

Protecting Our Water Environment



Metropolitan Water Reclamation District of Greater Chicago

***MONITORING AND RESEARCH
DEPARTMENT***

REPORT NO. 11-28

Monitoring and Research

2010

Annual Report

May 2011

Metropolitan Water Reclamation District of Greater Chicago
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MONITORING AND RESEARCH

2010

ANNUAL REPORT

Monitoring and Research Department
Thomas C. Granato, Acting Director

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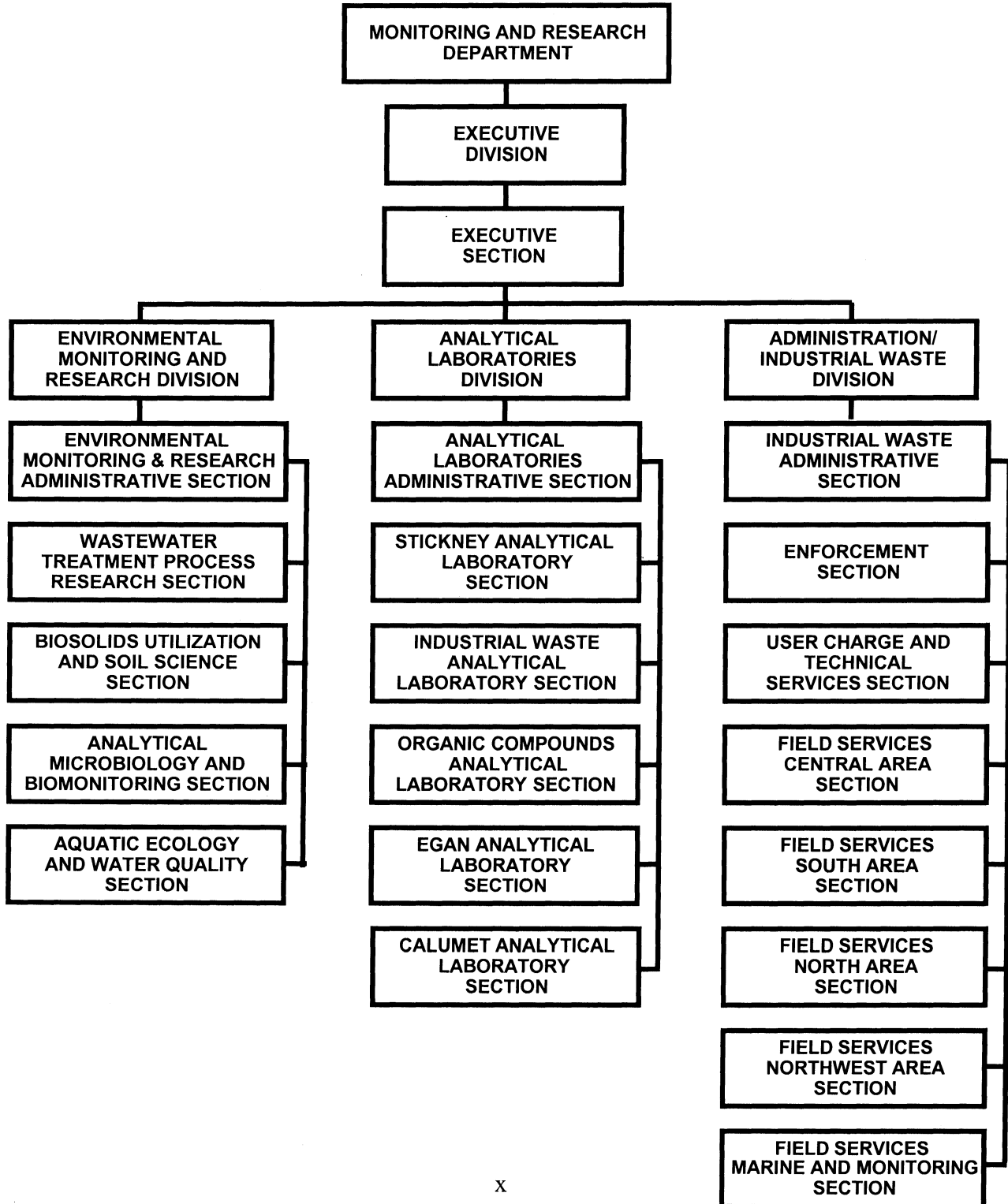
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DISCLAIMER

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

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

MONITORING AND RESEARCH DEPARTMENT
ORGANIZATION CHART FOR 2010



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 308 budgeted positions during 2010 with an adjusted total salary and wage appropriation of \$23,292,100. 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 2010, the Department reviewed personnel actions relative to 27 separations, including 25 retirements. In addition, one existing position was eliminated through attrition when vacated during 2009, while one new position was added in 2010, resulting in no net change in the number of positions in the Department. The 2010 salary expenditure-to-appropriation ratio was over 99 percent.

Greater Chicago Pollution Prevention Program

In January 1994, the Greater Chicago Pollution Prevention Program 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. In 2010, the District included referrals to the Center with all discharge authorizations.

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 2010, 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.

The Enterprise System, which was implemented in 2000, proved inadequate for preparing the District's budget. Therefore, since April 2001, the District has used an IT-designed program for budget preparation. This Budget Preparation Tool was used to prepare the 2010 Commitment Item and position budgets.

Budget Administration

A comparison of appropriations to expenditures for 2010 shows the following:

	<u>Appropriation</u>	<u>Expenditure</u>
Personnel (CI 101) (Adjusted)	\$23,292,100	\$23,211,387
Other CIs	<u>5,185,000</u>	<u>4,679,152</u>
Total	<u>\$28,477,100</u>	<u>\$27,890,539</u>

Purchasing Administration

During 2010, about 279 requisitions were reviewed and processed by the Administration Division, prior to being forwarded to the Procurement and Materials Management Department. This review verified the availability and proper use of department funds for all requisitioned items. The Division ensures that all departmental purchase orders are properly closed out at year's end and processes purchase order decreases or increases as appropriate.

Contract Administration

During 2010, the Division was involved in the preparation and administration of nineteen (19) contracts for a total cost of \$2,147,620.00, including multiyear contracts. Also, the Division purchased consumables for laboratory and field operations totaling \$77,201.00 under three (3) purchase orders and analytical services for \$42,000.00 under one (1) purchase order. To meet the growing technological needs of the Department's laboratories, the Division also entered into seven (7) agreements to purchase capital equipment for a total value of \$374,389.00. These

acquisitions 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, release of bid deposits, and execution of agreements.

The Division prepared and administered twenty-five (25) consulting services agreements for a total value of \$11,803,237.00 during 2010. Also, the Division prepared and administered twenty-three (23) maintenance service agreements with an aggregate value of \$1,591,323.00. The acquisition of these services 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 2010, the seven Monitoring and Research Department (M&R) laboratories previously accredited or certified with the State of Illinois maintained their status. The participation of our laboratories in these programs helps to ensure that the laboratories are operated in a manner that meets or exceeds the standards established by the applicable accreditation or certification program. Some benefits of maintaining the high standards required by these programs are better documentation of procedures, increased quality control and quality assurance, improved analyst training, and increased accuracy and precision of test results.

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

The ALD participates in four proficiency testing studies per year. The studies encompass both aqueous (water) and soil matrices. Participation in these studies is a requirement of the NELAP accreditation program. Each laboratory must receive an acceptable result in two of the last three studies to maintain accredited status for each analyte.

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 2010. Fees for the five accredited District laboratories range from \$3,400 to \$4,400.

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

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

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

Use Attainability Analysis Study

The IEPA began the Chicago Area Waterway System (CAWS) 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. Since the IEPA submitted its UAA proposal to the Illinois Pollution Control Board (IPCB), (Docket Number R08-9) in October 2007, the District has been actively participating at the hearings and has provided technical support through review of study reports, the conduct of a quantitative microbial risk assessment for recreational use of the waterways, a review of the regulatory criteria for bacterial standards, and provision of ambient water quality monitoring data. In 2010 the District, through the University of Illinois, completed the three year epidemiological study of secondary contact use of the waterways, and also completed a waterways habitat evaluation and improvement study, and filed the results of each with the IPCB in R08-9. Extensive testimony was also provided on the results of the epidemiological study and its implications regarding IEPA's proposed effluent limitations for fecal coliform bacteria.

Departmental Reports

During 2010, the Department published 62 formal reports dealing with various aspects of the District's operations. A list of these reports is given in Table 1.

TABLE 1: MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS
PUBLISHED DURING 2010

Report No.	Report Title	Author(s)	Date	Organization or Conference
2010-1	Evaluation of the Settling Characteristics of North Side Water Reclamation Plant Combined Solids and Stickney Water Reclamation Plant Preliminary Sludge	M&R Department Kozak, J. Lordi, D., and O'Connor, C.	January 2010	Illinois Environmental Protection Agency (IEPA)
2010-2	Monthly Controlled Solids Distribution Report, September 2009	M&R Department Oladeji, O.	January 2010	IEPA
2010-3	Report of the Fulton County Environmental Protection System for 2009	M&R Department Cox, A.	January 2010	IEPA
2010-4	Monthly Controlled Solids Distribution Report, October 2009	M&R Department Oladeji, O.	January 2010	IEPA
2010-5	Annual Biosolids Management Report for 2009	M&R Department Lindo, P.	February 2010	United States Environmental Protection Agency (USEPA), Region V
2010-6	Monthly Controlled Solids Distribution Report, December 2009	M&R Department Oladeji, O.	February 2010	IEPA
2010-7	Monthly Controlled Solids Distribution Report, November 2009	M&R Department Oladeji, O.	February 2010	IEPA
2010-8	Calumet East Solids Management Area Monitoring Report, Fourth Quarter 2009	M&R Department Lindo, P.	February 2010	IEPA
2010-9	Calumet West Solids Management Area Monitoring Report, Fourth Quarter 2009	M&R Department Lindo, P.	February 2010	IEPA
2010-10	Harlem Avenue Solids Management Area Monitoring Report, Fourth Quarter 2009	M&R Department Lindo, P.	February 2010	IEPA

TABLE 1 (Continued): MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS
PUBLISHED DURING 2010

Report No.	Report Title	Author(s)	Date	Organization or Conference
2010-11	Lawndale Avenue Solids Management Area Monitoring Report, Fourth Quarter 2009	M&R Department Lindo, P.	February 2010	IEPA
2010-12	Ridgeland Avenue Solids Management Area Monitoring Report, Fourth Quarter 2009	M&R Department Lindo, P.	February 2010	IEPA
2010-13	122 nd and Stony Island Avenue Solids Management Area Monitoring Report, Fourth Quarter 2009	M&R Department Lindo, P.	February 2010	IEPA
2010-14	Hanover Park Water Reclamation Plant Fischer Farm Monitoring Report, Fourth Quarter 2009	M&R Department Lindo, P.	February 2010	IEPA
2010-15	Reporting Requirements for Site-Specific Equivalency to Process to Further Reduce Pathogens Designation of the Metropolitan Water Reclamation District of Greater Chicago Biosolids Processing Trains at the Stickney and Calumet Water Reclamation Plants, August – December 2009	M&R Department Cox, A.	March 2010	USEPA Region V
2010-16	Monthly Controlled Solids Distribution Report, January 2010	M&R Department Oladeji, O.	March 2010	IEPA
2010-17	Microbiological Report of Bypass Samples in 2009	M&R Department Gore, R. and Rijal, G.	March 2010	Internal District Report
2010-18	Monthly Controlled Solids Distribution Report, February 2010	M&R Department Oladeji, O.	May 2010	IEPA
2010-19	Monthly Controlled Solids Distribution Report, March 2010	M&R Department Oladeji, O.	May 2010	IEPA

TABLE 1 (Continued): MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS
PUBLISHED DURING 2010

Report No.	Report Title	Author(s)	Date	Organization or Conference
2010-20	Calumet East Solids Management Area Monitoring Report, First Quarter 2010	M&R Department Lindo, P.	May 2010	IEPA
2010-21	Calumet West Solids Management Area Monitoring Report, First Quarter 2010	M&R Department Lindo, P.	May 2010	IEPA
2010-22	Hanover Park Water Reclamation Plant Fisher Farm Monitoring Report, First Quarter 2010	M&R Department Lindo, P.	May 2010	IEPA
2010-23	Harlem Avenue Solids Management Area Monitoring Report, First Quarter 2010	M&R Department Lindo, P.	May 2010	IEPA
2010-24	Lawndale Avenue Solids Management Area Monitoring Report, First Quarter 2010	M&R Department Lindo, P.	May 2010	IEPA
2010-25	Ridgeland Avenue Solids Management Area Monitoring Report, First Quarter 2010	M&R Department Lindo, P.	May 2010	IEPA
2010-26	122 nd and Stony Island Avenue Solids Management Area Monitoring Report, First Quarter 2010	M&R Department Lindo, P.	May 2010	IEPA
2010-27	Tunnel and Reservoir Plan, Calumet Tunnel System 2009 Annual Groundwater Monitoring Report	M&R Department MacDonald, D.	June 2010	IEPA
2010-28	Tunnel and Reservoir Plan, Des Plaines Tunnel System 2009 Annual Groundwater Monitoring Report	M&R Department MacDonald, D.	June 2010	IEPA
2010-29	Tunnel and Reservoir Plan, Upper Des Plaines Tunnel System 2009 Annual Groundwater Monitoring Report	M&R Department MacDonald, D.	June 2010	IEPA

TABLE 1 (Continued): MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS
PUBLISHED DURING 2010

Report No.	Report Title	Author(s)	Date	Organization or Conference
2010-30	Tunnel and Reservoir Plan, Mainstream Tunnel System 2009 Annual Groundwater Monitoring Report	M&R Department MacDonald, D.	June 2010	IEPA
2010-31	Tunnel and Reservoir Plan, O'Hare Chicagoland Underflow Plan Reservoir Water Quality Monitoring Wells 2009 Annual Groundwater Monitoring Report	M&R Department MacDonald, D.	June 2010	IEPA
2010-32	Tunnel and Reservoir Plan, Thornton Transitional Flood Control Reservoir Water Quality Monitoring Wells 2009 Annual Groundwater Monitoring Report	M&R Department MacDonald, D.	June 2010	IEPA
2010-33	Monitoring and Research 2009 Annual Report	M&R Department.	June 2010	Internal District Report
2010-34	Radiological Monitoring of the Raw Sewage, Final Effluent, Sludges, and Biosolids of the Metropolitan Water Reclamation District of Greater Chicago 2009 Annual Report	M&R Department Khalique, A.	June 2010	Internal District Report
2010-35	Monthly Controlled Solids Distribution Report, April 2010	M&R Department Oladeji, O.	July 2010	IEPA
2010-36	2009 Annual Summary Report Water Quality Within the Waterways System of the Metropolitan Water Reclamation District of Greater Chicago	M&R Department Abedin, Z.	August 2010	IEPA

TABLE 1 (Continued): MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS
PUBLISHED DURING 2010

Report No.	Report Title	Author(s)	Date	Organization or Conference
2010-37	Biomonitoring Report 2010 Chronic Whole Effluent Toxicity Tests Results for the Hanover Park Water Reclamation Plant, Hanover Park, Illinois National Pollutant Discharge Elimination System Permit Number IL0036137, June 2010	M&R Department Rijal, G. and Glymph, A.	August 2010	IEPA
2010-38	Monthly Controlled Solids Distribution Report, May 2010	M&R Department Oladeji, O.	August 2010	IEPA
2010-39	Continuous Dissolved Oxygen Monitoring in the Deep-Draft Chicago Waterway System During 2009	M&R Department Wasik, J.	August 2010	IEPA
2010-40	Continuous Dissolved Oxygen Monitoring in the Chicago Area Wadeable Streams During 2009	M&R Department Wasik, J.	August 2010	IEPA
2010-41	Monthly Controlled Solids Distribution Report, June 2010	M&R Department Oladeji, O.	August 2010	IEPA
2010-42	Calumet East Solids Management Area Monitoring Report for Second Quarter 2010	M&R Department Lindo, P.	August 2010	IEPA
2010-43	Calumet West Solids Management Area Monitoring Report, Second Quarter 2010	M&R Department Lindo, P.	August 2010	IEPA
2010-44	Hanover Park Water Reclamation Plant Fischer Farm Monitoring Report, Second Quarter 2010	M&R Department Lindo, P.	August 2010	IEPA
2010-45	Harlem Avenue Solids Management Area Monitoring Report, Second Quarter 2010	M&R Department Lindo, P.	August 2010	IEPA

TABLE 1 (Continued): MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS
PUBLISHED DURING 2010

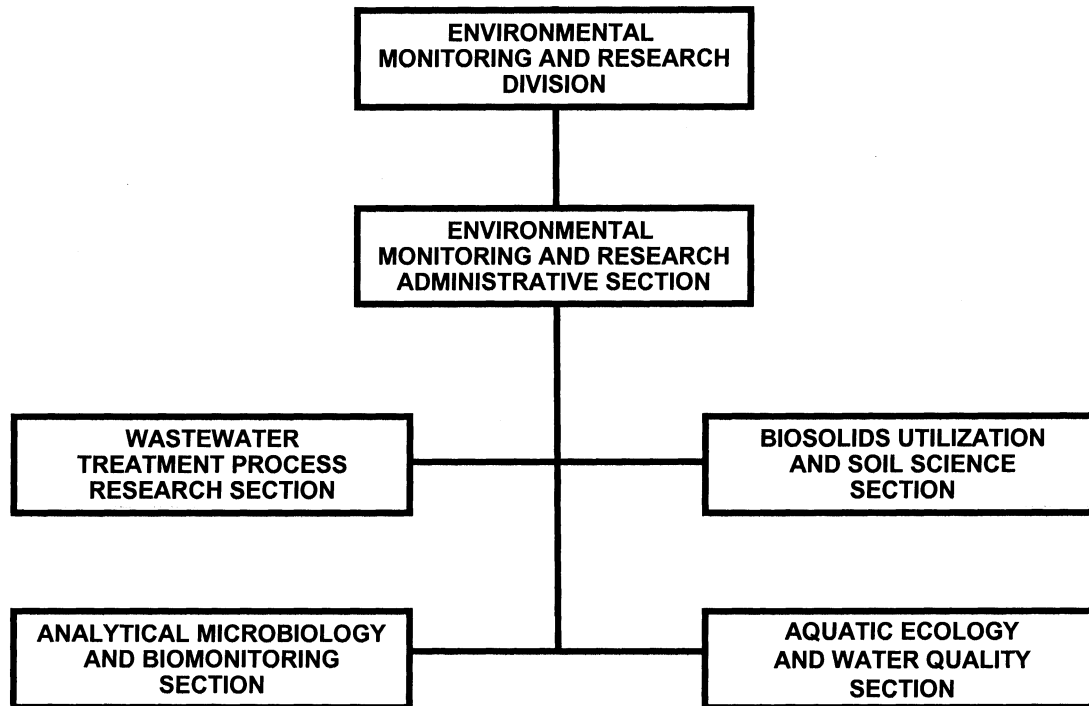
Report No.	Report Title	Author(s)	Date	Organization or Conference
2010-46	Lawndale Avenue Solids Management Area Monitoring Report, Second Quarter 2010	M&R Department Lindo, P.	August 2010	IEPA
2010-47	Reporting Requirements for Site-Specific Equivalency to Process to Further Reduce Pathogens Designation of the Metropolitan Water Reclamation District of Greater Chicago's Biosolids Processing Trains at the Stickney and Calumet Water Reclamation Plants, January – July 2010	M&R Department Cox, A.	August 2010	USEPA Region V
2010-48	Ridgeland Avenue Solids Management Area Monitoring Report, Second Quarter 2010	M&R Department Lindo, P.	August 2010	IEPA
2010-49	122 nd and Stony Island Avenue Solids Management Area Monitoring Report, Second Quarter 2010	M&R Department Lindo, P.	August 2010	IEPA
2010-50	Water and Sediment Quality Along the Illinois Waterway from the Lockport Lock to the Peoria Lock During 2009	M&R Department Minarik, T. and Wasik, J.	October 2010	IEPA
2010-51	Monthly Controlled Solids Distribution Report, July 2010	M&R Department Oladeji, O.	October 2010	IEPA
2010-52	Monthly Controlled Solids Distribution Report, August 2010	M&R Department Oladeji, O.	November 2010	IEPA
2010-53	Ridgeland Avenue Solids Management Area Monitoring Report, Third Quarter 2010	M&R Department Lindo, P.	November 2010	IEPA
2010-54	Calumet West Solids Management Area Monitoring Report, Third Quarter 2010	M&R Department Lindo, P.	December 2010	IEPA

TABLE 1 (Continued): MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS
PUBLISHED DURING 2010

Report No.	Report Title	Author(s)	Date	Organization or Conference
2010-55	Harlem Avenue Solids Management Area Monitoring Report, Third Quarter 2010	M&R Department Lindo, P.	December 2010	IEPA
2010-56	Final Report on Phosphorus Reduction at the John E. Egan Water Reclamation Plant	M&R Department Zhang, H., Wasik, J., Patel, K., and Tian, G.	December 2010	IEPA
2010-57	122 nd and Stony Island Avenue Solids Management Area Monitoring Report, Third Quarter 2010	M&R Department Lindo, P.	December 2010	IEPA
2010-58	Hanover Park Water Reclamation Plant Fischer Farm Monitoring Report, Third Quarter 2010	M&R Department Lindo, P.	December 2010	IEPA
2010-59	Lawndale Avenue Solids Management Area Monitoring Report, Third Quarter 2010	M&R Department Lindo, P.	December 2010	IEPA
2010-60	Calumet East Solids Management Area Monitoring Report, Third Quarter 2010	M&R Department Lindo, P.	December 2010	IEPA
2010-61	Odor Monitoring Program at Metropolitan Water Reclamation District of Greater Chicago Facilities 2009	M&R Department Lordi, D. and Oskouie, A.	December 2010	IEPA
2010-62	Environmental Monitoring and Research Division 2009 Annual Report	M&R Department	December 2010	Internal District Report

FIGURE 1

**ENVIRONMENTAL MONITORING AND RESEARCH DIVISION
ORGANIZATION CHART**



ENVIRONMENTAL MONITORING AND RESEARCH DIVISION

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

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

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 wastewater treatment and solids management operation problems.
- Providing technical assistance to other departments and agencies with respect to issues related to wastewater treatment; combined sewer overflow (CSO) management; waterways management; and solids processing, utilization, and marketing.
- Conducting applied and operations research to achieve improvement and cost reductions in District wastewater treatment, waterways management, and solids processing and biosolids utilization activities.
- Assessing the impacts of new or proposed regulations on District activities, with particular focus on the impacts to the District, of the proposed water quality standards for the CAWS that were submitted to the IPCB by the IEPA.

Administrative Section

The Administrative Section provides technical guidance, scientific review, and administrative support for the work being carried out by the EM&RD 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 2010, 1,809 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 and the Radiochemistry Group, which are a part of the Administrative Section, provided the following support to the rest of the EM&RD.

Experimental Design and Statistical Evaluation Group. The Experimental Design and Statistical Evaluation Group (EDSEG) 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. Personnel in this Group also develop multistage automation programs to interconnect different software programs such as LATEX, Visual Basic, SAS, Access, Excel, Outlook, and Power Point. 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 2010, a biostatistician provided statistical and computing support to various projects. The following is a description of some of the activities.

1. Statistical support was provided to the Analytical Microbiology and Biomonitoring Section (AMBS) to study antibiotic resistant bacteria in wastewater. This work is published in *Water Science & Technology* in 2009.
2. Extensive statistical analyses support was provided on the reduction of sampling frequencies in the District's drying sites.
3. EDSEG provided data management support to the Biosolids Utilization and Soil Science Section to produce quarterly reports on biosolids management at the District's Biosolids Management Areas in accordance with IEPA permit requirements. Solids Management Area reports were produced for Harlem Avenue Solids Management Area (HASMA), Lawndale Avenue Solids Management Area (LASMA), Ridgeland Avenue Solids Management Area (RASMA), Stony Island Solids Management Area (SMA), Calumet East SMA, Calumet West SMA and Hanover Park Fisher Farm fourth quarter of 2009 and for the first, second, and third quarter of 2010.
5. Statistical support was provided for research investigating the availability of phosphorus in biosolids.
6. Statistical support was provided for centrifuge analyses on polymer dose and the total solids of cake produced.

7. Support was provided to the Aquatic Ecology and Water Quality Section on the production of Continuous Dissolved Oxygen (DO) Monitoring Reports (Deep-Draft, and Wadeable).
8. Statistical support was provided to Aquatic Ecology and Water Quality Section on the study of fish abundance in the District's waters.
9. Four Ambient Water Quality Monitoring (AWQM) Exceedance Reports were produced by this Section for last quarter of 2009 and first three quarters of 2010.
10. On numerous occasions, statistical support was provided to support the review of proposed IEPA regulations.
11. Statistical support and consulting was provided on data management, automation of reports, etc. to various sections in the Division.
12. Statistical support was provided to clients who requested data and statistical analyses.

Water Quality Data. Each year, the EDSEG summarizes the results of the District's AWQM Program for the CAWS. Surface water quality data for 2010 were evaluated regarding compliance with water quality standards set by the IPCB. In 2010, 67 water quality parameters were analyzed and reported for samples taken at 59 stations throughout the waterway systems to which District Water Reclamation Plants (WRP) discharge.

Radiochemistry Group. The Radiochemistry Group 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 Group performed 2,949 tests in 2010.

Radiological Monitoring of Waterways. The radiological monitoring of the CAWS is a part of the District's AWQM Program. 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. Results to date indicate that the radioactivity in the final effluent of all the WRPs is 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 Group also performs radiological monitoring of biosolids from the seven WRPs, Hanover Park WRP lagoons, and from the solids drying areas (SDAs) 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 Group maintains a radioactive material license issued to the District by the IEMA, Division of Nuclear Safety, assuring that activities are conducted according to the license conditions and regulations. These activities include the personnel monitoring for radiation exposure, operational checks of radiation survey meters, physical inventory of licensed radioactive materials, testing for leakage and contamination of nickel-63 detectors in gas chromatographs at the M&R laboratories, testing for leakage and contamination of nuclear gauges used by the Engineering Department, and testing for leakage and contamination of an X-ray fluorescent paint analyzer and an APD2000 Chemical Warfare detector owned by Safety Section of the Human Resources Department.

Wastewater Treatment Process Research Section

The Wastewater Treatment Process Research (WTPR) Section is responsible for conducting basic, applied, and problem-solving research on the wastewater and sludge treatment processes utilized by the District and performing monitoring to meet certain regulatory requirements. The Section provides technical assistance to the Maintenance and Operations Department (M&O) for solving WRP operating problems and supports the Engineering Department by providing technical information for planning and design. This Section also investigates innovative treatment processes for potential future use. The investigation of current operations may originate as the result of a WRP problem, or interest in arriving at new knowledge concerning some aspect of a wastewater treatment process.

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

The major areas of study in 2010 included the following.

Providing Technical Support to Maintenance and Operations Department for Plant Operation Needs. In 2010, the WTPR Section assisted M&O in plant operations through the following projects.

Metropolitan Water Reclamation District of Greater Chicago-Wide Aeration Tank Performance Survey. A District-wide aeration survey was conducted at all seven WRPs during the late summer, fall, and winter of 2010. At each plant, profile sampling was completed in a minimum of one tank from each battery and at least three times per tank. Seven to nine sample locations along the aeration tanks were used to develop profiles of DO, nitrogen species, and suspended solids (SS) along the lengths of the aeration tanks. Air flow, along with other plant operations data, was collected coinciding with the sampling. Data analysis will be completed in early 2011 and results will aid in the optimization of air usage and therefore energy usage.

Side-by-Side Comparison of Plug Flow and Step Feed Tanks at the James C. Kirie Water Reclamation Plant. Aeration tanks operating in plug flow and step feed modes were monitored in the fall of 2010. Monitoring included profile sampling and comparison of aeration tank distributed control system (DCS) data such as influent flow, air flow, and return flow. The profile sampling was conducted along the length of the tanks and included the following: DO concentration, oxygen uptake rate (OUR), mixed liquor suspended solids (MLSS), mixed liquor volatile suspended solids (MLVSS), ammonia, nitrate, nitrite, and phosphorus (P). The sampling and DCS data will be analyzed in early 2011 to (1) compare the performance and air usage of the aeration tanks under plug flow and step feed operations and (2) determine if operating aeration tanks in step feed will result in energy savings due to a reduction in air demand.

Odor Management and Corrosion Control in Select Interceptors in the James C. Kirie Water Reclamation Plant Service Area. The second phase of this study was initiated to determine the kinetics of Bioxide to optimize the dosing level and the possible locations for Bioxide injection along Upper Des Plaines (UDP) interceptors 14A, 14B, and 20B leading to Drop Shaft 5. In 2010, the goal was accomplished by making an observation that hydrogen sulfide correlated reasonably well with oxidation-reduction potential (ORP), and Bioxide showed potential for improving ORP within 10 to 40 minutes of injection for initial ORP levels of -90 mV and above. The results of Phase II of this study indicated that applying Bioxide in a single location might not be the optimum approach to mitigating odors in the interceptors. The results of the study indicate that Bioxide is effective at minimizing H₂S.

Assistance to the James C. Kirie Water Reclamation Plant for a Full-Scale Filter Test. The James C. Kirie (Kirie) WRP is planning to use filters on a routine basis for ensuring compliance with the NPDES SS permit in 2011 when existing Battery A is scheduled for rehabilitation. To evaluate the efficiency of the filters, with the support of M&R, Kirie WRP operations personnel conducted filter testing in the fall of 2010. In the tests, the hydraulic loading to the filters was gradually increased by taking the filters out of service sequentially, while influent and effluent samples were evaluated for SS concentration analysis. The WTPR

Section collected the pertinent data during the tests and will prepare a report for M&O in early 2011.

Excess Flow Discharge Disinfection Study for the John E. Egan Water Reclamation Plant. At the request of M&O, the WTPR Section planned a laboratory bench-scale study to investigate the chlorine dose required to disinfect the primary treated excess flow of the Egan WRP. The study evaluated methods to meet the permit limit consistently and produce an effective disinfection monitoring strategy. As a supplement to Phase I tests in 2009, Phase II tests were conducted in the WTPR laboratory with the analytical support of the AMBS and the Analytical Laboratories Division (ALD) in 2010. The effectiveness of disinfection as a function of contact time and influent characteristics have been investigated. An M&R report detailing the results from the two phases of this study will be prepared in 2011.

Polymer Tests at the Stickney and Calumet Water Reclamation Plants. Full-scale tests were conducted at the Stickney WRP post-centrifuge dewatering complex during September/October 2010 for the selection and purchase of summer polymer used in the centrifuge dewatering process of anaerobically digested sludge. In October 2010, bench-scale polymer testing was carried out at the Lue-Hing Research and Development Complex for the selection and purchase of polymers used in the gravity concentration tanks to thicken the primary and waste-activated sludge at the Calumet WRP. A total of six polymers from three manufacturers were tested and found to be eligible for bidding for summer polymer purchase for the Stickney WRP, whereas only two polymers from the same manufacturers were tested and found to be eligible for bidding for thickening operations at the Calumet WRP.

Assistance to the Calumet Water Reclamation Plant in Controlling Foaming in Anaerobic Digesters. The WTPR Section teamed up with the AMBS and provided assistance to the Calumet WRP operations throughout the year to mitigate foaming problems in the anaerobic sludge digesters in 2010. Support included microbiological analyses, foaming potential and related tests conducted in the WTPR laboratories. The results of microbial analysis and review of the operational data suggest that low food-to-mass (F/M) is causing the foaming. M&R staff is working with M&O staff to develop and test strategies in 2011 to improve F/M and minimize foaming.

Providing Technical Support to the Engineering Department for Planning and Design Requests. In 2010, the WTPR Section conducted the following evaluations to provide the required technical support to the Engineering Department.

Grit Sampling at the North Side Water Reclamation Plant. In support of the computational fluid dynamic modeling of the aerated grit tanks at the North Side WRP being done by the University of Illinois at Urbana-Champaign, grit samples from the raw influent wastewater were collected in the fall and winter of 2010. A sampling device was designed, built,

and installed upstream of the grit tanks. Three grit samples were collected and a sieve analysis completed for each sample to determine the size distribution of the particles. A report including the results from the sampling was prepared and transmitted to the Engineering Department in December 2010.

Digester Mixing Study at the Calumet Water Reclamation Plant. Mixing is one of the most important physical factors that affect the anaerobic digestion process. To evaluate the effectiveness of mechanical mixing, six mechanical digester sludge mixers were installed on the floating cover of digester number 5 at the Calumet WRP. Analytical and operational data were collected and analyzed from digester number 5 and 6 to compare performance of digesters with and without supplemental mixing. The sampling for this study was conducted from February 2009 through November 2009. The summary report was drafted in 2010.

Evaluating Two Different Aeration Systems at the John E. Egan Water Reclamation Plant. This project was initiated to compare the operational efficiency of two different aeration systems at the Egan WRP: full floor, fine bubble, disc ceramic diffusers in a tapered configuration in the North Aeration Battery and the original spiral roll aeration system using square ceramic diffusers placed on one side of the aeration tank in the South Aeration Battery. Major field testing which included process oxygen transfer efficiency (OTE) measurements using the off-gas technique and profile sampling along the aeration tanks to evaluate OURs, nitrification, and DO distribution was completed in 2007. Supplemental field tests on process OTE measurements were conducted in 2008 and 2009. Additional supplemental field tests with a new hood configuration were conducted to verify the process OTE measurements in the South Aeration Battery in 2010. An M&R report presenting the results of this study will be prepared in 2011.

Stickney Permeable Pavements Evaluation. In 2008, the District initiated a plan to evaluate porous surface technology for stormwater flow and pollutant load reduction at the Stickney WRP. The Conservation Design Forum designed three test permeable surfaces and a control area in the parking lot on the northwest side of the Stickney WRP. The three test surfaces consisted of: 1) a porous asphalt; 2) a porous concrete; and 3) a porous paver system. The control area is traditional black top asphalt and is considered impervious.

M&R staff evaluated the effect of flow and load reduction in three different permeable pavements relative to a control lot at the Stickney WRP. Rainfall, subsurface water levels, infiltrated flow, and total flow were continuously measured for each lot from April through November 2010. Additionally, water quality of the total flow collected at each lot was monitored after rainfall events. Due to equipment problems and power outages, limited amount of data could be quantified for the 2010 study period. However, the data collected shows that all three permeable lots had much lower runoff relative to the control. This was corroborated by site visits during rainfall events where standing water was only observed at the control lot. In 2009 lower pollutant concentrations were observed in the permeable lots, but this trend did not occur in 2010 possibly due to lot design limitations. Numerous troubleshooting efforts during the

offseason to retrofit the system design and flow measurement will be performed in order to collect accurate flow data and stormwater samples in 2011.

Process Design for Proposed Battery E at the North Side Water Reclamation Plant. Technical information was provided to the Engineering Department for the design of the proposed Battery E at the North Side WRP in 2010. The information included (1) determining the design flows and loads to the battery, (2) determining the air flow requirements and distribution for aeration tanks, (3) evaluating the need to operate the aeration tanks in step feed, (4) evaluating the use of anoxic zones in the beginning of the aeration tanks for energy savings, and (5) assessing plant-wide needs for nutrient removal to a total nitrogen (TN) level of 6 mg/L and a total P (TP) level of 0.5 mg/L in the final effluent of the plant.

Support to the Engineering Department for Preliminary Design of Proposed Battery E at the North Side Water Reclamation Plant. The WTPR Section participated in the Engineering Department project of preliminary design of Battery E at the North Side WRP. Section staff reviewed the preliminary design documents submitted for the project and provided technical comments for improving the design quality in 2010. Section staff also attended workshops to discuss of the appropriate design for the plant.

Support to the Engineering Department for the Hanover Park Water Reclamation Plant Master Plan Study. The WTPR Section provided support to the Engineering Department for the Hanover Park WRP Master Plan Study. The commissioned study evaluates alternatives for improving and updating the infrastructure and process facilities to meet future needs. The support included participation in workshops and the review of documents and computer model in 2010.

Fulfilling Regulatory Monitoring Requirements. In 2010, the WTPR Section conducted the following activities to meet the regulatory requirements for biosolids management, monitoring of odor and hazardous air pollutants (HAPs) from the District WRPs and biosolids management facilities, and monitoring of groundwater surrounding the Tunnel and Reservoir Plan (TARP) tunnels and reservoirs.

Additional Digestion Tests for the Calumet Water Reclamation Plant. The WTPR Section directs a continuous monitoring program that assesses whether the requirements for vector attraction reduction are met in the biosolids processing at the District WRPs employing Option 2 of Section 503.33(b) of the 40 CFR Part 503 Regulations (Option 2). Option 2 states that vector attraction reduction is demonstrated if after anaerobic digestion of the biosolids, the volatile solids (VS) in the biosolids are reduced by less than 17 percent in an additional 40 days of bench-scale anaerobic digestion at a temperature between 30° and 37°C. The additional anaerobic digestion tests in accordance with Option 2 are used as a supplemental monitoring program, in addition to the routine monitoring of anaerobic digestion performance. In 2010, a

total of 28 tests were conducted in the WTPR laboratory for the Calumet WRP at a frequency of two to three tests per month.

Odor Monitoring Programs. As part of the District's continuing odor surveillance program, the WTPR Section conducts odor monitoring at HASMA, Vulcan SMA, LASMA, the Marathon SMA, and the Calumet SMA. A similar odor monitoring program was initiated in the spring of 2001 at the Stony Island SMA and the RASMA. The programs are required by NPDES permits for the SMA. Odor monitoring is also conducted at the Calumet, Egan, Stickney, Kirie, and North Side WRPs.

A similar protocol for monitoring odors is used at each location. Either M&R or M&O personnel (at some WRPs) visit various locations on a regular basis. The frequency of odor monitoring can range from once per week (Egan WRP) to daily (Kirie WRP). 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.

The objective of the program is to collect and maintain a database of odor levels within and around each WRP and associated solids processing areas. The data is used to study the trends in odor levels associated with WRP operations, and to relate odor levels to changing conditions within the WRP, such as installation of odor control equipment.

Since several residential areas surround the WRPs in the program, the odor monitoring activities also provide early warning of odorous conditions that develop within the WRPs, to allow for corrective action before they become a nuisance to area residents.

The details of the odor surveillance program and odors detected at or near District operations will be summarized in an M&R report in 2011.

Tunnel and Reservoir Plan Groundwater Monitoring. Groundwater monitoring for the six TARP systems, which included the Mainstream, Calumet, Des Plaines, and UDP Tunnel Systems, the Gloria Alitto Majewski Reservoir, and the Thornton Transitional Flood Control Reservoir, was conducted throughout 2010. The WTPR Section coordinates the groundwater sampling that is carried out by the Industrial Waste Division (IWD), handles the preparation of samples that are analyzed by ALD for the required parameters, and performs data management. Groundwater monitoring reports summarizing the monitoring results for the year 2010 will be prepared and one report for each system will be published as an M&R report. All six reports will be submitted to the IEPA as well as the USEPA by June 2011.

Pollutants Captured by Tunnel and Reservoir Plan. One of the main purposes of building the TARP system was to prevent CSOs from entering Lake Michigan and the CAWS. M&R annually calculates the removal of certain pollutants, including SS, both carbonaceous and

nitrogenous oxygen-demanding substances, and the volume of CSOs collected by the TARP systems.

Calculating pollution removal gives an indication of how well TARP is serving its function, since the pollutants diverted to TARP would have otherwise been discharged into the area waterways. The results of the calculations will be sent to M&O and also published in the 2010 EM&RD annual report in 2011.

Estimation of Emission of Hazardous Air Pollutants from Metropolitan Water Reclamation District of Greater Chicago Water Reclamation Plants. Under Section 112 of Title I of the Clean Air Act, a publicly owned treatment works (POTW) is considered a major source of HAPs if it emits or has the potential to emit 10 tons per year or more of any HAP or 25 tons per year or more of any combination of HAPs. As part of the NPDES permits and regulations under the Clean Air Act, emission of HAPs from the wastewater treatment processes for each WRP was estimated.

Estimation of the emissions of these HAPs from the wastewater treatment process units is made using the Bay Area Sewage Toxics Emissions (BASTE) computer model developed by CH2M Hill. According to the output from the BASTE model, all of the individual HAP emissions were less than the 10 ton/year criterion at any District WRP. Toluene and acetaldehyde were the predominant compounds emitted from the wastewater treatment processes at the Stickney WRP. Carbon disulfide was the predominant compound emitted from the Calumet WRP liquid stream. The total measured HAP emissions were substantially less than the 25 ton/year threshold at each of the three large WRPs. The wastewater treatment process units at the District's WRPs are not a major source of HAPs.

Conducting Applied Research on Process Optimization and Evaluation of New Technologies. The WTPR Section conducted the following applied research projects in 2010.

Characterization of Recycle Streams at the Stickney and Calumet Water Reclamation Plants. In July 2008, the WTPR Section began sampling the recycle streams at the Stickney and Calumet WRPs in order to evaluate the nutrient loads to the headwork contributed by these recycle streams. The District does not routinely monitor flow of recycle streams or nutrient contents in the recycle streams at either plant. However, grab samples are collected from certain recycle streams for total and suspended solids analyses for process control information. The parameters analyzed in this study have been chosen such that a range of nutrient treatment strategies may be considered to address stricter nutrient regulations for TN and TP. Thus, the characterization of nutrient loads in recycle streams will provide important information for formulating the nutrient reduction strategies for both WRPs. Sampling for this project continued through August 2009. The findings of the study were presented at the November 2010 M&R seminar, which included the details of sampling plan, data, and a set of recommended technologies for nutrient treatment and recovery based on the data collected. A final report detailing this study will be completed in 2011.

Methane and Nitrous Oxide Emissions from Wastewater Treatment. According to a recent USEPA report (*Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990–2004*, USEPA 2006), domestic and industrial wastewater treatment is the sixth highest contributor to atmospheric methane (CH₄), and human sewage is the fourth highest contributor to atmospheric nitrous oxide (N₂O).

In 2010, a comprehensive monitoring study was performed to assess the CH₄ and N₂O flux from a Stickney WRP aeration battery with an emphasis on the spatial and diurnal variability within a battery tank. Water quality was monitored in parallel with the greenhouse gas evaluation. Based on the results, the measured N₂O and CH₄ fluxes from the aeration basin were estimated. CH₄ was mainly released upon mixed liquor entry into the battery tank due to air stripping, whereas N₂O emissions were low upon entry but became elevated further along the tank flow path. No relationship between the water quality parameter concentrations monitored and greenhouse gas emissions were observed.

Chemical Phosphorus Removal at the John E. Egan Water Reclamation Plant. For the Salt Creek Phosphorus Reduction Demonstration Project, the TP concentrations in the final effluent of the Egan WRP were reduced to a target level of 0.5 mg/L of TP. Chemical precipitation of P with FeCl₃ was utilized. A full-scale chemical P removal test was conducted from February 2007 through December 2008. Monitoring of the impact of chemical P removal on plant operations including both liquid and sludge streams continued until 2009. The data collected in this two year study were analyzed, and an M&R report describing this project in detail and presenting the results from the entire study was prepared and finalized in 2010.

Laboratory Study on Odor Management and Corrosion Control. In order to address concerns of odor abatement and H₂S generation and corrosion in District interceptors, different chemical technologies were evaluated through laboratory headspace tests to see their effect on H₂S generation. Bioxide (a nitrate salt), calcium nitrate (Ca(NO₃)₂), FeCl₃, and ByoGon (a biostimulant) were examined at different doses to anaerobic wastewater. Periodic H₂S as well as select water quality parameter measurements over a three hour study period were made. Both Bioxide and Ca(NO₃)₂ (500 mg/L nitrate nitrogen) worked the best among the treatments and were able to lower H₂S at dosing concentrations greater than 250 µL/L; at lower doses, the chemicals were consumed and H₂S began to increase towards the end of the study period. Likewise 35% FeCl₃ was able to continuously lower H₂S concentrations for the entire study period at concentrations greater than 1,250 µL/L; however, this sulfide removal was accomplished through oxidation and precipitation and resulted in low pHs. ByoGon did not suppress H₂S at all.

GPS-X Modeling of the North Side Water Reclamation Plant. A steady-state model of the North Side WRP was developed by CTE|AECOM using the GPS-X software as part of a Master Plan study completed in 2007. WTPR staff will further develop the model into a dynamic model. Special discrete sampling commenced in 2009 and continued into 2010. Winter sampling is planned for early 2011. Sample results will be used for further model development

including calibration and validation as needed in 2011. When complete, the dynamic model will allow for the evaluation of plant capacity and plant operations and will assist in evaluating plant expansion options. An M&R report detailing the dynamic modeling of the North Side WRP will be prepared in 2011.

Literature Review on Nitrification Rate. A literature review was completed for nitrification rate testing. The literature review will aid in the development of a standard operating procedure (SOP) for a quick determination of nitrification rates. The SOP will be utilized to regularly track nitrification rates at the District's plants over time and troubleshoot plant upsets.

Ferrate Disinfection Evaluation. The WTPR Section evaluated a process for wastewater disinfection using ferrate. Bench scale tests were conducted in the WTPR laboratory to evaluate the process of ferrate synthesis and application of ferrate for disinfection. The test results indicate that highly unstable ferrate could be synthesized on site and used for effective wastewater disinfection. However, the tests also showed that due to the amount of chemicals required for ferrate synthesis and effective disinfection, the process is not cost effective compared with chlorination and dechlorination and ultraviolet light.

Potential Energy Savings at Hanover Park Water Reclamation Plant Using Anoxic Zone and at Egan Water Reclamation Plant Using Chemical Enhanced Primary Settling. The WTPR Section has initiated two full-scale testing projects targeting energy savings at the District plants in 2009. One project is to introduce an anoxic zone in an aeration tank at the Hanover Park WRP to reduce aeration, and the other is to use polymer and/or FeCl₃ to enhance settling in the primary settling tanks at the Egan WRP. During 2010, the WTPR Section worked with the Engineering Department on developing design parameters through site visits and laboratory bench-scale tests, and aided the Engineering Department on preparing a scope of work and contract specifications under Engineering Department project 06-494-3P. Full-scale testing is expected to commence in 2012.

Responding to Other Requests for Technical Support. In 2010, the WTPR Section provided the following technical support to other requests.

Support for Studies Relating to Illinois Pollution Control Board Rulemaking on Dissolved Oxygen Standards for the Chicago Area Waterway System. In support of the studies relating to the IPCB rulemaking on DO standards for the CAWS, the WTPR Section provided data analysis on the relation of DO concentrations in the waterway to urban wet-weather runoff and CSO events. In addition, the WTPR Section participated in an Engineering Department project on integrated strategy to meet DO water quality standards for the CAWS through attending workshop discussion and reviewing documents for the project.

Chicago Department of Transportation Blue Island Sustainable Streetscape Project. M&R staff in collaboration with the Chicago Department of Transportation and the United States Geological Survey are investigating the effect of best management practices (BMPs) such as permeable pavements, bioswales, infiltration basins, and planters on stormwater flow and pollutant load reduction in the Sustainable Streetscape Project (SSP) located on West Cermak Road between South Halsted Street and South Ashland Avenue, and South Blue Island Avenue between South Ashland Avenue and South Western Avenue. In 2010 background monitoring of the rainfall, combined sewer flow, and groundwater levels at numerous SSP locations and quality of sewage and groundwater were performed. It was observed that sewer flows increased upon rainfall events, but groundwater level response was more than likely controlled by the local groundwater hydrology. Additionally, groundwater quality was shown to be compromised by roadway deicing agents, i.e. chlorides, and possibly exfiltration of sewage from the local system. BMP construction began in August 2010 and is expected to be completed by June 2011 for the first phase of the project. Upon BMP implementation, the following parameters will be examined in combination with the above: (1) stormwater flow and water quality; (2) soil moisture, soil quality, and soil water quality in planters and bioswales; (3) biomass quality in planters and bioswales; overflow and water quality from select BMPs; and (4) sediment quality in catch basins.

Biosolids Utilization and Soil Science Section

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

1. To conduct monitoring and document compliance with permits and regulations governing the biosolids management programs and file all relevant reports in a timely manner.
2. To promote the beneficial use of biosolids and provide technical support to biosolids users.
3. To conduct applied research and demonstrations to evaluate the environmental impacts of land application of biosolids, to showcase the benefits of land application of biosolids, and to evaluate the impacts of regulations on the District's biosolids land application programs.
4. Keep up-to-date with and review relevant regulatory developments to evaluate their impact on the District's operations, and assist with the formulation of technically sound regulations.

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

Environmental Monitoring. In 2010, the Section conducted the following monitoring and reporting activities to comply with permits and regulations governing the biosolids management programs:

Monitoring of Wells and Lysimeters at Biosolids Drying Facilities. This monitoring and quarterly reporting is conducted for six biosolids drying facilities according to permits issued by the IEPA. These facilities are the Calumet East, Calumet West, Lawndale Avenue, Harlem Avenue, Ridgeland Avenue, and Stony Island Avenue drying sites. In 2010, a total of 24 quarterly monitoring reports were submitted to IEPA. The reports include results of sampling and analysis of groundwater and biosolids.

Environmental Monitoring at Hanover Park Fischer Farm. All biosolids generated at the Hanover Park WRP are land applied at the Fischer Farm located on the grounds of the plant. Biosolids are temporarily held in lagoons then land applied by subsurface injection of the solids or supernatant according to the permit issued by the IEPA. The Section is responsible for providing technical support to the monitoring program and the quarterly monitoring reporting by the permit. In 2010, four monitoring reports were submitted to IEPA

Biosolids Monitoring under Process to Further Reduce Pathogens Certification. The Section is responsible for maintaining the District's site-specific certification of processes that further reduce pathogens for biosolids processing trains at the Stickney and Calumet WRPs, as awarded by the USEPA. In this certification, the District's air-dried biosolids generated according to a codified operation is designated as Class A according pathogen standards under the USEPA Part 503 Rule. The monitoring program for this certification includes pathogen analysis of biosolids and semi-annual reporting to the USEPA. In 2010, two monitoring reports were submitted to the USEPA.

Fulton County Land Reclamation Site. The Fulton County land reclamation site was used for land application of biosolids to reclaim strip-mined land from 1972 to 2004 under a permit issued by the IEPA. The site permit required monitoring of soil, crops, groundwater, and surface water. All environmental monitoring required by the permit was terminated in 2007 until such time that application of biosolids on the site resumes. Discretionary environmental monitoring on a limited number of fields and groundwater and surface water sites are collected every two years. In 2010, one annual report was submitted to the IEPA.

Promotion of Biosolids Beneficial Reuse and Technical Support to Biosolids Users. The Section assists in the local marketing of biosolids and providing technical support to

biosolids users under the District's Controlled Solids Distribution Program. Biosolids marketing activities include preparation of promotional documents, showcasing the District's biosolids management program at local trade shows and conferences, and presentations to potential biosolids users. In 2010, the Section conducted one exhibition and one field day to promote beneficial use of the District's biosolids. During the year, biosolids and technical support were provided to a total of 43 users consisting of 17 new and 26 returning users. These users include, park districts, villages, golf courses, landscapers, and schools.

The Section also maintains continuous demonstrations of turfgrasses, prairie grasses, forage grasses, and wild flowers in a greenhouse at the Lue-Hing R&D Complex. During 2010, there were numerous tours of the greenhouses.

Applied Research on the Benefits and Safety of Biosolids Land Application. The research and demonstration component of the program is aimed to support the local marketing of biosolids. Research consists of studies conducted in collaboration with universities and the IEPA to demonstrate that land application of biosolids according to the USEPA Part 503 Rule is beneficial and provides protection to human health and the environment. These studies include:

Corn Fertility Experiment on Calcareous Mine Spoil. Since 1973, the District has been conducting a corn fertility experiment on calcareous mine spoil at the Fulton County site. The purpose of this experiment is to evaluate the effect of long-term applications of anaerobically digested biosolids on crop yields, crop chemical composition, and mine spoil chemical composition. This is the longest running continuous biosolids research experiment in the country. The experiment was designed to simulate biosolids application to fields at the site at agronomic and reclamation rates, and to provide information that can be used for management of biosolids and crops.

Biosolids Phosphorus Studies. Many states are implementing regulations to minimize phosphorus contamination of water bodies due to runoff from land application of biosolids. This project was started in 2003 in collaboration with the IEPA and University of Florida to address the potential for environmental impacts associated with the application of District biosolids to cropland and to minimize the impact of future biosolids P regulations on District operations. The project included greenhouse and field studies to evaluate plant availability of biosolids, and laboratory and field studies to evaluate potential for phosphorus runoff from farm fields on which District biosolids are applied. The studies were completed in 2010. Journal articles and a white paper assessing the potential impact of biosolids phosphorus regulations on the District's biosolids farmland application program are being prepared.

Farmland Application of Class B Biosolids Project. The practice of Class B biosolids application to farmland has met with public concern and opposition in some regions of the United States. Most of the concerns stem from misinformation about the potential human health and environmental risks from pathogens and trace metals in the Class B biosolids applied to

farmland. In the fall of 2004, the District began a research and demonstration project on farmers' fields in Will and Kankakee Counties to demonstrate the safety of farmland application of Class B centrifuge cake biosolids and to improve the overall public perception and the understanding of communities residing in the vicinities of biosolids-amended farmlands. The field project sites were used by the District and farmland application contractor to host field days. The data collection component of this project was concluded in 2007. During 2010, activities on this project included analysis of samples and data analysis for the project report.

Fate and Transport of Biosolids-Borne Triclosan and Triclocarban. Triclosan (TCS) and triclocarban (TCC) are the active ingredients heavily used in the antibacterial product market and these compounds are discharged from industries and household drains to become influent to wastewater treatment plants. In 2008, the District began a study in collaboration with University of Florida to conduct laboratory and bench scale tests on samples of District biosolids to determine the levels of TCS and TCC in the biosolids and the fate of these compounds in biosolids amended soil. Activities conducted by the section on this project in 2010 included trapping of earthworms in biosolids amended soil for bench scale tests and hosting a project meeting.

Investigation of Stabilization of Dewatered Biosolids in Lagoons. The District's exceptional quality air-dried biosolids, which are produced by lagoon aging and air-drying, are utilized under the Controlled Solids Distribution Program in the Chicago metropolitan area on golf courses, parks, and athletic fields. The odor potential of the dried biosolids is a major factor controlling the cost of managing the biosolids, public acceptance, and the economic value of the product. In 2009, the District initiated a project to investigate mechanisms of biosolids stability and the factors controlling odor potential during processing of District air-dried biosolids. The first phase of the study was done in collaboration with the Illinois Institute of Technology and was focused on determination of indices of biosolids stability during lagoon aging. This first phase of the project was completed in 2010 and a paper reporting the results of the study has been submitted for journal publication.

Effect of Moisture on Odor Potential of Biosolids During Storage. Air-dried biosolids used under the District's Controlled Solids Distribution Program are available only during a limited period of the year, because dried biosolids typically become odorous during storage. This study began in mid-2010 and is designed to determine the effect of various biosolids moisture contents on odor development in biosolids during storage. The study consists of stockpiling of biosolids under cover at the HASMA and measuring the odor emission potential over time.

Greenhouse Gas Accounting of the District's Biosolids Management Program. The use of biosolids are known to directly and indirectly affect the generation of methane and nitrous oxides and soil carbon sequestration, which can be translated into carbon debits and credits in greenhouse gas accounting. In collaboration with the University of Washington, the District

conducted a study to evaluate the carbon credits and debits for each of the District's end uses of biosolids for both 2001 and 2008. The end-uses evaluated were centrifuge cake landfill disposal, centrifuge cake as fertilizer on farmland, and air-dried biosolids utilization as landfill final cover, urban recreational areas, and for the reclamation of mineland at Fulton County. A report on this project was prepared in 2010.

Use of Biosolids in Ecological Restoration. As part of its efforts to promote the use of biosolids in the City of Chicago, this project was initiated in 2009 to address issues raised by United States Fish and Wildlife and other stakeholders regarding the potential for using biosolids for ecological restoration in Chicago's Calumet Region. The project has been conducted in collaboration with The Ohio State University. The study consists of developing field plots in which biosolids and other recyclable materials are used as a soil amendment and evaluating the impact of these treatments on soil biology and concentrations of potential contaminants in runoff water.

Analytical Microbiology and Biomonitoring Section

In 2010, the Analytical Microbiology and Biomonitoring Section (AMBS) provided microbiological monitoring of the final effluent, area rivers, lake, canals, and biosolids to document the effectiveness of the District's wastewater treatment operations. The Section was also involved in public health research studies to generate data and scientific information to inform policy, guide regulatory development, and improve operations. An additional responsibility included laboratory tours to promote public awareness of wastewater microbiology.

The Section's staff actively participated in the IPCB rule-making hearings for the CAWS water quality standards and effluent limitations. Responsibilities in this administrative process included the review of testimonial documents and preparation of position statements, along with questions and comments. Professionally, the Section was involved in the USEPA and Water Environment Research Foundation (WERF) issue area team research in the fields related to micro-constituents, biosolids risk assessment, and critical research and science needs for the development of national recreational water quality criteria.

Use Attainability Analysis Research Projects. The AMBS staff coordinated the following scientific research studies which provided important information to IPCB regarding human health risks for the identified incidental recreational uses, particularly in light of the current practice of not disinfecting the District effluents discharged to the CAWS.

Dry and Wet Weather Risk Assessment of Human Health Impacts of Disinfection vs. No Disinfection of the Chicago Area Waterway System. The microbial risk assessment study was completed in collaboration with a team of nationally-recognized experts in risk assessment led by Geosyntec consultants. The risk assessment study showed low pathogen levels in the District final effluents from North Side, Calumet and Stickney WRPs and in the CAWS downstream of

those WRPs. In fact, the study estimated that the gastrointestinal illness risk associated with incidental contact recreational on the CAWS was minimal, and is below the USEPA threshold for primary contact recreation¹. The findings from this study have been peer reviewed and published^{2,3}. The study received recognition as a scholarly research work and in 2010 was awarded the American Academy of Environmental Engineers Excellence in Environmental Engineering Research Honor Award (<http://www.aace.net/Website/E32010HonorResearch.htm>).

Epidemiological Research Study of Recreational Use of the Chicago Area Waterway System. The study known as the Chicago Health, Environmental Exposure and Recreation Study (CHEERS), conducted in collaboration with a multidisciplinary team at the University of Illinois at Chicago (UIC) School of Public Health, was completed and the final report was submitted to IPCB. The CHEERS directly measured the occurrence of illness associated with incidental contact recreation between the study groups -- CAWS, general use water (GUW), and unexposed. The CHEERS report concluded that rates of gastrointestinal illness are not higher among CAWS recreators when compared to recreators participating in the same activities on GUW (area rivers, inland lakes, or Lake Michigan) that do not receive undisinfecting wastewater effluent.

Water Reclamation Plant Operation Monitoring and Research. The AMBS conducted analysis and provided technical counsel for the following: (1) monitoring for fecal coliform (FC) and *E. coli* (EC) to evaluate ultraviolet light disinfection systems; (2) monitoring microbial densities on farm soil after application of biosolids; (3) studying effective disinfection strategies for high-flow Egan WRP; and (4) assessing microbiological health of mixed liquor to solve operational problems at Egan, North Side, and Calumet WRPs.

Specialized Laboratories Monitoring and Research. The Section's four state-of-the-art laboratories performed a wide range of microbiological analyses in the areas of bacteriology, environmental microbiology, parasitology, virology, and biomonitoring. Construction was

¹ Geosyntec, 2008. Dry and Wet Weather Risk Assessment of Human Health Impacts of Disinfection vs. No Disinfection of the Chicago Area Waterways System, District website (www.mwrd.org).

² G. Rijal et al. 2009. Dry and wet weather microbial characterization of the Chicago area waterway system. *Water Science & Technology—WST*, Vol. 60 No. 7 pp. 1847–1855© IWA Publishing 2009 doi:10.2166/wst.2009.598.

³ G. Rijal et al. 2010. Microbial Risk Assessment for Recreational Use of the Chicago Area Waterway System. *Journal of Water and Health* © IWA Accepted for Publication currently in press.

completed on a fifth laboratory -- Molecular Microbiology Laboratory. The specific activities of the laboratories are summarized below.

Analytical Microbiology Laboratory. The Analytical Microbiology Laboratory (AML) has been certified by the IDPH for the bacterial analysis of water since 1979. The AML is responsible for bacterial population density analyses used in WRP effluent monitoring mandated by NPDES permits. The laboratory completed proficiency testing and evaluation programs with acceptable results for the Discharge Monitoring Report – Quality Assurance (DMR-QA) Study 30, and seven microbial procedures for the examination of water from public water supplies and their sources.

Monitoring of Chicago's lake front harbors was conducted on the one occasion of river reversal to Lake Michigan in 2010. The reversal was the result of a major rainstorm event in the Chicagoland area.

The AML conducted microbiological analyses to support the following monitoring and research programs: FC and EC for CAWS AWQM Program; FC for Part 503 Compliance Biosolids Monitoring, TARP Groundwater Monitoring Wells, and TARP Reservoir Monitoring.

Biomonitoring Laboratory. Chronic whole effluent toxicity (WET) tests with fish (*Pimephales promelas*) and daphnids (*Ceriodaphnia dubia*) were conducted on effluent samples from the Hanover Park WRP. No chronic toxicity was observed. The biomonitoring report for Hanover Park WRP was submitted to IEPA in compliance with the NPDES permit. The laboratory successfully completed the DMR-QA Study 30 for WET tests as required under the Clean Water Act's NPDES program.

Parasitology Laboratory. 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. The laboratory continued to monitor coliphages (male-specific and somatic) in class A and Class B biosolids.

Virology Laboratory. Air-dried biosolids (final product) were analyzed for culturable enteric viruses for compliance with the Part 503 Standards. All biosolids produced from the District's codified process were determined to be Class A with respect to pathogens (less than 1 enteric virus per four grams) as defined by the Part 503 Standards.

Outreach Support Services. The AMBS continued the outreach support by providing following services.

Science Projects/Laboratory Tour. Information on the role of wastewater microorganisms in waste recycling and technical advice on water quality monitoring and analytical methods were provided to high school students; participated in the Chicago School Science Fair program; and conducted laboratory tours.

Water Environment Research Foundation Research Projects. The AMBS provided analytical sampling and monitoring support as well as technical review of WERF's research projects and regulatory documents; attended project related meetings and teleconference calls, and evaluated project proposals and final reports.

University Research Manuscripts. The AMBS staff reviewed and commented several research proposals and/or manuscripts for publication.

Aquatic Ecology and Water Quality Section

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

Field monitoring activities conducted during 2010 by the Aquatic Ecology and Water Quality Section included the following:

Benthic Invertebrate Monitoring. As part of the AWQM Program, benthic invertebrate abundance was assessed at 25 monitoring stations in the Chicago, Calumet, and Des Plaines River Systems from June through September of 2010. Samples were collected from 17 stations located on the deep-draft waterways and 8 stations on wadeable streams. Benthic invertebrates were collected using a 6- x 6-inch Ponar Grab sampler and 3- x 3-inch Hester-Dendy artificial substrate samplers. A kick net sampler was employed at two stations. 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 from June through September of 2010 at 31 stations in the Chicago, Calumet, and Des Plaines River Systems. Twenty three stations were located on the deep-draft waterways and 8 stations were on wadeable streams.

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

Habitat Quality Monitoring. During June through September of 2010, a physical habitat assessment was conducted at 25 monitoring stations in the Chicago, Calumet, and Des Plaines River Systems. The Qualitative Habitat Evaluation Index was calculated for the 8 stations located on wadeable streams. The results of the habitat assessments will be provided to the IEPA for their use in preparing the Illinois 305(b) assessment report.

Chlorophyll Monitoring. During 2010, 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* is used to estimate the phytoplankton biomass and productivity and is used as an indicator of excess nutrients in the system.

Continuous Dissolved Oxygen Monitoring. Continuous DO monitoring continued during 2010 at 31 stations in the Chicago, Calumet, and Des Plaines River Systems, including 20 deep-draft stations and 11 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 of the 2009 DO monitoring results were published in August of 2010. The 2010 reports are planned for publication in the second quarter of 2011.

Illinois Waterway Monitoring. During May, August, and October of 2010, water samples were collected from 49 stations in six navigational pools along 133 miles of the Illinois Waterway System from the Lockport Lock to the Peoria Lock. The primary objective of the monitoring is to determine water quality and sediment trends along the waterway system from Chicago to Peoria. In order to characterize the chemical quality of the sediments, sediment samples were collected during October at 14 selected monitoring stations. An annual summary report for the 2009 Illinois Waterway Monitoring was published in October 2010. The 2010 annual summary report will be completed by the second quarter of 2011.

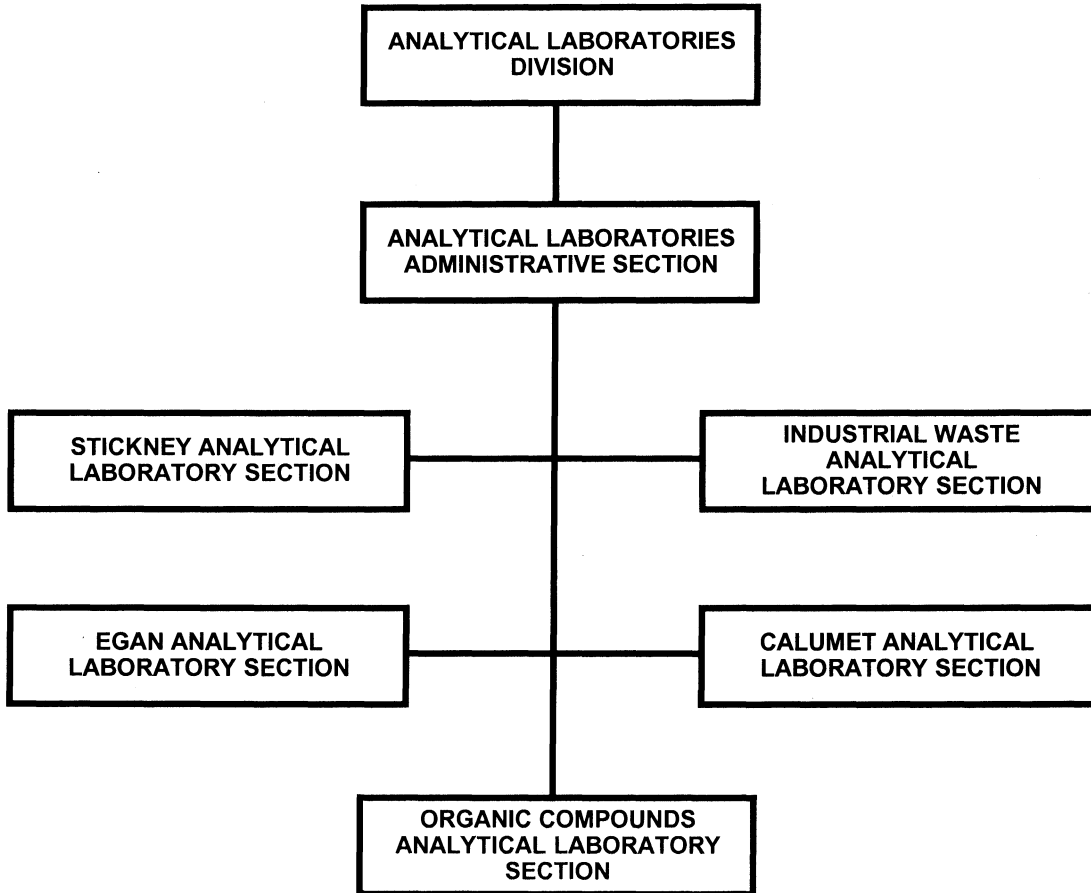
Endocrine Disrupting Compound Study. A three-year study commenced in March 2009 to conduct a comprehensive assessment of the potential for endocrine disrupting compounds (EDCs) to impact the reproductive potential of fish populations in the CAWS. The objectives of this study are to determine (1) the spatial and temporal occurrence of EDCs; (2) the occurrence of endocrine disruption in wild fish populations; and (3) the likely sources contributing to any occurrence of endocrine disruption.

Waterway samples were collected from 38 AWQM stations and final effluent samples were obtained from all seven District treatment plants. These water samples were analyzed each quarter for total estrogenicity and a subset of common estrogenic compounds. The unanalyzed samples have been archived for future analysis as needed. Caged fish were deployed in selected CAWS waterways for at least two weeks during two periods in 2010 (April/May and September/October). Wild fish were also collected in May. Wild and caged fish were examined for endocrine disruption using histopathology and plasma vitellogenin analysis. Two successful deployments of the mobile exposure laboratory trailer (MELT) occurred in August and September of 2010. MELT will enable the study to evaluate whether a relationship between specific water sources and observed endocrine disruption exists, and identify the likely compounds responsible. Results will be published at the conclusion of this study in 2012.

Wet Weather Fish Movement Study. A collaborative study with LimnoTech Inc. and the Illinois Natural History Survey (INHS) funded by the WERF began in 2010. The purpose of this pilot study is to assess the effect of wet weather driven DO sags on CAWS fish. During the summer of 2010, fourteen acoustic hydrophone receivers were installed in Bubbly Creek, the South Branch Chicago River, the Chicago Sanitary and Ship Canal, and two off-channel slips. Electronic tags were surgically implanted in 20 largemouth bass that were collected in or near Bubbly Creek. Twenty common carp were also tagged by INHS within the study area in cooperation with Asian carp monitoring activities occurring in the CAWS. The District will provide DO data from at least 5 continuous DO monitoring stations in order to determine whether tagged fish avoid low DO areas during wet weather events and, if so, where they relocate. A final report will be published on this research by early 2012.

FIGURE 2

**ANALYTICAL LABORATORIES DIVISION
ORGANIZATION CHART**



ANALYTICAL LABORATORIES DIVISION

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

- To M&O 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. Review and comment on the WRP's Public Notice Fact Sheet/Draft Permit for NPDES permit renewal.
- To EM&RD for various applied and operations research to achieve improvements and cost reductions in District treatment process operations, and to assist in monitoring water quality in the Chicagoland and Illinois waterways.
- To assist IWD as it routinely regulates categorical industrial discharges to the sewer system and waterways to determine compliance with the Sewage and Waste Control Ordinance (SWCO) and the USEPA-approved Pretreatment Program.

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

The large number of analyses performed by the ALD, as shown in Table 2 on page 40, could not be accomplished without automation and instrumentation. Staff from the M&R and IT Departments worked together to further improve the Laboratory Information Management System (LIMS) to increase data processing and reporting, and to enhance data acquisition from automated instruments. Through its LIMS team, ALD provided ongoing support during 2010 to the EM&RD, IWD, and M&O personnel.

In mid-2003, the ALD implemented a chemical hygiene plan (CHP) for the District laboratories, which was revised in 2010. The eighth round of annual audit inspections of the laboratories was completed during 2010. Each laboratory is in compliance with the requirements of the CHP.

The five analytical laboratories maintained laboratory accreditation by the IEPA during 2010.

TABLE 2: TOTAL NUMBER OF ANALYSES PERFORMED BY THE ANALYTICAL LABORATORIES DIVISION IN 2010

Program	Nutrients	Oxygen Demands	Metals	Solids	Organic Compounds	Others	Total Program
4652 Liquid Monitoring	125,707	74,874	255,362	56,141	22,052	62,728	596,864
TARP	3,905	907	24,150	555	0	2,711	32,228
Treatment Facilities	121,802	73,967	231,212	55,586	22,052	60,017	564,636
4653 Solids Monitoring	14,823	979	50,671	134,119	12,915	35,094	248,601
4663 User Charge	22	52,979	0	17,808	0	35,355	106,164
4666 Sewage & Waste Control	475	36	314,426	498	34,563	9,534	359,532
4671 Lake Michigan	799	216	2,660	329	0	343	4,347
4672 Waterways	10,854	1,932	102,515	3,352	64,994	14,905	198,552
4681 Assistance to M&O	2,130	57	985	4,867	2,616	12,165	22,820
4682 Assistance to Others	474	612	878	484	4,009	169	6,626
4690 Operations & Research	18,114	2,575	59,680	3,589	1,498	2,654	88,110
Totals	173,398	134,260	787,177	221,187	142,647	172,947	1,631,616

Stickney Analytical Laboratory

This laboratory is located at the Lue-Hing R&D Complex and performed 759,644 analyses for solids, nutrients, and metals on 50,816 samples in providing analytical services for the following:

Maintenance and Operations Department.

1. Process Control, Operations Monitoring, and NPDES Permit Compliance Monitoring for the Stickney WRP.
2. Biosolids Processing at HASMA and LASMA.
3. Calumet, Stickney, and Egan WRPs Biosolids Centrifuge Cake Application to agricultural lands.
4. TARP Groundwater Monitoring Program.

Environmental Monitoring and Research Division.

1. AWQM Network Program.
2. Lysimeter samples from solids management areas at LASMA, Calumet East and West, Marathon, Vulcan, HASMA, Stony Island and RASMA.
3. Analytical support for biosolids marketing.
4. Illinois Waterways Monitoring Program.
5. Kirie – UDP14 Odor and Corrosion, Phase III.
6. Fulton County Phosphorus Runoff.
7. Fish Kill Response.
8. Notice and Necessary Information (NANI) Biosolid Study.
9. Hanover Park Fischer Farm Biosolids and Supernatant.
10. Hanover Park Ultraviolet Disinfection Systems Dose Response Evaluation.
11. Solids Management Areas Biosolids.
12. Lab and Full Scale Polymer Evaluation for Centrifuge Dewatering.

13. WRP Greenhouse Gas Monitoring.
14. University of Illinois Corn Fertility at Fulton County.
15. Lab Test for Enhanced Primary Settling.
16. Process to Further Reduce Pathogens Biosolids Monitoring.
17. Streetscape Groundwater, Stormwater and Wastewater Monitoring.
18. District-wide Aeration Survey.

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

Other Services. In addition to typical water, wastewater, and biosolids analyses, this laboratory also performs analyses on materials purchased by the District (such as lubricants, sodium hypochlorite, polymer, and FeCl_3) for verification of contract requirements.

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

Industrial Waste Analytical Laboratory

Located at the Lue-Hing R&D Complex, this laboratory performed 181,730 analyses on 23,778 samples. The laboratory performs analyses for fats, oils and greases (collectively, FOG); several species of cyanide (total, amenable to chlorination, and weak acid dissociable); phenols; total organic carbon (TOC); total and suspended solids; biochemical, carbonaceous biochemical, and chemical oxygen demands (BOD_5 , CBOD_5 and COD) and all required support analyses; residual chlorine; pH; and DO in support of the following:

Maintenance and Operations Department.

1. Process Control, Operations Monitoring, and NPDES Permit Compliance Monitoring for the District's seven WRPs.
2. Biosolids processing areas at HASMA, LASMA, RASMA, Stony Island, and Calumet.

3. Class B Biosolids Application to Farmlands.
4. TARP Groundwater Monitoring Program.

Environmental Monitoring and Research Division.

Long-term environmental monitoring and research programs, such as:

1. AWQM Network Program.
2. Illinois Waterways Monitoring Program.
3. Fulton County Retention Basin Monitoring.
4. Thornton Transitional Reservoir and Monitoring Wells.

Short-term environmental monitoring and research projects, such as:

1. Hanover Park Ultraviolet Disinfection Systems Dose Response Evaluation.
2. Analytical assistance during Fish Kill events.
3. Water Environment Research Foundation WRP Greenhouse Gas Monitoring Study.
4. Disinfection Study of Egan Excess Discharge Flow.
5. Permeable Pavement Monitoring Plan.
6. Endocrine Disruptor Study.
7. Enhanced Primary Settling Testing.
8. Data Collection for North Side WRP GPS-X Dynamic Model.

Industrial Waste Division. The Section continued to provide analytical assistance for the administration of the District's SWCO and the User Charge Ordinance (UCO), in addition to compliance testing related to the categorical pretreatment limits. This includes: (1) maintaining evidentiary laboratory chain of custody for all samples obtained from various industrial dischargers; (2) providing records as required for various legal proceedings, hearings and/or Freedom of Information Act requests; (3) providing responses of a technical nature to dischargers' inquiries related to analytical methodologies. Vital technical and programming assistance continued to be provided for the interfacing of the new Sample Manager for Windows LIMS upgrade to the Pretreatment Information Management System.

Organic Compounds Analytical Laboratory

The Organic Compounds Analytical Laboratory (OCAL) is located at the Egan WRP and is responsible for analysis of organic compounds in samples primarily from the District's WRPs, industrial waste discharges, and Chicagoland and Illinois Waterways.

During 2010, the OCAL performed 142,647 analyses on 607 samples in providing analytical services to the following:

Maintenance and Operations Department.

1. Organic Priority Pollutants analyses in raw sewage, sludge, and final effluent samples from the seven District WRPs for monitoring NPDES compliance semi-annually.
2. Pharmaceutical and Personal Care Product (PPCP) compounds analyses in raw sewage, sludge, and final effluent samples from the seven District WRPs for monitoring emerging pollutants.
3. Organic Compounds analyses for 40 CFR Part 503 compliance monitoring in sludge from the seven District WRPs.
4. Preparation for complying with the General Storm Water permit for the seven District WRPs.
5. Organic compounds analyses for TARP and CSO events.
6. Organic compounds analyses for Emergency Spill and Fish Kill samples.

Environmental Monitoring and Research Division.

1. Emission study of volatile organic compounds in District raw sewage samples from the seven District WRPs.
2. Nonylphenols in Chicagoland and Illinois Waterways samples.
3. Organic priority pollutants/BETX/PPCP in Chicagoland and Illinois Waterway samples, in aqueous samples.
4. Organic Compounds including Herbicides in Lockport Powerhouse drinking water samples annually.
5. Culture or toxicity water samples from the Analytical Microbiology and Bio-monitoring Section.

6. PAH analyses for the Permeable Pavement study at Stickney.
7. Low levels of Diazinon in final effluents from the seven District WRPs.

Industrial Waste Division.

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

John E. Egan Analytical Laboratory

This laboratory is located at the Egan WRP and performed 289,840 analyses on 34,633 samples in providing analytical services for the following:

Maintenance and Operations Department.

1. Process Control and NPDES Compliance Monitoring for Egan, Kirie, Hanover Park, and North Side WRPs.
2. USEPA and IEPA Split Sampling Program.
3. Materials (Sodium Bisulfite, Sodium Hypochlorite, and Bioxide) and boiler water testing programs.
4. Soluble Phosphorus Study at the four North Area WRPs.
5. Wastewater Emergency Response Plan samples.
6. Polymer Testing for raw sludge dewatering at the Egan and Hanover Park WRPs.
7. Development, Implementation and Support of LIMS reports for use by M&O Personnel at the four North Area WRPs.
8. Soluble Metals Analyses of the Influent and Effluent of the four North Area WRPs.
9. 40 CFR Part 503 Compliance Monitoring of sludge from the four North Area WRPs.

10. Solids Monitoring of the processing and use of biosolids.
11. Control of Nocardia and Microthrix Parvicella Filaments analytical support at the Egan WRP.
12. Provide instruction on pH and DO analysis to M&O personnel assigned to the four north area treatment plants.

Environmental Monitoring and Research Division.

1. District-wide Aeration Survey.
2. Characterization of Egan Centrate.
3. Hanover Park Fischer Farm Wells and Biosolids.
4. Monitoring Step Feed Performance at the Egan and Kirie WRPs.
5. Full Scale Evaluation of the Gravity Belt Thickener at Hanover Park WRP.
6. Kirie Filter Test.
7. Data Collection for North Side WRP GPS-X Dynamic Model.
8. Profile of Egan South Aeration Tanks.
9. Egan-North Side Centrate Line Investigation.

Industrial Waste Division.

1. Determination of pHs for grab samples collected by IWD personnel.
2. Screen and preserve Cyanide grab samples before holding time is exceeded.

Calumet Analytical Laboratory

This laboratory is located at the Calumet WRP and performed 257,756 analyses on 32,055 samples in 2010 by providing analytical services for the following:

Maintenance and Operations Department.

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

2. Provided assistance to the Stickney Analytical Laboratory to coordinate the sampling for Low Level Mercury of the Calumet and Lemont WRP effluents.
3. Calumet and Lemont WRP Wet Weather Events.
4. Drying Bed samples from Stony Island at the request of LASMA.
5. 40 CFR Part 503 Compliance Monitoring of Sludge from the Calumet and Lemont WRPs.
6. Soluble Metals analysis of the Influent and Outfall of the Calumet and Lemont WRPs.
7. Odor and Corrosion Control at Kirie Interceptors.

Environmental Monitoring and Research Division.

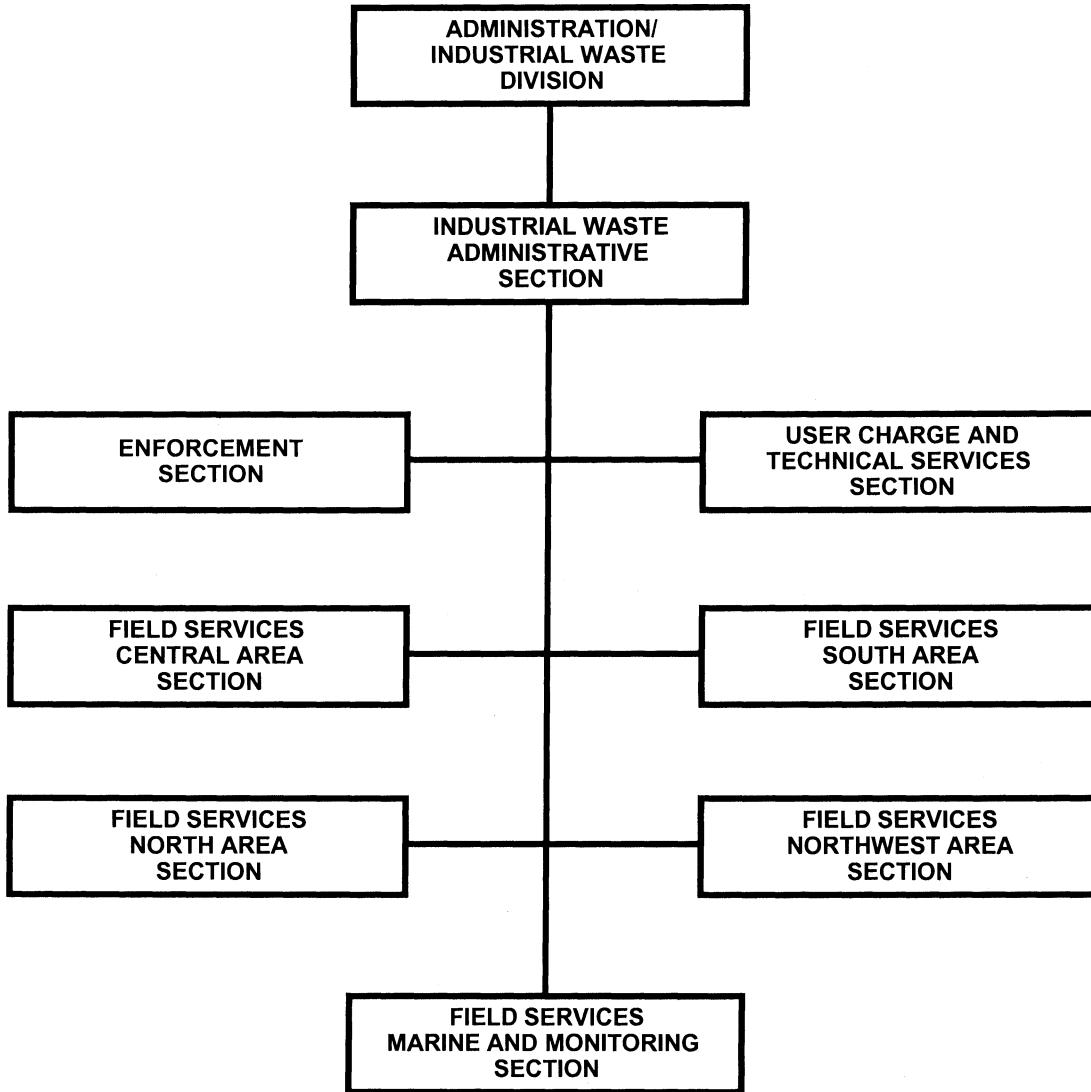
1. Calumet Biosolids Processing Operations and the Fulton County Prairie Plan Project Monitoring.
2. Sulfate analyses of Waterways, TARP, and Lysimeter samples.
3. Sulfate and Trace Metals analyses for the Stickney Greenhouse samples.
4. Materials testing for Sodium Hypochlorite purchased by the District for verification of Contract requirements.
5. NANI Biosolid Study Samples.
6. Sulfate and Trace Metals analyses for Surface and Ground Water samples from the Fulton County Land Reclamation Project.
7. Hexavalent Chromium analyses of certain soil samples previously obtained from some of the District owned agricultural fields located in Fulton County where pre-503 regulation biosolids were applied.
8. Suspended Solids and Nutrients analyses in the District-wide Aeration Survey of the Mixed Liquor from the Calumet and Lemont WRPs.
9. Total and Dissolved Sulfide analyses for the Kirie UDP14 Odor and Corrosion Study.
10. Total and Dissolved Sulfide analyses for the Egan and North Side WRPs Centrate line.

Industrial Waste Division.

1. Screen and preserve Cyanide grab samples before holding time is exceeded.

FIGURE 3

ADMINISTRATION / INDUSTRIAL WASTE DIVISION
ORGANIZATION CHART



INDUSTRIAL WASTE DIVISION

The Industrial Waste Division (IWD) 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 users' 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

The Administrative Section directs the activities of the Division in the administration of the Pretreatment and User Charge programs for compliance with federal and state requirements, including the review of escalated enforcement actions and recommendations for User Charge appeals. The Administrative Section formulates and implements policies and procedures for the Division and reviews proposed Ordinance changes and opportunities for operational efficiencies. The review of personnel actions, including grievances, are handled by this Section.

The Administrative Section also prepares and administers the Division's budget, monitors cost expenditures and approves requisitions. The Administrative Section directs the conduct of technical studies and the preparation of related technical reports for interdepartmental or interagency presentation. The Administrative Section also directs the development and management of the Division's information management systems.

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 2010 included the issuance or renewal of 87 Discharge Authorizations; the review of 717 Continued Compliance Reports; and the review of 14 Spill Prevention, Containment and Countermeasure Plans. Enforcement activities for the period from 2005 through 2010 are depicted in the following table.

Year	Cease and Desist Orders	Board Orders	Legal Actions
2005	152	2	0
2006	149	1	0
2007	132	1	0
2008	126	1	0
2009	88	1	0
2010	84	3	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 2005 through 2010 is depicted in the following table.

Publication Year ¹	Effluent Limitations	Reporting Requirements	Other Requirements ²	Total Number of Industrial Users Published
2005	21	55	0	72
2006	11	54	0	61
2007	12	44	0	51
2008	13	25	2	36
2009	6	23	5	30
2010 ³	10	31	1	33

¹ For prior year's actions.

² Other violations included dilution, failure to provide access for inspection purposes, failure to install adequate sampling facilities, failure to provide adequate spill containment, failure to install and maintain adequate pretreatment facilities.

³ Data is projected. Publication will be completed by 3rd quarter of 2011.

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 2010, the Section manually reviewed 2,215 reports, including delinquent filings, for 1,980 users (779 commercial-industrial and 1,201 tax-exempt users) containing calculations of

their User Charge liabilities under the UCO and documentation corroborating their data. The Section utilized an automated clearing process for 1,630 tax-exempt users approved to file under Section 7f of the UCO, which required no report submittal from the user or manual review by the District. The Section classified 86 new Large Commercial-Industrial and Tax-Exempt Users and 77 Small Nonresidential Commercial-Industrial Users in 2010.

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 2010, the Section reviewed 702 District inspections and sampling reports from the Field Services Section; 88 technical proposals submitted by Users for sampling, flow monitoring and/or equipment installations; sealed 78 privately owned water meters used for reporting volume deductions or discharge volumes; and conducted 130 field inspections to verify user data and/or compliance with the UCO. In order to ensure the quality of flow data obtained by the Field Services Section, User Charge and Technical Services Section engineers perform quality control inspections of all flow meter monitoring installations. During 2010, the User Charge and Technical Services Section conducted 315 evaluations of flow meter installations at commercial and industrial facilities.

As of the end of 2010, the Section had also identified 789 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 2005 through 2010.

Year	User Charge Receipts
2005	\$44,571,653
2006	\$53,616,772
2007	\$50,828,451
2008	\$54,442,493
2009	\$48,253,267
2010	\$48,666,789

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 2010, 2,853 SWCO and 2,373 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 2010, 10,365 water quality samples were collected. Further, all groundwater monitoring wells installed for the District's TARP were routinely sampled. In 2010, 1,181 samples were obtained at 125 TARP groundwater monitoring wells. Chemical toilet service companies who, under District permit, discharge cleanings at the Stickney WRP are also monitored and sampled. During 2010, four chemical toilet service companies made 577 disposals at the Stickney WRP. For these disposal events, 123 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 2010, 200 investigations were conducted in response to requests from federal, state and local agencies, municipalities and private citizens; 82 investigations were conducted in response to self-reported industrial activities; and 40 investigations were conducted in response to requests from the District's M&O Department.

APPENDIX I

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MEETINGS AND SEMINARS 2010

1. DuPage River, Salt Creek Watershed Workgroup Meeting (and follow-up meetings throughout the year), Downers Grove, Illinois, *January 2010*.
2. Illinois Association of Park Districts/Illinois Parks and Recreation Association Conference, Chicago, Illinois, *January 2010*.
3. Illinois Pollution Control Board, Use Attainability Analysis Hearings (and follow-up hearings throughout the year), Chicago, Illinois, *January 2010*.
4. Illinois Water Environment Association and Central States Water Environment Association, Government Affairs in Water Pollution Control Conference, Willowbrook, Illinois, *January 2010*.
5. Industrial Water, Waste, and Sewage Group Meeting (and follow-up meetings throughout the year), Chicago Illinois, *January 2010*.
6. Midwest Water Analysts Association, Winter Expo 2010 (and follow-up committee meetings throughout the year), Kenosha, Wisconsin, *January 2010*.
7. National Environmental Laboratory Accreditation Conference Institute, Forum on Laboratory Accreditation, Chicago, Illinois, *January 2010*.
8. Publicly Owned Treatment Works Nutrient Reduction and Efficiency Conference, Evansville, Indiana, *January 2010*.
9. United States Army Corp of Engineers, Bubbly Creek Feasibility Study (and follow up meetings throughout the year), Chicago, Illinois, *January 2010*.
10. United States Fish and Wildlife Service, Hines Emerald Dragonfly Critical Habitat Planning (and follow-up meetings throughout the year), Chicago, Illinois, *January 2010*.
11. DePaul University, Sustainable Cities Class, Chicago, Illinois, *February 2010*.
12. Illinois Chapter of the American Fisheries Society, Annual Meeting, Whittington, Illinois, *February 2010*.
13. Illinois Institute of Technology, Environmental Law and Compliance Class, Stuart School of Business, Chicago, Illinois, *February 2010*.
14. Emergency Operations Management, Lake County, Illinois, *March 2010*.

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MEETINGS AND SEMINARS 2010

15. Illinois Water Environment Association, 31st Annual Conference & Exhibition (and follow-up committee meetings throughout the year), East Peoria, Illinois, *March 2010*.
16. United States Environmental Protection Agency, Greenhouse Gas Mandatory Reporting Rule Region 5 and 7 Training Session, Chicago, Illinois, *March 2010*.
17. United States Environmental Protection Agency, Region 5, BeWISE (Women in Science and Engineering) 2010 Conference, Chicago, Illinois, *March 2010*.
18. Water Environment Federation/Air & Waste Management Association, Odors and Air Pollutants 2010, Charlotte, North Carolina, *March 2010*.
19. Water Environment Federation, Urban River Restoration Conference, Boston, Massachusetts, *March 2010*.
20. Water Environment Research Foundation, Research Council Spring Meeting, Alexandria, Virginia, *March 2010*.
21. Central States Water Environment Association, Managing Biosolids in Our Energy Conscious Era Education Seminar, Madison, Wisconsin, *April 2010*.
22. Chicago Department of the Environment, Calumet Summit, Hammond, Indiana, *April 2010*.
23. Illinois Institute of Technology, Advanced Wastewater Treatment Technology: Conventional and Micropollutants Workshop, Chicago Illinois, *April 2010*.
24. National Association of Clean Water Agencies, National Environmental Policy Forum, Washington, D.C., *April 2010*.
25. National Association of Clean Water Agencies, National Perspectives, Developments, and Advanced Urban Wet Weather Solutions Workshop, Chicago, Illinois, *April 2010*.
26. Water Environment Research Foundation, Regional Conference, Alexandria, Virginia, *April 2010*.
27. American Society for Mass Spectrometry, 58th ASMS Conference on Mass Spectrometry and Allied Topics, Salt Lake City, Utah, *May 2010*.
28. Chicago Chromatography Discussion Group, 47th Annual Course in Gas Chromatography, Schaumburg, Illinois, *May 2010*.

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MEETINGS AND SEMINARS 2010

29. Commonwealth Edison, Energy Efficiency Expo, Rosemont, Illinois, *May 2010*.
30. Hazardous Waste Operations and Emergency Response Training, Palos Hills, Illinois, *May 2010*.
31. Illinois Association of Wastewater Agencies, Technical Committee Meeting (and follow-up committee meetings throughout the year), Utica, Illinois, *May 2010*.
32. Illinois State Dental Society, Dental Amalgam Waste Management Workshop, Chicago, Illinois, *May 2010*.
33. Mettler Toledo, Weighing and Pipetting Skills and Solutions, Rosemont, Illinois, *May 2010*.
34. Midwest Preparedness and Response Conference, Rockford, Illinois, *May 2010*.
35. Pesticide Training and Certification Clinics, DesPlaines, Illinois, *May 2010*.
36. Response to Biological Events, River Grove, Illinois, *May 2010*.
37. Thermo Scientific, Informatics World 2010, Philadelphia Pennsylvania, *May 2010*.
38. United States Environmental Protection Agency, Technology Transfer Seminar on Nutrient Control at Municipal Wastewater Treatment Plants, Rosemont, Illinois, *May 2010*.
39. University of Illinois at Chicago, e-Government Workshop, Chicago, Illinois, *May 2010*.
40. Varian Incorporated, Gas Chromatography Galaxie Training, Itasca, Illinois, *May 2010*.
41. Water Environment Federation, Residuals and Biosolids Conference, Savannah, Georgia, *May 2010*.
42. Friends of the Chicago River, Chicago River Summit, Chicago, Illinois, *June 2010*.
43. Hach Corporation, Application Seminar on Wastewater, Joliet, Illinois, *June 2010*.
44. Midwest Water Analysts Association, 2010 Spring Meeting, Lisle, Illinois, *June 2010*.
45. United States Department of Agriculture, Regional Research Committee 2-2170, Annual Meeting, Willow Springs, Illinois, *June 2010*.

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MEETINGS AND SEMINARS 2010

46. Metrohm, Ion Chromatography Seminar, Lisle, Illinois, *July 2010*.
47. National Association of Clean Water Agencies, Summer Conference, San Francisco, California, *July 2010*.
48. Water Environment Research Foundation, The Johnson Foundation at Wingspread Conference, Racine, Wisconsin, *July 2010*.
49. Water Environment Research Foundation/National Environmental Laboratory Accreditation Conference Institute, Environmental Measurement Symposium NEMC 2010, Washington, D.C., *August 2010*.
50. American Fisheries Society, Annual Meeting, Pittsburgh Pennsylvania, *September 2010*.
51. American Institute of Chemical Engineers, Midwest Regional Conference, Chicago, Illinois, *September 2010*.
52. Illinois Emergency Management Agency, Emergency Management Conference, Springfield, Illinois, *September 2010*.
53. Illinois Environmental Protection Agency, Nutrient Science Summit, Springfield, Illinois, *September 2010*.
54. iPACS User Group Conference, Princeton, New Jersey, *September 2010*.
55. Mississippi Nutrient/Hypoxia Task Force Meeting and Summit, Robinsonville and Tunica, Mississippi, *September 2010*.
56. National Association of Clean Water Agencies, Nutrient Summit, Chicago, Illinois, *September 2010*.
57. Northwest Biosolids Management Association Conference, Lake Chelan, Washington, *September 2010*.
58. Agronomic Institute, VIIth Inter-American Symposium of Biosolids, Campinas, Sao Paulo State, Brazil, *October 2010*.
59. Great Lakes Beach Association, 2010 Conference, Preque Isle, Pennsylvania, *October 2010*.

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MEETINGS AND SEMINARS 2010

60. Illinois Environmental Protection Agency, Nutrient Standard Roundtable Meeting, Springfield, Illinois, *October 2010*.
61. Illinois Water Conference 2010, Champaign, Illinois, *October 2010*.
62. Maine Benzodiazepine Study Group Conference, Annual Conference, Portland, Maine, *October 2010*.
63. Midwest Water Analysts Association, Fall Meeting, Racine Wisconsin, *October 2010*.
64. Northern Illinois Pipeline Association, Safety Meeting, Elmhurst, Illinois, *October 2010*.
65. TestAmerica, Meet the Experts Forum and Laboratory Open House, University Park, Illinois, *October 2010*.
66. Water Environmental Federation, 83rd Annual Technical Exhibition and Conference, New Orleans, Louisiana, *October 2010*.
67. Water Environment Research Foundation, Pathogen Program Issue Area Team Challenge, Wastewater Microbes and Public Health Meeting, Alexandria, Virginia, *October 2010*.
68. Air and Waste Management Association, 2010 Air Quality Management Conference, Glen Ellyn, Illinois, *November 2010*.
69. American Society of Agronomy, Annual Meeting, Long Beach, California, *November 2010*.
70. Incident Command System ICS 300, River Grove, Illinois, *November 2010*.
71. Industrial Water, Waste, and Sewage Group, Chicago, Illinois, *November 2010*.
72. National Science Foundation, Industry and University Cooperative Research Center for Water Equipment and Policy, Milwaukee, Wisconsin, *November 2010*.
73. Society of Environmental Toxicology and Chemistry, North America 31st Annual Meeting, Portland Oregon, *November 2010*.
74. Illinois Association of Environmental Laboratories, Midwest Environmental Laboratory Stakeholders Summit, Chicago, Illinois, *December 2010*.

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MEETINGS AND SEMINARS 2010

75. Illinois Emergency Management Agency and Central Midwest Interstate Low-Level Radioactive Waste Commission, Low-Level Radioactive Waste Generators/Radioactive Material License Conference, Chicago, Illinois, *December 2010*.
76. Midwest Association of Fish and Wildlife Agency, Midwest Fish and Wildlife 71st Conference, Minneapolis, Minnesota, *December 2010*.
77. Ohio Water Environment Association, Annual Conference, Columbus, Ohio, *December 2010*.

APPENDIX II

APPENDIX II

PRESENTATIONS 2010

1. “Determining Plant Capacity for Future Expansion Assessment Using Plant Performance Data.” Presented at the Midwest Water Association, Winter Expo 2010, Kenosha, Wisconsin, by J. Moran. *January 2010*. PP
2. “Energy and Carbon Footprint of Water Reclamation and Water Management in Greater Chicago and Chicago’s Sustainable Streetscape.” Presented at DePaul University, Sustainable Cities Class, Chicago, Illinois, by J. A. Kozak. *February 2010*. PP
3. “Environmental Management: Perspectives of a Regulated and Regulatory Agency.” Presented at the Illinois Institute of Technology, Environmental Law and Compliance Class, Stuart School of Business, Chicago, Illinois, by L. Kollias, *February 2010*. PP
4. “Can the New Water Quality Criteria be Applied to POTW Permit Compliance Monitoring?” Presented at the Illinois Water Environment Association, 31st Annual Conference and Exhibition, East Peoria, Illinois, by G. Rijal. *March 2010*. PP
5. “Effects of Mechanical Mixing on Full-scale Digester Performance at the Calumet Water Reclamation Plant.” Presented at the Illinois Water Environment Association, 31st Annual Conference and Exhibition, East Peoria, Illinois, by K. Patel. *March 2010*. PP
6. “Farmland Application of Biosolids by the Metropolitan Water Reclamation District of Greater Chicago.” Presented at the Illinois Water Environment Association, 31st Annual Conference and Exhibition, East Peoria, Illinois, by A. Cox, D. Collins, K. Kumar, G. Tian, and T. C. Granato. *March 2010*. PP
7. “Protozoa as Indicators of Activated Sludge Treatment System Conditions.” Presented at the Illinois Water Environment Association, 31st Annual Conference and Exhibition, East Peoria, Illinois, by A. Glymph. *March 2010*. PP
8. “The Effect of Ferric Chloride Addition and Filtration on UV Disinfection.” Presented at the Illinois Water Environment Association, 31st Annual Conference and Exhibition, East Peoria, Illinois, by J. A. Kozak. *March 2010*. PP
9. “Weathering the Biosolids Storm: Forecasting and Preparation.” Presented at the Illinois Water Environment Association, 31st Annual Conference and Exhibition, East Peoria, Illinois, by T. C. Granato, *March 2010*. PP

APPENDIX II

PRESENTATIONS 2010

10. "Assessing the Potential for Endocrine Disruption in Urbanized Aquatic Environments: Study Design, Findings and Impacts for the Calumet Region." Presented at the Chicago Department of the Environment, Calumet Summit, Hammond, Indiana, by T. Minarik. *April 2010*. PP
11. "Greening More than the Chicago River." Presented at the National Association of Clean Water Agencies, National Perspectives, Developments, and Advanced Urban Wet Weather Solutions Workshop, Chicago, Illinois, by J. A. Kozak. *April 2010*. PP
12. "Microconstituents Accumulation on Biosolids: Impact on Residuals Management." Presented at the Illinois Institute of Technology, Advanced Wastewater Treatment Technology: Conventional and Micropollutants Workshop, Chicago, Illinois, by T. C. Granato. *April 2010*. PP
13. "Heat Recovery at a Water Reclamation Plant in Greater Chicago." Presented at the American Institute of Chemical Engineers, Midwest Regional Conference, Chicago, Illinois, by A. Oskouie. *September 2010*. PP
14. "Occurrence and Fate of Emerging Contaminants in Biosolids and Biosolids-Amended Soils – An Overview." Presented at the Northwest Biosolids Management Association Conference, Lake Chelan, Washington, by L. S. Hundal. *September 2010*. PP
15. "The Energy and Carbon Footprint of Water Treatment, Water Reclamation, and Waterway Management in Greater Chicago." Presented at the American Institute of Chemical Engineers, Midwest Regional Conference, Chicago, Illinois, by J. A. Kozak, and P. Mulvaney. *September 2010*. PP
16. "Assessing the Potential for Endocrine Disruption in Urbanized Aquatic Environments: Study Design and Preliminary Findings." Presented at the Illinois Water Conference 2010, Champaign, Illinois by T. Minarik. *October 2010*. PP
17. "Biosolids Land Application by the Metropolitan Water Reclamation District of Greater Chicago: An Overview of the Program, its Benefits, and Environmental Impacts." Presented at the Agronomic Institute, VIIth Inter-American Symposium of Biosolids, Campinas, Sao Paulo State, Brazil, by T. C. Granato. *October 2010*. PP
18. "Continuous Dissolved Oxygen Monitoring of Illinois Streams: An Assessment of Practicality, Sustainability, and Necessity." Presented at the Illinois Water Conference 2010, Champaign, Illinois, by T. C. Granato, T. Minarik, and J. Wasik. *October 2010*. PP

APPENDIX II

PRESENTATIONS 2010

19. "Greenhouse Gas Emissions from Three Chicago Wastewater Treatment Plants." Presented at the Water Environment Federation, 83rd Annual Technical Exhibition and Conference, New Orleans, Louisiana, by F. Bellucci, J.A. Kozak, L. Hearaty, J. Carbone, N. C. Sturchio, C. O'Connor, L. Kollias and R. Lanyon. *October 2010*. PP
20. "Operating the Sidestream Elevated Pool Aeration Stations to Meet the Proposed Water Quality Standards on the Calumet-Sag Channel." Presented at the Illinois Water Conference 2010, Champaign, Illinois, by J. Moran. *October 2010*. PP
21. "Stream Response to Phosphorus Reduction at the Metropolitan Water Reclamation District of Greater Chicago." Presented at the Illinois Water Conference 2010, Champaign, Illinois by J. Wasik. *October 2010*. PP
22. "A Framework to Predict Uptake of Pharmaceutical and Personal Care Products by Plants." Presented at the American Society of Agronomy, Annual Meeting, Long Beach, California, by K. Kumar, L. S. Hundal, A. Cox, and T. C. Granato. *November 2010*. PP.
23. "Assessing the Potential for Endocrine Disruption in Urbanized Aquatic Environments: Study Design, Finding, and Impacts for the Calumet Region." Presented at the Society of Environmental Toxicology and Chemistry, North America 31st Annual Meeting, Portland Oregon, by T. Minarik. *November 2010*. PP
24. "Effect of Long-Term Application of Biosolids on Biological Soil Quality: SOC Pools." Presented at the American Society of Agronomy, Annual Meeting, Long Beach, California, by G. Tian, A. J. Franzluebbbers, T. C. Granato, A. Cox, and C. O'Connor. *November 2010*. PP
25. "Regulatory Update: Pretreatment and User Charge Issues." Presented at the Industrial Water, Waste and Sewage Group, Chicago, Illinois by L. Kollias, *November 2010*. PP
26. "Microconstituents in Biosolids – What Does it Mean for the Future of Land Application of Biosolids?" Presented at the Ohio Water Environment Association, Annual Conference, Columbus, Ohio, by L. S. Hundal. *December 2010*. PP

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

APPENDIX III

APPENDIX III

PAPERS PUBLISHED 2010

1. Apul, D. S, M. Diaz, J. P. Gustafsson, and L. S. Hundal. 2010. "Geochemical Modeling of Trace Element Release from Biosolids." *Environmental Engineering and Science*. 27(9):743 -755. 2010.
2. Bellucci, F., J. A. Kozak, L. Heraty, J. Carbone, N. C. Sturchio, C. O'Connor, L. Kollias, and R. Lanyon. "Greenhouse Gas Emissions from Three Chicago Wastewater Treatment Plants." Proceedings of the Water Environment Federation, 83nd Annual Technical Exhibition and Conference, New Orleans, Louisiana. 2010.
3. Higgins, C. P., Z. J. Paesani, T. E. A. Chalew, R. U. Halden, L. S. Hundal. "Persistence of TCS and TCC in Soils After Land Application of Biosolids and Bioaccumulation in *Eisenia foetida*." *Journal of Environmental Toxicology and Chemistry*, 30:556-563. 2010.
4. Kozak, J., D. T. Lordi, Z. Abedin, C. O'Connor, T. C. Granato, and L. Kollias. "The Effect of Ferric Chloride Addition for Phosphorus Removal on Ultraviolet Radiation Disinfection of Wastewater." *Environmental Practice*, Vol. 12, No. 4: 275-284. 2010.
5. Kozak, J., K. Patel, Z. Abedin, D. Lordi, C. O'Connor, T. C. Granato, and L. Kollias. "Effect of Ferric Chloride Addition and Holding Time on Gravity Belt Thickening of Waste Activated Sludge." *Water Environment Research*, 82: n.p. 2010.
6. Rijal, G. K., J. K. Tolson, C. Petropoulou, T. C. Granato, A. Glymph, C. Gerba, M. F. Deflaun, C. O'Connor, L. Kollias, and R. Lanyon. "Microbial Risk Assessment for Recreational Use of the Chicago Area Waterway System." *Journal of Water and Health*, © IWA Publishing. 2010.
7. Xia, K., L. S. Hundal, K. Kumar, A. E. Cox, T. C. Granato, and K. Armbrust. "TCC, TCS, PBDEs, and 4-NP in Biosolids and in Soil Receiving 33-year Biosolids Application." *Journal of Environmental Toxicology and Chemistry*, 29:597-605. 2010.

APPENDIX IV

**METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO
MONITORING AND RESEARCH DEPARTMENT 2010 SEMINAR SERIES**

- January 29, 2010** ***Incorporating Microbiology in Wastewater Process Control***
Ms. Auralene Glymph, Senior Environmental Microbiologist, Monitoring and Research Department, Metropolitan Water Reclamation District of Greater Chicago (District), Chicago, IL
- February 26, 2010** ***Environmental and Sustainability Factors Associated With Next-Generation Biofuels in the United States: What Do We Really Know?*** Dr. Pamela Williams, E Risk Sciences, Boulder, CO
- March 19, 2010** ***Uptake of Emerging Contaminants in Plants***
Dr. Kuldip Kumar, Associate Environmental Soil Scientist, Monitoring and Research Department, District, Cicero, IL
- April 30, 2010** ***The Emerald Forest – An Integrated Approach for Sustainable Community Development and Bio-Derived Energy Generation*** Dr. Fouad Teymour, Illinois Institute of Technology, Chicago, IL
- May 21, 2010** ***Status of Implementing the Tunnel and Reservoir Plan at the District***
Mr. Kevin Fitzpatrick, Principal Civil Engineer, Engineering Department, District, Chicago, IL
- June 18, 2010** ***Management of the Chicago Area Waterway System from the Locks to Lockport***
Mr. Edward Staudacher, Supervising Civil Engineer, and Mr. James Yurik, Principal Civil Engineer, Maintenance and Operations Department, District, Chicago, IL
- July 30, 2010** ***Greenhouse Gas Accounting for District Biosolids Management Program***
Dr. Sally Brown, University of Washington, Seattle, WA, and Dr. Guanglong Tian, Senior Environmental Soil Scientist, Monitoring and Research Department, District, Cicero, IL
- August 27, 2010** ***Pharmaceuticals in the Environment: Is the Problem Here or Just Around the Corner?***
Dr. Cecil Lue-Hing, Cecil Lue-Hing & Associates, Burr Ridge, IL
- September 24, 2010** ***Plant Availability and Environmental Significance of Phosphorus in Land-Applied District Biosolids***
Dr. Guanglong Tian, Senior Environmental Soil Scientist, and Dr. Kuldip Kumar, Associate Environmental Soil Scientist, Monitoring and Research Department, District, Cicero, IL
- October 29, 2010** ***Chicago Health, Environmental Exposure, and Recreational Study***
Dr. Samuel Dorevitch, University of Illinois at Chicago, Chicago, IL
- November 19, 2010** ***Feasibility of Traditional and Emerging Technologies for Treatment and Resource Recovery of Recycle Streams***
Mr. Kamlesh Patel, Senior Environmental Research Scientist, Monitoring and Research Department, District, Cicero, IL
- December 17, 2010** ***Bubbly Creek Sediment Oxygen Demand Study and Implications for Water Quality Improvement***
Dr. Marcelo Garcia, University of Illinois at Urbana-Champaign, Urbana, IL

RESERVATIONS REQUIRED (at least 24 hours in advance); PICTURE ID REQUIRED FOR PLANT ENTRY

**CONTACT: Dr. Catherine O'Connor, Assistant Director of Monitoring and Research, EM&R Division, (708) 588-4264 or (708) 588-4059
LOCATION: Stickney Water Reclamation Plant, Lue-Hing R&D Complex, 6001 West Pershing Road, Cicero, IL 60804; TIME: 10:00 A.M.**

NOTE: These seminars are eligible for Professional Development Credits/CEUs