174 samples in 2006 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. USEPA and IEPA Split Sample Study.

3. Provide assistance with the UV disinfection study as part of the Use Attainability Study.

4. Provide assistance to the Stickney analytical laboratory to coordinate the sampling for low level mercury of the Calumet and Lemont WRP effluents.

5. Provided analytical support for the Calumet Master Plan.

6. Provided analytical support during Calumet WRP Wastewater Emergency Response Plan events.

EM&R Division.

1. Calumet Biosolids Processing Operations, Fulton County Prairie Plan Project, Sulfate Analyses of Waterways, TARP, and Lysimeter Samples.

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

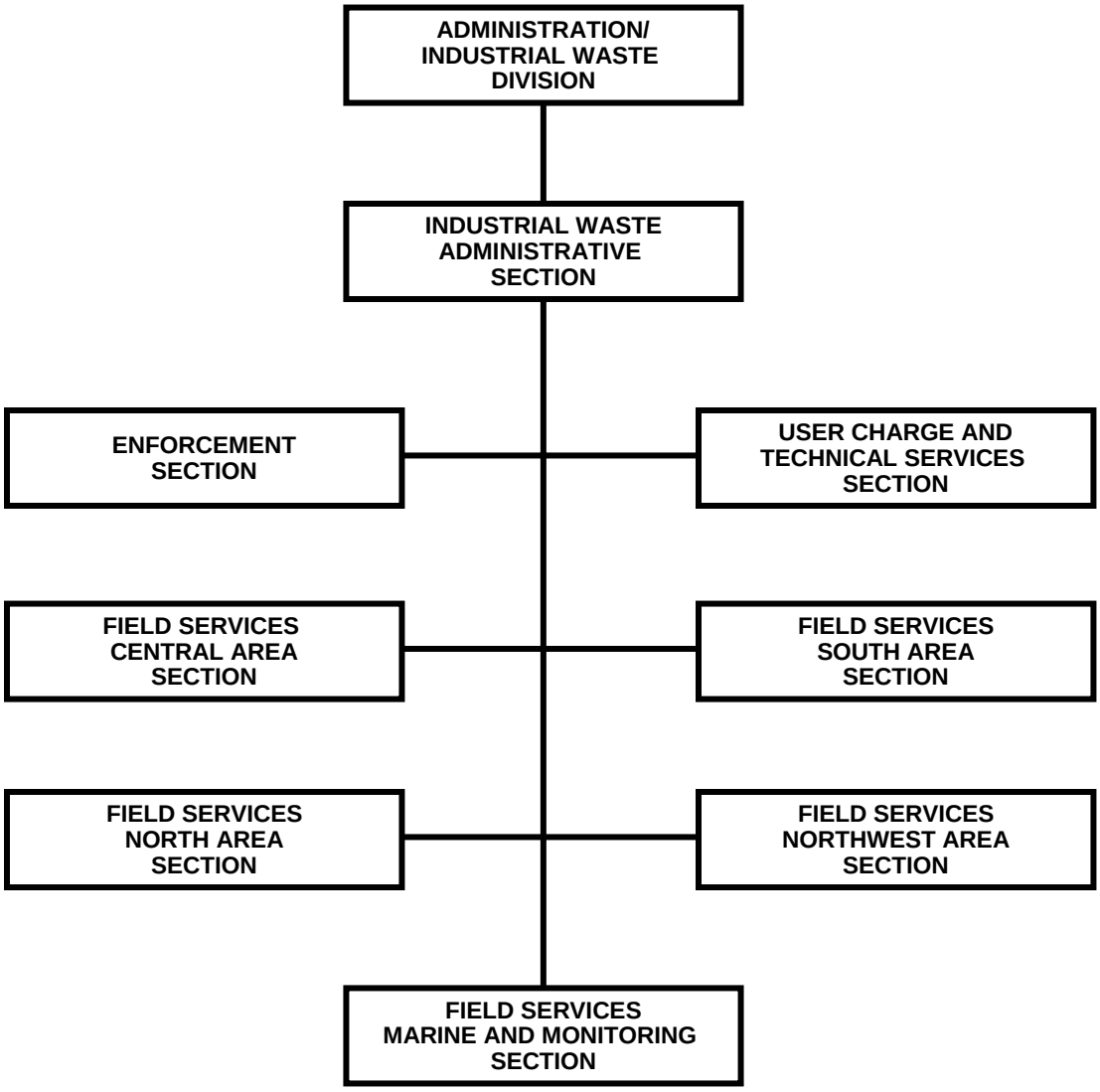
3. Provided analytical support for the Determination of Settling Velocities by Particulate Distribution in Primary Influent for Calumet and Stickney WRPs.

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

5. Provided analytical and LIMS assistance for the RARE study conducted in the South area drainage basin.

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 Sewage and Waste Control Ordinance (SWCO) and User Charge Ordinance (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 2006 included the issuance or renewal of 92 Discharge Authorizations; the review of 866 Continued Compliance Reports; and the review of 54 Spill Prevention, Containment and Countermeasure Plans. Enforcement activities for the period from 2001 through 2006 are depicted in the following table.

Year	Cease and Desist Orders/Amendments	Board Orders	Legal Actions/ Amendments
2001	456	1	6
2002	429	0	11
2003	406	1	18
2004	284	11	4
2005	152	2	0
2006	149	1	0

The Enforcement Section also prepares the District's list of significant violators of applicable pretreatment regulations, which is required to be published annually in a newspaper that provides meaningful public notice within the jurisdiction of the District. The trend for the period from 2001 through 2006 is depicted in the following table.

Year	Effluent Limitations	Reporting Requirements	Other Requirements[1]	Total Number of Industrial Users Published
2001	11	61	0	68
2002	15	49	0	62
2003	18	64	2	76
2004	21	55	0	72
2005	11	54	0	61
2006	12	44	0	51

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

User Charge and Technical Services Section

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

In 2006, the Section received and reviewed reports filed by 3,470 users (870 commercial-industrial and 2,600 tax-exempt users) containing calculations of their User Charge liabilities under the UCO and documentation corroborating their data. The Section classified 63 new large commercial-industrial and tax-exempt users and 155 small nonresidential-commercial users in 2006.

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 2006, the Section reviewed 715 District inspection and sampling reports from the Field Services Section; 93 user proposals for sampling, monitoring and/or installations; sealed 91 privately owned water meters used for reporting volume deductions or discharge volumes; and conducted 628 field inspections to verify user data and/or compliance with the UCO. As of the end of 2006, the Section had also identified 67 Users who were eligible for reduced reporting and self-monitoring requirements under Sections 7g, 7h, and 7i of the UCO. Granting reduced reporting requirements reduces the cost to industrial users for determining their fair share of User Charges and reduces the District's oversight costs related to these industrial users.

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

charges is administered through the UCO and the recovery of NCE charges is administered through the SWCO.

The following table shows the User Charge revenue, as reported by the District's Finance Department, collected over the period from 2002 through 2006.

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

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 2006, 1,555 SWCO and 1,336 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 2006, 14,770 water quality samples were collected. Further, all groundwater monitoring wells installed for the District's TARP were routinely sampled. In 2006, 1,124 samples were obtained at 131 TARP groundwater monitoring wells. Chemical toilet service companies who, under District permit, discharge cleanings at the Stickney WRP are also monitored and sampled. During 2006, five chemical toilet service companies made 778 disposals at the Stickney WRP. For these disposal events, 186 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 2006, 358 investigations were conducted in response to requests from federal, state and local agencies, municipalities and private citizens; 60 investigations were conducted in response to self-reported industrial activities; and 36 investigations were conducted in response to requests from the District's M&O Department.

APPENDIX I

APPENDIX I

MEETINGS AND SEMINARS 2006

1. Calumet Research Summit, Hammond, Indiana, *January 2006*.

2. Du Page River, Salt Creek Watershed Workgroup Meeting (and follow-up committee meetings throughout the year), Elmhurst, Illinois, *January 2006*.

3. Illinois/Indiana Sea Grant, Aquatic Nuisance Species Dispersal Barrier Committee Meeting, Chicago, Illinois, *January 2006*.

4. Illinois River, Coordinating Council Meeting, Chicago, Illinois, *January 2006*.

5. Illinois Water Environment Association, Government Affairs in Water Pollution Control Seminar, Lisle, Illinois, *January 2006*.

6. Industrial Water, Waste & Sewage Group Meeting (and follow-up committee meetings throughout the year), Chicago, Illinois, *January 2006*.

7. Midwest Water Analysts Association, Winter Expo 2006, Kenosha, Wisconsin, *January 2006*.

8. North Carolina Soil Science Society, Annual Meeting, Raleigh, North Carolina, *January 2006*.

9. United States Department of Agriculture, Cooperative State Research, Education, and Extension Service, Regional Research Committee W-1170 Annual Meeting, Las Vegas, Nevada, *January 2006*.

10. Chicago Metal Finishers Institute, Member Meeting, Des Plaines, Illinois, *February 2006*.

11. Illinois Association of Wastewater Agencies, Mini-Conference, Springfield, Illinois, *February 2006*.

12. Illinois Environmental Protection Agency, Nutrient Standards Workgroup and Science Committee Meeting, Springfield, Illinois, *February 2006*.

13. Illinois/Indiana Sea Grant, Asian Carp Rapid Response Planning Team Meeting, Chicago, Illinois, *February 2006*.

14. Illinois Water Environment Association, Industrial Pretreatment and Hazardous Waste Winter Meeting, Lombard, Illinois, *February 2006*.

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MEETINGS AND SEMINARS 2006

15. United States Environmental Protection Agency, Region V, 2006 Midwest Surface Water Monitoring and Standards (SWiMS) Meeting, Chicago, Illinois, *February 2006*.

16. United States Environmental Protection Agency, Wetlands Trading Summit, Chicago, Illinois, *February 2006*.

17. Calumet Government Working Group, 2006 First Quarter Meeting, Chicago, Illinois, *March 2006*.

18. City of Chicago, Department of Environment, Bubbly Creek Active Sediment Capping Committee Meetings (and follow-up committee meetings throughout the year), *March 2006*.

19. Cornell University, Workshop, "Detection of *Ascaris* and Other Parasites Eggs and Cysts in Sewage Sludge," Ithaca, New York, *March 2006*.

20. Illinois Chapter of American Fisheries Society Meeting, Whitington, Illinois, *March 2006*.

21. Illinois/Indiana Sea Grant, Asian Carp Rapid Response Planning Team Meeting, Chicago, Illinois, *March 2006*.

22. Illinois Section of the American Water Works Association and the Illinois Water Environment Association, 2006 Joint Water Conference, Springfield, Illinois, *March 2006*.

23. Illinois Water Environment Association, 27th Annual Conference (and follow-up committee meetings throughout the year), Springfield, Illinois, *March 2006*.

24. Iowa Water Pollution Control Association, 15th Annual Biosolids Specialty Conference, Des Moines, Iowa, *March 2006*.

25. Pittsburgh Conference, Orlando, Florida, *March 2006*.

26. Water Environment Federation and Air and Waste Management Association, Odors and Air Emissions 2006 Specialty Conference, Hartford, Connecticut, *March 2006*.

27. Water Environment Federation, Biosolids 2006 Conference, Cincinnati, Ohio, *March 2006*.

28. City of Chicago, Earth Day Celebration, Chicago, Illinois, *April 2006*.

29. Greater Chicago Pollution Prevention Alliance Meeting, Chicago, Illinois, *April 2006*.

APPENDIX I

MEETINGS AND SEMINARS 2006

30. Perkin Elmer, 7th Annual Open House, Oak Brook, Illinois, *April 2006*.

31. American Society for Microbiology, 106th General Meeting, Orlando, Florida, *May 2006*.

32. CEM Corporation Seminar, Elmhurst, Illinois, *May 2006*.

33. Midwest Water Analysts Association, 2006 Spring Meeting, Milwaukee, Wisconsin, *May 2006*.

34. Occupational Safety and Health Administration, 8th Annual Midwest Emergency Preparedness and Response Conference, Rockford, Illinois, *May 2006*.

35. Restek Gas Chromatography/Mass Spectrometry Training, Des Plaines, Illinois, *May 2006*.

36. United States Fish and Wildlife Service, Hines Emerald Dragonfly Critical Habitat Planning Meeting (and follow-up committee meetings throughout the year), Romeoville, Illinois, *May 2006*.

37. Water Environment Federation, 2nd National Water Quality Trading Conference, Pittsburgh, Pennsylvania, *May 2006*.

38. Air and Waste Management Association, 99th Annual Conference, New Orleans, Louisiana, *June 2006*.

39. Calumet Government Working Group, 2006 Second Quarter Meeting, Chicago, Illinois, *June 2006*.

40. North American Benthological Society, Annual Meeting, Anchorage, Alaska, *June 2006*.

41. Greater DuPage Chapter, Wild Ones, Native Plants, Natural Landscapes, 27th National Wild Ones Conference, Naperville, Illinois, *July 2006*.

42. International Union of Soil Science, 18th World Congress of Soil Science, Philadelphia, Pennsylvania, *July 2006*.

43. National Association of Clean Water Agencies, 2006 Summer Conference, Seattle, Washington, *July 2006*.

44. Illinois/Indiana Sea Grant, Aquatic Nuisance Species Dispersal Barrier Committee Meeting, Chicago, Illinois, *August 2006*.

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MEETINGS AND SEMINARS 2006

45. National Environmental Monitoring Conference (NEMC), 22nd Annual Conference, Arlington, Virginia, *August 2006*.

46. United States Department of Transportation, Multi-Modal HazMat Training, Naperville, Illinois, *August 2006*.

47. United States Environmental Protection Agency, Amendments for Ecological Restoration Workshop, Chicago, Illinois, *August 2006*.

48. American Chemical Society (ACS), 232nd National Meeting and Exposition, San Francisco, California, *September 2006*.

49. American Fisheries Society, Annual Meeting, Lake Placid, New York, *September 2006*.

50. Calumet Government Working Group, 2006 Third Quarter Meeting, Chicago, Illinois, *September 2006*.

51. Fisher Scientific Vendor Show, Chicago, Illinois, *September 2006*.

52. Gas Chromatography and Gas Chromatography/Mass Spectrometry Technologies Environmental Seminar, Rolling Meadows, Illinois, *September 2006*.

53. Illinois Emergency Management Agency, Annual Emergency Preparedness Conference, Springfield, Illinois, *September 2006*.

54. Malcolm Pirnie, Seminar, "Managing Liabilities for Persistent Bioaccumulative and Toxic Chemicals (PBTs) in Sediments and Surface Waters," Chicago, Illinois, *September 2006*.

55. Northern/Central Illinois Pipeline Association, Public Awareness Meeting for Emergency Responders, Elmhurst, Illinois, *September 2006*.

56. Pretreatment Information Management System, User Conference, Milwaukee, Wisconsin, *September 2006*.

57. United States Environmental Protection Agency, Region V, Seminar, "Pharmaceuticals and Personal Care Products in the Environment," Chicago, Illinois, *September 2006*.

58. Upper Mississippi River, Sub-Basin Hypoxia Nutrient Committee Workshop, Moline, Illinois, *September 2006*.

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MEETINGS AND SEMINARS 2006

59. Air and Waste Management Association, Lake Michigan Section, 2006 Air Quality Management Conference and Clean Air Act Primer, Oak Brook, Illinois, *October 2006*.

60. American Water Works Association, Chlorination and Alternative Disinfection Methods Workshop, Joliet, Illinois, *October 2006*.

61. Calumet Government Working Group, 2006 Fourth Quarter Meeting, Chicago, Illinois, *October 2006*.

62. Chicago Wilderness, Urban Ecology, Glencoe, Illinois, *October 2006*.

63. Midwest Water Analysts Association, 2006 Fall Meeting, Brookfield, Illinois, *October 2006*.

64. National Association of Clean Water Agencies, 2006 Pretreatment Conference, New Orleans, Louisiana, *October 2006*.

65. National Beaches Conference, Niagara Falls, New York, *October 2006*.

66. Perkin Elmer User Meeting, Oak Brook, Illinois, *October 2006*.

67. Thermo Informatics World 2006 (LIMS), San Diego, California, *October 2006*.

68. United States Environmental Protection Agency, Regional Workshop on Nutrient Characterization & Control in the NPDES Context, Chicago, Illinois, *October 2006*.

69. United States Green Building Council, Chicago Chapter, Green Engineering and Brownfield Redevelopment Conference, Chicago, Illinois, *October 2006*.

70. Water Environmental Federation, 79th Annual Technical Exhibition and Conference, Dallas, Texas, *October 2006*.

71. Chicago Metropolitan Agency for Planning, Open Forum on Water Supply Planning in Northeastern Illinois, Oak Brook, Illinois, *November 2006.*

72. City of Chicago, Department of Environment, Chicago River Charette, Chicago, Illinois, *November 2006*.

73. Greater Chicago Pollution Prevention Alliance Meeting, Chicago, Illinois, *November 2006*.

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MEETINGS AND SEMINARS 2006

74. Illinois Sports Turf Managers Association, Illinois Professional Turf Conference, St. Charles, Illinois, *November 2006*.

75. US Department of Homeland Security, Incident Command System Training, Anniston, Alabama, *November 2006*.

76. Lake County Local Emergency Planning Committee, HazMat Seminar, Grayslake, Illinois, *November 2006*.

77. Midwest Water Analysts Association, Expo Planning Meeting, Gurnee, Illinois, *November 2006*.

78. Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, "Science Symposium: Source, Transport, and Fate of Nutrients in the Mississippi and Atchafalaya River Basins," Minneapolis, Minnesota, *November 2006*.

79. Soil Science Society of America, International Annual Meeting, Indianapolis, Indiana, *November 2006*.

80. DePaul University, Soil in Restoration Ecology Conference, Chicago, Illinois, *December 2006*.

81. Great Lakes Byproducts Management Association, Annual Meeting, Columbus, Ohio, *December 2006*.

82. Illinois River, Coordinating Council Meeting, Grayslake, Illinois, *December 2006*.

83. Midwest Environmental Laboratory, Stakeholders Summit, Chicago, Illinois, *December 2006*.

84. United States Environmental Protection Agency, Multi-Stakeholder Meeting for Input on New Recreational Water Quality Criteria, Washington, D.C., *December 2006*.

85. Water Environment Research Foundation, Program Area Research Meeting, Baltimore, Maryland, *December 2006*.

APPENDIX II

APPENDIX II

PRESENTATIONS 2006

1. "Benefits and Safety of Using Biosolids as a Soil Conditioner and Fertilizer." Presented at the Calumet Research Summit, Hammond, Indiana, by Thomas C. Granato. *January 2006*. PP

2. "Managing Chicago's Biosolids Through Land Application." Presented at the North Carolina Soil Science Society, Annual Meeting, Raleigh, North Carolina, by Thomas C. Granato. *January 2006*. PP

3. "Assessment of Transfer of Radioactivity to Soil and Crops from Long Term Land Application of Chicago Biosolids." Presented at the Water Environment Federation, Biosolids 2006 Conference, Cincinnati, Ohio, by Thomas C. Granato. *March 2006*. B

4. "Beneficial Use of Biosolids in the Chicago Metropolitan Area Iowa Water." Presented at the Iowa Water Pollution Control Association, 15th Annual Biosolids Specialty Conference, Des Moines, Iowa, by Albert E. Cox and Thomas C. Granato. *March 2006*. PP

5. "Review of Bioassays Used to Measure the Activity of Organic Contaminants in Wastewater and Biosolids and Their Application to Assessing the Efficiency of Wastewater and Biosolids Treatment." Presented at the Illinois Water Environment Association, 27th Annual Conference, Springfield, Illinois, by Geeta Rijal. *March 2006*. PP

6. "Review of Whole Effluent Toxicity (WET) Results by Wastewater Treatment Plant Management." Presented at the Illinois Water Environment Association, 27th Annual Conference, Springfield, Illinois, by James Zmuda. *March 2006*. PP

7. "The Metropolitan Water Reclamation District of Greater Chicago's Efforts to Reduce Pharmaceuticals that Enter the Water Reclamation Plants." Presented at the Illinois Section of the American Water Works Association and the Illinois Water Environment Association, 2006 Joint Water Conference, Springfield, Illinois, by Catherine O'Connor. *March 2006*. PP

8. "Densities of Pathogens and Indicator Microorganisms in Class B Biosolids Produced at the Metropolitan Water Reclamation District of Greater Chicago." Presented at the American Society of Microbiology, 106th General Meeting, Orlando, Florida, by Geeta Rijal, James Zmuda, Richard Gore, Thomas C. Granato, and Richard Lanyon. *May 2006*. PS

9. "The Effect of Secondary Sewage Treatment on the Total Numbers and Percentages of Antibiotic Resistant Fecal Coliforms in Municipal Raw Sewage." Presented at the American Society of Microbiology, 106th General Meeting, Orlando, Florida, by James Zmuda, Zainul Abedin, Richard Gore, Thomas C. Granato, and Richard Lanyon. *May 2006*. PS

APPENDIX II

PRESENTATIONS 2006

10. "Suitability of Biosolids for Use in the City of Chicago." Calumet Government Working Group, 2006 Second Quarter Meeting, Chicago, Illinois, by Albert E. Cox, Lakhwinder Hundal, and Thomas C. Granato. *June 2006*. PP

11. "Effectiveness of Biosolids Amendments in Enhancing Soil Fertility and Microbial Ecology in Golf Course Greens." International Union of Soil Science, 18th World Congress of Soil Science, Philadelphia, Pennsylvania, by Guanglong Tian, Thomas C. Granato, Frank Dinelli and Albert E. Cox. *July 2006*. PS

12. "Issues Related to Disinfection of Water Reclamation Plant Effluent." Presented at the National Association of Clean Water Agencies, 2006 Summer Conference, Seattle, Washington, by Catherine O'Connor. *July 2006*. B

13. "Alkylphenol Ethoxylates (APEs) in Commercial Laundry Effluents Contributory to the Water Reclamation Plants of Metropolitan Water Reclamation District of Greater Chicago." Presented at the Textile Rental Services Association of America Meeting, Chicago, Illinois, by Louis Kollias. *August 2006*. PP

14. "The Metropolitan Water Reclamation District of Greater Chicago's Call to Action Regarding Triclosan and Triclocarban." Presented at the National Association of Clean Water Agencies, 2006 Pretreatment Conference, New Orleans, Louisiana, by Catherine O'Connor. *October 2006*. PP

15. "Does Long-term Land Application of Biosolids Result in 4-NP and PBDEs Accumulation in Soil?" Presented at the Soil Science Society of America, Annual Meeting, Indianapolis, Indiana, by Lakhwinder Hundal, Kang. Xia, Albert E. Cox, Kuldip Kumar, Thomas C. Granato, Louis Kollias, Richard Lanyon, and Kevin Armbrust. *November 2006*. PP

16. "Environmental Management: Perspectives of a Regulated and Regulatory Agency." Presented at the Environmental Compliance and Monitoring Course, Chicago, Illinois, by Louis Kollias. *November 2006*. PP

17. "Occurrence of Chemicals of Emerging Concern in Biosolids: Implications for Land Application." Presented at the Soil Science Society of America, Annual Meeting, Indianapolis, Indiana, by Thomas C. Granato. *November 2006*. PP

18. "Occurrence of Estrogenic Compounds in Swine Manure and Biosolids." Presented at the Soil Science Society of America, Annual Meeting, Indianapolis, Indiana, by Kuldip Kumar, Satish Gupta, Ashok Singh, Yodesh Chander, Lakhwinder Hundal, Albert E. Cox, and Thomas C. Granato. *November 2006*. PP

APPENDIX II

PRESENTATIONS 2006

19. "Regulatory Update: Pretreatment, User Charge and Water Quality Issues." Presented at the Industrial Water, Waste & Sewage Group Conference, Chicago, Illinois, by Louis Kollias. *November 2006*. PP

20. "An Evaluation of the Benefits and Limitations of the Use of Biosolids to Produce Topsoil for Turfgrass." Presented at the Great Lakes Byproducts Management Association, Annual Meeting, Columbus, Ohio, by Thomas C. Granato. *December 2006*. 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

APPENDIX III

PAPERS PUBLISHED 2006

1. Granato, T. C., A. Khalique, A. Cox, and R. I. Pietz, "Assessment of Transfer of Radioactivity to Soil and Crops from Long Term Land Application of Chicago Biosolids." Proceedings of the Water Environment Federation, Biosolids 2006 Conference, Cincinnati, Ohio, *2006*.

2. Rijal, G., J. T. Zmuda, R. Gore, T. Granato, and R. Lanyon, "Densities of Pathogens and Indicator Microorganisms in Class B Biosolids Produced at the Metropolitan Water Reclamation District of Greater Chicago." Proceedings of the American Society of Microbiology, 106th General Meeting, Orlando, Florida, *2006.*

3. Tian, G., T. C. Granato, R. I. Pietz, C. R. Carlson, and Z. Abedin, "Effect of Long-Term Application of Biosolids for Land Reclamation on Surface Water Chemistry." *Journal of Environmental Quality*, 35: 101-113, *2006*.

4. Zmuda, J. T., Z. Abedin, R. Gore, T. Granato, and R. Lanyon, "The Effect of Secondary Sewage Treatment on the Total Numbers and Percentages of Antibiotic Resistant Fecal Coliforms in Municipal Raw Sewage." Proceedings of the American Society of Microbiology, 106th General Meeting, Orlando, Florida, *2006*.

APPENDIX IV

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO
RESEARCH AND DEVELOPMENT DEPARTMENT 2006 SEMINAR SERIES

Date	Subject
January 27, 2006	***Endocrine Disruption in Aquatic Organisms Exposed to Fluoxetine (Prozac®)*** Professor Marsha Black, University of Georgia, Athens, Georgia
February 24, 2006	***Wastewater Infrastructure Vulnerability, Security, and Funding Issues: An Overview*** Dr. Cecil Lue-Hing, Cecil Lue-Hing & Associates, Chicago, Illinois
March 24, 2006	***Scale Issues in Urban Watershed Management*** Professor Edwin Herricks, University of Illinois, Champaign, Illinois
April 28, 2006	***Identification of the Sources of Nitrate in the Illinois River Using Isotopic and Chemical Techniques*** Mr. Samuel V. Panno, Illinois State Geological Survey, Champaign, Illinois
May 19, 2006	***Electrical Energy Management at the Metropolitan Water Reclamation District of Greater Chicago*** Mr. Sanjay Patel, AETPO, Maintenance and Operations Department, Metropolitan Water Reclamation District of Greater Chicago (District), Chicago, Illinois
June 23, 2006	***Potential Ecological Significance of Consumer Product Chemical Flux through Major Wastewater Treatment Facilities*** Dr. Larry Barber, United States Geological Survey, Boulder, Colorado
July 28, 2006	***Evaluation of Cost and Benefits of CSO Treatment, Flow Augmentation, and Supplemental Aeration to Improve Water Quality in the Chicago Area Waterways*** Dr. David R. Zenz, CTE/AECOM Engineers, Chicago, Illinois
August 25, 2006	***Biosolids Use in Park Land Development at the Former U. S. Steel Southworks Brownfield Site*** Dr. Lakhwinder Hundal, Soil Scientist, Research and Development Department, District, Cicero, Illinois
September 29, 2006	***Watershed Approach for Meeting West Branch DuPage River/Salt Creek TMDLs*** Mr. Larry Cox, Downers Grove Sanitary District, Downers Grove, Illinois
October 27, 2006	***North Side Water Reclamation Plant Master Plan*** Mr. Robert Kulchawik, CTE/AECOM Engineers, Chicago, Illinois
November 17, 2006	***Microbial Risk Assessment of Human Health Impacts of Disinfection vs. No Disinfection for the Chicago Waterway System*** Dr. Chriso Petropoulou, Geosyntech Consulting, Inc., Chicago, Illinois
December 8, 2006	***Overview of the Metropolitan Water Reclamation District of Greater Chicago's New Stormwater Management Program for Cook County*** Mr. Joseph Sobanski, Chief Engineer, Engineering Department, District, Chicago, IL

RESERVATIONS REQUIRED (at least 24 hours in advance)
CONTACT: Dr. Thomas C. Granato, Assistant Director of Research and Development, EM&R Division, (708) 588-4264 or (708) 588-4059
LOCATION: Stickney Water Reclamation Plant, Lue-Hing Research and Development Complex
6001 West Pershing Road, Cicero, Illinois 60804-4112
TIME: 10:00 A.M. (Picture ID required for plant entry)
(Note: These seminars are eligible for Professional Development Credits/CEUs)