Metropolitan Water Reclamation District of Greater Chicago

RESEARCH AND DEVELOPMENT DEPARTMENT

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Metropolitan Water Reclamation District of Greater Chicago
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Research and Development Department
Richard Lanyon, Director

March 2006

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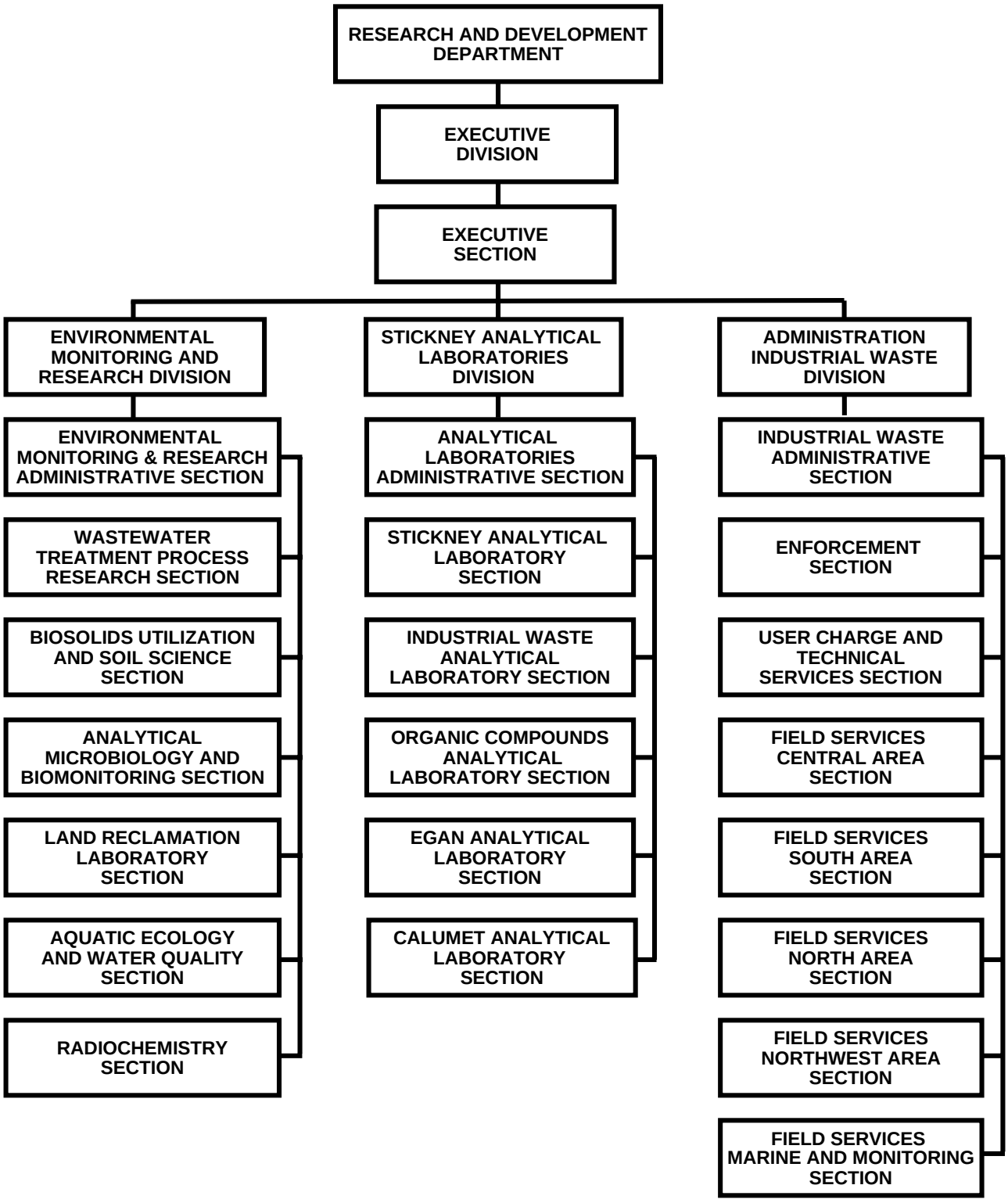
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

RESEARCH AND DEVELOPMENT DEPARTMENT
ORGANIZATION CHART FOR 2005



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 321 budgeted positions during 2005 with an adjusted total salary and wage appropriation of $20,937,500. 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 2005, the Department reviewed personnel actions relative to twelve retirements. In addition, as part of adopting the 2005 Budget and the District's attrition program, five existing positions were eliminated when vacated during 2004. This decrease in positions led to a salary expenditure-to-appropriation ratio of 99 percent.

Greater Chicago Pollution Prevention Program

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

Technical assistance is provided directly to companies requesting such assistance by a member of the Center's staff. During 2005, the Center provided onsite technical assistance to two companies.

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 2005, with the assistance of the Information Technology Department (IT), the Administration Division continues its review of all departmental computer systems, local and wide area networks, software utilization, compliance with District security and access procedures, training requirements, etc.

Since April 2001, the District has used an IT-designed program for budget preparation. This Budget Preparation Tool (BPT) was used to prepare the 2005 line item and position budgets. The Enterprise System, which was implemented in 2000, proved inadequate for preparing the District's budget and BPT was developed to assist in this area. The Administration Division prepared the 2005 budget using this system. Some enhancements were made to this budgeting tool for preparation of the 2006 budget.

Budget Administration

A comparison of appropriations to expenditures for 2005 shows the following:

	Appropriation	Expenditure
Personnel (Line Item 101) (Adjusted)	$20,937,500	$20,687,047
Other Line Items	5,292,500	3,604,624
Total	$26,230,000	$24,291,671

Purchasing Administration

During 2005, more than 170 requisitions were reviewed and processed by the Administration Division, prior to being forwarded to the Purchasing Department. This review verified the availability and proper use of department funds for all requisitioned items. The Division will ensure that all departmental purchase orders are properly closed out at year's end and will process purchase order decreases or increases as appropriate.

Contract Administration

During 2005, the Division was involved in the preparation and administration of 17 contracts for a total cost of approximately $1,037,020, including multiyear contracts. This involved the preparation of detail specifications, Board letters, advertisements, coordination of the receipt and review of bids, recommendations to award, processing of purchase requisitions, change orders, pay ment of invoices, and release of bid deposits.

The Division administered 27 consulting services agreements with individual values of $9,000 or more and having a total value of approximately $2,333,278 during 2005. The Division also administered 22 maintenance agreements with individual values of $10,000 or more and a total value of $1,094,631. This involved preparation and processing of purchase requisitions, change orders, Board letters, and preparation and execution of consultant agreements, preparation of requests for proposals, and coordination of the receipt and review of proposals.

Laboratory Accreditation

In 2005, the seven Research and Development (R&D) Department laboratories previously accredited or certified with the State of Illinois maintained their status. The participation of our laboratories in these programs helps to ensure that the laboratories are operated in a manner that meets or exceeds the standards established by the applicable accreditation or certification program. Some benefits of maintaining the high standards required by these programs are better documentation of procedures, increased quality control and quality assessment, improved analyst training, and increased accuracy of test results.

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

Analytical Laboratory is accredited for organic analysis of wastewater and solid waste.

In 2002, the State of Illinois created an advisory committee to review and evaluate the IEPA management of the NELAP accreditation program. Under the enabling Public Act, the District maintains a permanent member on the nine-person committee. The fee schedule for accredited laboratories established in 2002 remained unchanged in 2005. Fees for the five accredited District laboratories range from $3,400 to $4,400.

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

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

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

Use Attainability Analysis Study

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

Departmental Reports

During 2005, the Department published 33 formal reports dealing with various aspects of the District's operations. A list of these reports is given in Tables 1 and 2.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 1

RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2005

Report No.	Report Title	Author(s)	Date	Organization or Conference
2005-1	Calculation of 2005 User Charge Rates		Jan-05	Internal District Report
2005-2	Sedimentation Management in Combined Sewer Overflow Storage Reservoirs Using Water Jets	Sequeiros, O.E., Y. Nino, M.H. Garcia	Feb-05	Prepared by Ven Te Chow, Hydrosystems Laboratory
2005-3	Annual Biosolids Management Report for 2004	Cox, A.E., P. Lindo, M. Patel, T.C. Granato, B. Sawyer	Feb-05	Internal District Report
2005-4	Continuous Dissolved Oxygen Monitoring in the Chicago Waterway System during 2003	Dennison, S.G., M. Sopcak, J. Wasik, T.A. Minarik	Mar-05	Internal District Report
2005-5	R&D 2004 Annual Report		Mar-05	Internal District Report
2005-6	Use of Biosolids for Establishing Vegetation at the USX Steel Mill Slag Brownfield in Chicago: a Research and Demonstration Project	Hundal, L.S., A.E. Cox, P. Lindo, G. Tian, T.C. Granato, B. Sawyer	Jun-05	Internal District Report
2005-7	Radiological Monitoring of the Raw Sewage, Final Effluent, Sludges, and Biosolids of the MWRDGC 2004 Annual Report	Abdussalam, T., A. Khalique	Jul-05	Internal District Report
2005-8	Water and Sediment Quality Along the Illinois Waterway from the Lockport Lock to the Peoria Lock During 2004	Wasik, J.L., T.A. Minarik	Jul-05	Internal District Report
2005-9	Simulation of Fecal Coliform Concentrations in the Chicago Waterway System Under Unsteady Flow Conditions	Manache, G., C.S. Melching, Ph.d, P.E.	Jun-05	Prepared by Institute for Urban Environmental Risk Management, Marquette University, Milwaukee, WI
2005-10	Combined Sewer Overflow Impact Report	Pulaski, C., M. Joseph, W.J. Stuba, L. Kollias	Aug-05	Internal District Report
2005-11	Continuous Dissolved Oxygen Monitoring in the Chicago Waterway System during 2004	Dennison, S.G., M. Sopcak, J.L. Wasik, T.A. Minarik	Aug-05	Internal District Report

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 1

RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2005

Report No.	Report Title	Author(s)	Date	Organization or Conference
2005-12	Verification of a Continuous Water Quality Model under Uncertain Storm Loads in the Chicago Waterway System – Technical Report #17	Neugebauer, A., M.S., C.S. Melching, Ph.d, P.E	Aug-05	Prepared by Institute for Urban Environmental Risk Management, Marquette University, Milwaukee, WI
2005-13	2004 Annual Summary Report Water Quality within the Waterways System of the Metropolitan Water Reclamation District of Greater Chicago	Abedin, A.	Aug-05	Internal District Report
2005-15	Interim Report Fecal Coliform Densities in Chicago Area Waterways During Dry and Wet Weather 2004	Dennison, S.G., J.T. Zmuda	Oct-05	Internal District Report
2005-16	Odor Monitoring Program at MWRDGC Facilities during 2004	Lordi, D.T.	Oct-05	Internal District Report
2005-17	EM&R Annual Report for 2004		Dec-05	Internal District Report

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 2

RESEARCH AND DEVELOPMENT UNNUMBERED REPORTS PUBLISHED DURING 2005

Report Title	Author(s)	Date	Organization or Conference which Presented
Fulton County IEPA December 2004	R&D Department Granato, T.C., P. Lindo	Feb-05	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Hanover Park Water Reclamation Plant Fischer Farm Report for 4th Quarter of 2004	R&D Department Granato, T.C., P. Lindo	Feb-05	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Fulton County IEPA January 2005	R&D Department Granato, T.C., P. Lindo	Mar-05	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Biomonitoring Report 2005 Stickney WRP NPDES Permit IL0028053 Spec Cond 11	Zmuda, J.T.	Apr-05	Internal District Report
Biomonitoring Report 2005 Calumet WRP NPDES Permit IL0028061 Spec Cond 11	Zmuda, J.T.	May-05	Internal District Report
Biomonitoring Report 2005 Hanover Park WRP NPDES Permit IL0036137 Spec Cond 11	Zmuda, J.T.	May-05	Internal District Report
Biomonitoring Report 2005 Calumet WRP NPDES Permit IL0028061 Spec Cond 11	Zmuda, J.T.	Jul-05	Internal District Report
Biomonitoring Report 2005 Egan WRP NPDES Permit IL0036340 Spec Cond 11	Zmuda, J.T.	Aug-05	Internal District Report
Biomonitoring Report 2005 North Side WRP NPDES Permit IL0028088 Spec Cond 11	Zmuda, J.T.	Sep-05	Internal District Report
Calumet TARP System Groundwater Monitoring Annual Report for 2004	R&D Department	Sep-05	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Des Plaines TARP System Groundwater Monitoring Annual Report for 2004	R&D Department	Sep-05	Illinois Environmental Protection Agency, United States Environmental Protection Agency

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 2

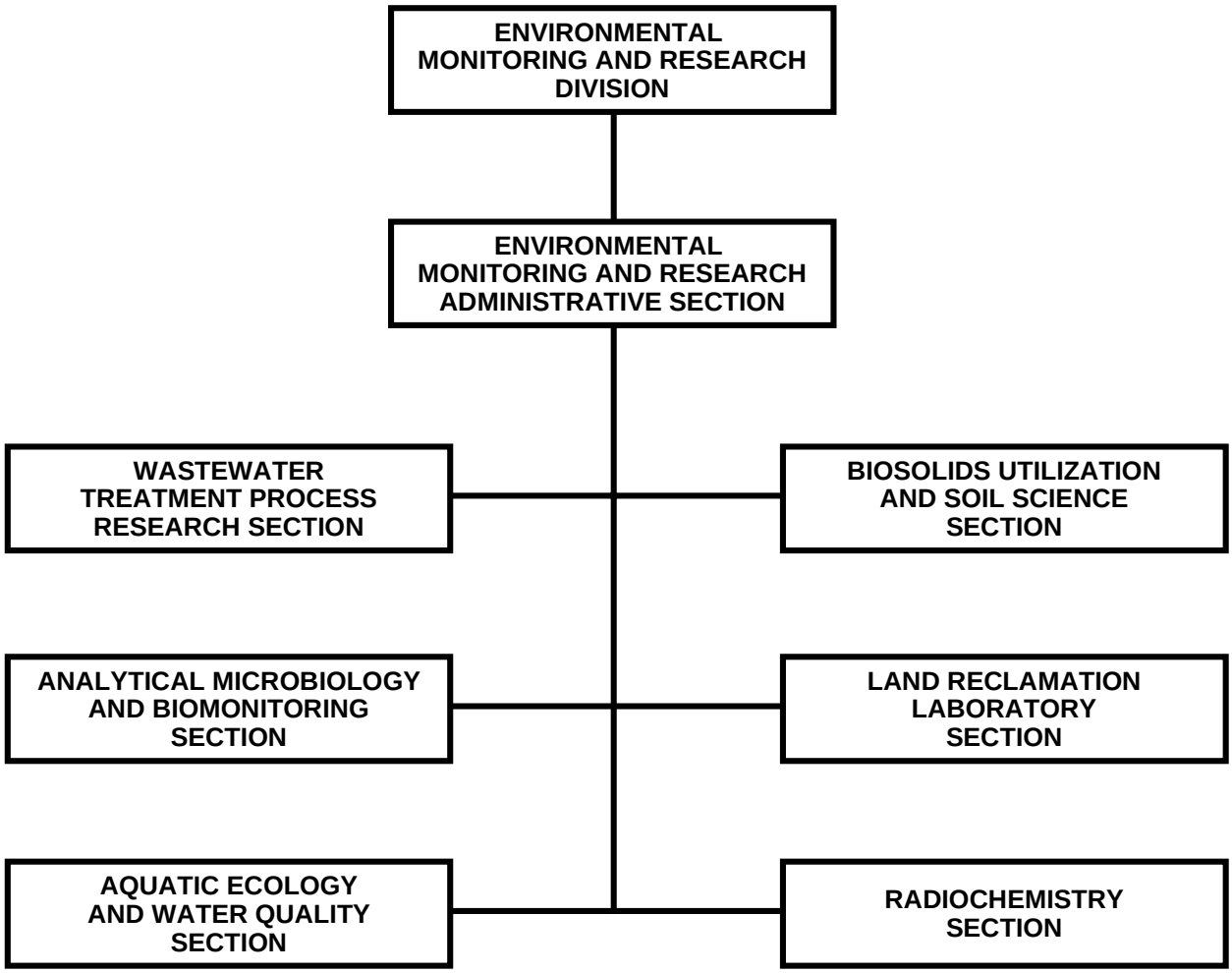
RESEARCH AND DEVELOPMENT UNNUMBERED REPORTS PUBLISHED DURING 2005

Report Title	Author(s)	Date	Organization or Conference which Presented
Mainstream TARP System Groundwater Monitoring Annual Report for 2004	R&D Department	Sep-05	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Upper Des Plaines TARP System Groundwater Monitoring Annual Report 2004	R&D Department	Sep-05	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Thornton Transitional Flood Control Reservoir Water Quality Monitoring Wells Annual Report for 2004	R&D Department	Sep-05	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Biomonitoring Report 2005 North Side WRP NPDES Permit IL0028088 Spec Cond 11	Zmuda, J.T.	Oct-05	Internal District Report
Biomonitoring Report 2005 Stickney WRP NPDES Permit IL0028088 Spec Cond 11	Zmuda, J.T.	Oct-05	Internal District Report
Biomonitoring Report 2005 Egan WRP NPDES Permit IL0036340 Spec Cond 11	Zmuda, J.T.	Nov-05	Internal District Report

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

FIGURE 1

ENVIRONMENTAL MONITORING AND RESEARCH DIVISION ORGANIZATION CHART



ENVIRONMENTAL MONITORING AND RESEARCH DIVISION

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

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

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

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

Administrative

The Administrative Section provides technical guidance, scientific review, and administrative support for the work being carried out by the EM&R Division staff. The Section also organizes a monthly seminar series, open to all District employees, that presents information on areas of interest to the wastewater field. In 2005, 1,521 people attended these seminars. A list of the seminar topics is shown in Appendix IV.

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

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

designs, and to respond to many requests in a shorter period of time.

Statistical and Computing Support. During 2005, a Biostatistician and an Associate Statistician provided statistical and computing support to various projects. The following is a description of some of the activities.

1. Statistical support was provided to the Wastewater Treatment Process Research Section on reduction of TARP groundwater monitoring wells. The analysis was completed in November 2005.

2. Statistical support was provided to the Analytical Microbiology & Biomonitoring Section on a project entitled: "Effect of Secondary Sewage Treatment on the Total Numbers and Percentages of Antibiotic Resistant Fecal Coliforms in Municipal Raw Sewage." The statistical analyses for the project were completed in November 2005.

3. Statistical support was provided to the Analytical Microbiology & Biomonitoring Section on a project entitled: "Protecting Lake Michigan Water Quality: Addressing Beach Issues."

4. Statistical support was provided to the Biosolids Utilization and Soil Science Section to study the effect of long-term application of biosolids to land at the District's Fulton County project site on surface water chemistry. Data collected from reservoirs and creeks from 1972 through 2002 were analyzed.

5. Statistical support was provided to the Biosolids Utilization and Soil Science Section to support requests to IEPA for termination of monitoring requirements at Fulton County.

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

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

Water Quality Data. Each year, the Experimental Design and Statistical Evaluation Group prepares an annual report summarizing results of the District's Ambient Water Quality Monitoring program for the Chicago Waterway System. Surface water quality data for 2005 were evaluated regarding compliance with water quality standards set by the Illinois Pollution Control Board (IPCB). In 2005, 68 water quality parameters including biochemical oxygen demand; carbonaceous biochemical oxygen demand; dissolved oxygen; temperature; pH; alkalinity (total); chloride; turbidity; total Kjeldahl nitrogen; ammonium nitrogen; unionized ammonia; organic nitrogen; nitrite plus nitrate nitrogen; total solids; total suspended solids; volatile suspended solids; total dissolved solids; sulfate; fats, oils, and greases; total phosphorus; total cyanide; weak acid dissociable cyanide; fluoride; total organic carbon; fecal coliform; *Escherichia coli*; total calcium; total magnesium; hardness; gross alpha radioactivity; gross beta radioactivity; chlorophyll a; benzene; ethylbenzene; toluene; xylene; total silver; total arsenic; total barium; total boron; total cadmium; total copper; total chromium; total hexavalent chromium; total iron; total lead; total nickel; total manganese; total mercury; total zinc; total selenium; soluble calcium; soluble magnesium; soluble silver; soluble arsenic; soluble barium; soluble boron; soluble cadmium; soluble copper; soluble

chromium; soluble iron; soluble lead; soluble nickel; soluble manganese; soluble mercury; soluble zinc; and soluble selenium were analyzed and reported.

General Use Water. In 2005, 31 water quality parameters had IPCB General Use Standards. Benzene and total mercury had IPCB Human Health standards. Twenty-one water quality parameters were in total compliance with the standards in all river systems. They were ammonium nitrogen, phenols, weak acid dissociable cyanide, gross beta radioactivity, benzene, ethylbenzene, toluene, xylene, total silver, total barium, total boron, total selenium, total arsenic, soluble cadmium, soluble copper, soluble chromium, soluble iron, soluble lead, soluble nickel, soluble mercury, and soluble zinc. Benzene had total compliance with the Human Health standard in all river systems. Eight of the remaining 10 parameters, viz., dissolved oxygen, temperature, pH, chloride, sulfate, fluoride, total hexavalent chromium, and total manganese had compliance rate greater than 86.5 percent in all river systems. Total dissolved solids had a compliance rate greater than 76.5 percent in all river systems. Fecal coliform had the lowest compliance rate, and it was in the range of 38.6 to 45.8 percent in the Chicago, Calumet, and the Des Plaines River Systems. The compliance rates of total mercury with respect to the IPCB Human Health Standard were 70.6, 73.6, and 85.0 percent, respectively, in the Chicago, Calumet, and Des Plaines River Systems.

Secondary Contact Water. Twenty-three water quality parameters measured in the secondary contact waters during 2005 had applicable IPCB standards. Sixteen parameters were in complete compliance with the IPCB standards for the Chicago and the Calumet River Systems in 2005. They were temperature; phenols; fats, oils, and greases; total cyanide; fluoride; total silver; total arsenic; total barium; soluble cadmium; total copper; total hexavalent chromium; total nickel; total manganese; total zinc; total selenium; and total iron. The percent compliance of the remaining 7 parameters (dissolved oxygen, pH, un-ionized ammonia, total dissolved solids, total iron, total lead, and total mercury), which were not in total compliance in both the river systems varied from 94.2 percent to total compliance.

Wastewater Treatment Process Research Section

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

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

The major areas of study in 2005 included the following.

Polymer Testing. The WTPR Section assists the M&O Department in selecting and optimizing seasonal polymer use at the solids thickening and dewatering processes at the Stickney, Calumet, and Hanover Park WRPs.

Polymer tests were conducted at the Calumet WRP Centrifuge Complex in April 2005 and at the Stickney Post-Digestion Centrifuge Complex in February and August 2005 to select polymers for use in centrifugal dewatering of anaerobically digested sludge as part of the competitive-bid process. The test procedures include both bench-scale laboratory screening tests and full-scale centrifuge tests as described in R&D Report No. 01-13. The testing procedure was performed twice at Stickney, once in summer and once in winter, as seasonal changes in sludge characteristics make it necessary to change the polymer used at this WRP. A polymer that does not produce a minimum of 95 percent solids capture is disqualified from bidding.

In addition to the testing that supports polymer purchase, full-scale polymer tests were conducted in May and November 2005 at the Stickney Post-Digestion Centrifuge Complex to assist M&O with seasonal dose adjustments.

Full-scale polymer tests were conducted at the Hanover Park WRP in June 2005 to select the polymer to be used in gravity belt thickening of waste-activated sludge. Any polymer that does not produce a minimum of 6.0 percent solids cake is disqualified from bidding.

Bench-scale polymer testing was carried out at the Lue-Hing R&D Complex in September 2005 for the selection and purchase of the polymer to be used in the gravity concentration tanks to thicken the primary and waste activated sludge at the Calumet WRP.

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

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

Grit Testing. During 2005, due to a concern regarding excess grit causing maintenance problems at the WRPs, a study was initiated to quantify and characterize the grit in the preliminary sludge. Studies were carried out at the North Side, Calumet, and Stickney WRPs using a mobile vortex degritting unit, Eutek Systems, to separate the grit from the preliminary sludge. The unit was operated over a period of three days at each location in cooperation with the M&O Department, Eutek Systems, and their subcontractor, Grit Solutions, Inc. The WTPR Section coordinated testing, collected samples, and prepared reports on the test data. Sieve analyses of split samples of the collected material were performed by the Biosolids

Utilization and Soil Science Section, the EM&R Division, and Grit Solutions, Inc.

The volume of collected grit varied between less than 0.001 percent to 0.06 percent of the volume of primary sludge processed at the Stickney WRP and at the North Side WRP, respectively. The particle size distribution of this material varied from 21 percent of the mass smaller than 150 µm at the Stickney WRP to 50 percent of the mass smaller than 150 µm at the North Side WRP. For the North Side WRP combined primary and waste-activated sludge received at the Stickney WRP, about 8 percent of the collected grit particle mass fraction was smaller than 150 µm. A conclusion of the study is that during dry weather conditions there does not appear to be excess grit in the primary sludge.

Phosphate Detergents. In view of pending requirements for the removal of phosphorus from WRP effluents, the District has supported a bill introduced in the Illinois General Assembly by the Illinois Association of Wastewater Agencies (IAWA). This legislation is to limit phosphorus in automatic dish washer detergents (ADWDs) and other cleaning products used in business and homes. It has been estimated that phosphorus loading due to ADWDs to the District's WRPs accounts for 4.2 to 15.1 percent of the total phosphorus (TP) load.

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

A similar protocol for monitoring odors is used at each location. Either R&D or M&O Department personnel (at some WRPs) visit various stations at each site on a regular basis. Frequency can range from once per week (Egan WRP), or daily (Kirie WRP), depending on the program. The odor monitoring personnel make subjective observations regarding the character and intensity of odors at each of the stations. The odor intensities are ranked on a scale from 0, no odor, to 5, very strong odor. These data are tabulated monthly and summarized in an annual report, R&D Report No. 05-16, Odor Monitoring Program at Metropolitan Water Reclamation District Facilities During 2004.

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

Additional Digestion Tests for Calumet WRP. This program was initiated to determine whether the requirements for vector attraction reduction could be met in the biosolids process at the Calumet WRP applying Option 2 of Section 503.33(b) of the 40 CFR Part 503 Regulations. Option 2 states that vector attraction reduction is demonstrated if after anaerobic digestion the volatile solids in the biosolids are reduced by less than 17 percent in an additional 40-day bench-scale anaerobic digestion at a temperature between 30° and 37°C. The additional anaerobic digestion tests under Option 2 can be used as a supplemental monitoring program, in addition to the routine monitoring of anaerobic digestion performance, if volatile solids reduction of 38 percent (required for achieving vector attraction reduction under Option 1 of Section 503.33(b) of the 503 Regulations) cannot be consistently achieved. In 2005, 14 additional anaerobic digestion tests were periodically performed for the digester draw from the Calumet WRP in the R&D WTPR Laboratory at the Lue-Hing R&D Complex. Of the 14 tests conducted in 2005, the additional volatile solids reduction in 11 of the tests was less than 17 percent. The three tests in which the additional volatile solids reduction was slightly greater than 17 percent were conducted in March, July and October 2005. However, the plant monitoring data showed that volatile solids reduction of 38 percent was achieved in those months.

WERF Study on Nutrient Removal Full-Scale Testing at the Egan WRP. As a part of the District's commitment to Water Environment Research Foundation (WERF) Project No. 02-CTS-1, Technologies to Achieve Low Nitrogen and Phosphorus Effluents, full-scale tests were conducted at the Egan WRP. Tests on nitrogen removal employing the step-feed biological nutrient removal process and phosphorus removal employing chemical precipitation with ferric chloride were conducted in winter (January through April) and summer (July through October) 2005. The test results showed that creating anoxic zones in the aeration tank and operating the tank in a step-feed mode increased total nitrogen (TN) removal from about 33 percent to up to 69 percent. TN removal efficiency increased as the number of step-feed locations and respective anoxic zones increased. TP removal to less than 0.5 mg/L in the final effluent was achieved by adding 35 to 44 mg/L of ferric chloride to the mixed liquor at the effluent end of the aeration tank. Process temperature in the range of 53 - 74 °F (11.7 - 23.2°C) had no apparent effect on the denitrification and phosphorus removal processes tested. Some operational problems were encountered during the tests, such as rising sludge volume index (SVI) in the test aeration battery and dewatering problems in gravity belt thickeners (GBTs), apparently due to ferric precipitates in the waste activated sludge. These problems may be plant-specific and need to be further investigated.

Unsteady Flow Water Quality Modeling for the Chicago Waterway System. An unsteady flow water quality model was developed by Marquette University for the Chicago Waterway System (CWS). The water quality model for the CWS was built on the platform of the Duflow modeling studio. The model was calibrated and verified using part of the 2001 and 2002 hydraulic and water quality monitoring data, respectively, and was delivered to the District in August 2005. Since then, the model has been used to study a number of scenarios, including the impact of CSO treatment, operating the two existing in-stream aeration stations, adding new supplemental aeration stations and augmenting flow, on the water quality, particularly the dissolved oxygen (DO) concentrations, in the CWS.

Settleability Tests for District WRPs. To collect data on settling characteristics of mixed liquor at the District WRPs, settling tests with the mixed liquor samples from aeration tanks of the District WRPs were performed in the R&D WTPR Laboratory. The settling column was equipped with a bar mixer and a recirculation pump to simulate the dynamic conditions in a secondary clarifier. Interfacial settling velocities, which are a more useful parameter for process control and modeling, were measured. In 2005, 30 tests were conducted on mixed liquor samples from Stickney, Calumet, North Side, Egan and Lemont WRPs. For the settling test, mixed liquor samples were collected under dry weather conditions. For each aeration battery or tank tested, duplicate tests were normally performed on separate days. The settling tests will continue in 2006 to study the aeration batteries at the Kirie and Hanover Park WRPs.

Continuous Hydrogen Sulfide Odor Monitoring Stations. Two continuous odor monitoring stations are located at the Calumet WRP. The stations monitor and record hydrogen sulfide concentrations south of the plant on 130th Street and north of the plant inside the fence line.

The continuous hydrogen sulfide analyzers were fully operational in 2005. The hydrogen sulfide concentration data from each analyzer was recorded and compared considering ambient weather data collected at the Calumet WRP. Weekly reports are compiled and submitted to the Calumet M&O Department. A paper entitled "Ambient Air Monitoring of Low Level Hydrogen Sulfide" was presented at WEFTEC 2005.

GPS-X Model Development for Kirie Biological Nutrient Removal. The removal of phosphorus at the Kirie WRP will be evaluated using Hydromantis, Inc., GPS-X software. The Kirie WRP process was modeled, assuming that phosphorus is removed by enhanced biological phosphorus uptake. The model incorporated the Tunnel and Reservoir Plan (TARP) storage tunnel and secondary treatment unit processes. The physical and historical data were used in combination with software defaults. The initial model was based on the 2001 through 2004 data.

TARP Groundwater Monitoring. Groundwater monitoring reports for the year 2004 were prepared for the five TARP systems which included Mainstream, Calumet, Des Plaines, Upper Des Plaines, and the O'Hare Chicago Underflow Plan (CUP) Reservoir. These reports were submitted to the Illinois Environmental Protection Agency (IEPA) as well as the United States Environmental Protection Agency (USEPA).

Thornton Transitional Reservoir Fill Events for 2005. One of the reporting requirements for the Thornton Transitional Reservoir as specified by the IEPA is written, narrative reports of fill events that have occurred during the year.

There were a total of two fill events at the Thornton Transitional Reservoir during 2005. The events took place on January 12, 2005, and February 14-15, 2005.

The first fill event took place on January 12, 2005. This fill event resulted in an estimated depth of 10 to 12 feet of CSO stored in the reservoir. The second fill event took place on February 14-15, 2005, with water still in the reservoir from the January 12, 2005, fill event. It was estimated the reservoir depth was 4 to 6 feet.

In both fill events, samples were collected from the reservoir and the four water quality monitoring wells surrounding the reservoir. The results of the analyses from the water

quality monitoring wells were then compared with the statistical background determinations from these wells.

Biosolids Utilization and Soil Science Section

The Biosolids Utilization and Soil Science Section is responsible for determining, through monitoring and research activities, the environmental impact of the District's biosolids management program. The program consists of centrifuge dewatering, lagoon-aging, drying, and application of biosolids on agricultural fields, disturbed and urban lands, and landfill sites. The Section is also responsible for providing technical support for biosolids marketing and oversight of technical aspects of biosolids land application contracts.

The environmental monitoring component of the program includes the sampling and analysis of waters, soils, plant tissue, and biosolids at land application sites, landfills, and solids drying facilities receiving biosolids. The results of this monitoring program are reported to the IEPA and the USEPA. In 2005, the Section submitted 56 permit-required reports to the IEPA, three reports to the USEPA, and 12 reports to the M&O Department for reporting to the IEPA.

The research component of the program consists of studies to support the local marketing of biosolids such as: research plots in farmers' fields to demonstrate the safety of farmland application of biosolids; cooperative research with soil scientists from the University of Florida, Pennsylvania State University, and the IEPA to study availability of biosolids phosphorus to plants and its environmental impacts; and cooperative research with the University of Illinois to evaluate the beneficial effects of biosolids use on golf course turf. The research component also consists of studies to demonstrate that land application of biosolids according to the USEPA Part 503 biosolids rule provides protection to human health and the environment, such as: studying the toxicity of trace elements to plants, and studying changes in the bioavailability of trace elements to plants over time in biosolids-amended soils.

The Section also conducts applied research at the District's land reclamation site in Fulton County to support the land application activities at the site and the impact of biosolids phosphorus on the environment. The studies include the experimental corn plots which have received cumulative applications of 990 tons of biosolids per acre (maximum-amended plots) from 1973 through 2005. These plots are utilized to study the uptake of trace elements into corn, and the fate of nutrients from continuous annual applications of biosolids. The biosolids phosphorus studies are aimed at determining the bioavailability of biosolids phosphorus, and estimating and mitigating phosphorus runoff in biosolids amended soils. The Section also utilizes historic monitoring data to assess long-term impacts of land application of biosolids on environmental quality at the site. In 2005, the Section completed an analysis of long-term impacts of land application on surface water quality. The results of this research were accepted for publication in the *Journal of Environmental Quality*.

The Section also provides technical support for biosolids marketing by maintaining continuous demonstrations of turfgrasses, prairie grasses, forage grasses, and wild flowers in a greenhouse at the Lue-Hing R&D Complex.

Analytical Microbiology and Biomonitoring Section

In 2005, the Analytical Microbiology and Biomonitoring Section was composed of 4 professional and 12 technical personnel. The Section was involved in following studies designed to assess the future needs of the District: master planning for the Stickney, Calumet, and North Side WRPs; risk assessment of human health impacts of disinfection versus no disinfection; review of the USEPA water quality criteria for bacteria; monitoring bacterial densities on farm soil after application of biosolids; monitoring antibiotic resistant bacteria and endocrine disrupters in final effluents; and the Salt Creek nutrient reduction demonstration project. The Section was comprised of the following sub-groups, which performed specific monitoring or research activities: Virology, Parasitology, Analytical Microbiology, and Biomonitoring. The activities of the Microbiology Section in 2005 are summarized below.

Virology Sub-Group. Air-dried biosolids (final product) were analyzed for enteric viruses for compliance with the Part 503 *Standards for the Use or Disposal of Sewage Sludge* (Standards). No enteric viruses were isolated from any of the final product samples. Research focusing on male-specific RNA (FRNA) coliphages as an alternate indicator for enteric viruses in wastewater biosolids continued.

Parasitology Sub-Group. Air-dried biosolids (final product) were analyzed for viable *Ascaris* ova for compliance with the Part 503 Standards. All biosolids produced from the District's codified process were determined to be Class A biosolids with respect to pathogens (less than 1 viable *Ascaris* ovum per four grams) as defined by the Part 503 Standards. Research to investigate the use of microscopic image analysis (MIA) to routinely analyze biosolids for viable *Ascaris* ova was continued in 2005.

Analytical Microbiology Sub-Group. Fecal coliform (FC) and other microbiological analyses were conducted in support of the following monitoring studies: Illinois Waterway; Chicago Area Waterways; Lake Michigan beaches; offshore waters of Lake Michigan; biosolids monitoring for Part 503 compliance; solids drying areas monitoring wells; and TARP groundwater monitoring wells. Potable water at District facilities was monitored for total coliforms, *E. coli*, and total heterotrophic bacteria. Experimental work for the first phase of a research study begun in 2004 to study antibiotic resistant bacteria in raw sewage and final effluents was completed.

Biomonitoring Sub-Group. Acute whole effluent toxicity (WET) tests with fish (*Pimephales promelas)* and daphnids (*Ceriodaphnia dubia)* were conducted on effluent samples from the Stickney, Calumet, North Side, John E. Egan, and Lemont WRPs. Chronic toxicity tests with these same organisms were conducted on effluent samples from the Hanover Park WRP. Biomonitoring reports for these WRPs were submitted to the IEPA in compliance with the respective NPDES permits. A final report for the cooperative study by the USEPA, IEPA, and the District to assess chronic WET at the North Side, Stickney, and Calumet WRPs was submitted to the USEPA and to the IEPA. In 2005, the capability to conduct the algal growth test (AGT) was developed. Five valid AGTs were conducted to measure biologically available phosphorus in John E. Egan WRP effluent samples and Salt Creek samples from the following locations: Busse Reservoir Dam; Kennedy Blvd; and Thorndale Ave. The results of the AGTs are important in the District's effort to maintain

the biotic integrity of Salt Creek and the IEPA's effort to develop nutrient standards for the State of Illinois.

Aquatic Ecology and Water Quality Section

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

Field monitoring activities conducted during 2005 by the Aquatic Ecology and Water Quality Section included the following:

Benthic Invertebrate Monitoring. During the period of June through October 2005, benthic invertebrates were assessed at 27 monitoring stations in the Calumet, Chicago, and the Des Plaines River Systems. Thirteen stations were located on the deep-draft waterways and 14 stations were on shallow streams. Benthic invertebrates were collected using a 6- x 6-inch Ponar Grab sampler and a 3- x 3-inch Hester-Dendy artificial substrate. In the laboratory, the sediment samples were washed, screened, and the oligochaetes (sludge worms) were sorted out and counted. Other benthic invertebrates were sent to an outside contractor for identification. The benthic invertebrate data will be provided to the IEPA for their use in preparing the Illinois 305(b) assessment report.

Fish Monitoring. Fish were collected during June through October 2005, at 27 stations in the Calumet, Chicago, and Des Plaines River Systems. Thirteen stations were located on the deep-draft waterways and 14 stations were on shallow 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 shallow 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. Forty-two fish were collected from seven Ambient Water Quality Monitoring (AWQM) stations to comprise 13 fish tissue composites, which will be sent to IEPA for contaminant analyses.

Monitoring for Asian carp was also performed during April and October 2005, at three sample stations in the Brandon Road Pool of the Des Plaines River and one station in the Lockport Pool of the Chicago Sanitary and Ship Canal. Trammel and mini-fyke nets were used for fish collection, but no Asian Carp were found within this study reach.

Habitat and Sediment Quality Monitoring. During June through October 2005, a physical habitat assessment was conducted at 27 monitoring stations in the Chicago, Calumet, and Des Plaines River Systems. In order to assess sediment chemistry and sediment toxicity, sediment samples were collected at 15 monitoring stations in the northern area of the Chicago River System. The results of the habitat assessments, chemical analyses of sediments, and sediment toxicity testing will be provided to the IEPA for their use in preparing the Illinois 305(b) assessment report.

Chlorophyll Monitoring. During 2005, chlorophyll in phytoplankton was monitored monthly at 59 stations in the Calumet, Chicago, and Des Plaines River Systems. Surface water samples were collected using a stainless steel bucket. In the laboratory, samples were analyzed for chlorophyll *a*, *b*, and *c*, and pheophyton *a*. The concentration of chlorophyll *a* will be used to estimate the phytoplankton biomass and productivity, and to determine the trophic status of surface waters.

Continuous Dissolved Oxygen (DO) Monitoring. Continuous DO monitoring continued during 2005 at 23 stations in the deep draft of the Calumet, Chicago, and Des Plaines River Systems. Nine shallow draft DO monitoring stations were added during summer and fall of 2005 in Salt Creek, Des Plaines River, and the North Branch of the Chicago River. 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 will be prepared for DO data monitored in the Calumet, Chicago, and Des Plaines River Systems.

Illinois Waterway Monitoring. During May, August, and October 2005, water samples were collected from 49 stations in six navigational pools along 133 miles of the Illinois Waterway System from the Lockport Lock to the Peoria Lock. The primary objective of the monitoring is to determine water quality and sediment trends along the waterway system from Chicago to Peoria. In order to characterize the chemical quality of the sediments, sediment samples were collected during October at 14 selected monitoring stations.

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

Council for Food and Agricultural Research Nutrient Study. A cooperative study regarding nutrients in waterways throughout Illinois was undertaken with the University of Illinois and the Illinois Council on Food and Agricultural Research (CFAR). The results of this study will be considered by IEPA when promulgating nutrient standards. Five monitoring stations were chosen in 2004 on the Des Plaines River, Salt Creek, and the North Branch of the Chicago River for this 3-year project. During 2005, water samples were collected two times per month through November, once in December (winter sampling only once per month), and on four consecutive days during two rain events. Water samples were analyzed for nutrients and other relevant constituents. The Aquatic Ecology and Water Quality Section collected and sent one sediment sample from each station to collaborators at the University of Illinois, and one benthic invertebrate ponar sample from each station for analysis by the District contractor.

Salt Creek Nutrient Demonstration Project. In 2005, the District conferred with IEPA and agreed to conduct a large-scale phosphorus removal demonstration project at the Egan Water Reclamation Plant, which included extensive sampling at three new stations on Salt Creek. While the phosphorus removal will not be on-line until 2006, pre-implementation chemical and biological monitoring began in February 2005. Water samples were collected one time per month during February, March, and December, twice per month between April–November, and on four consecutive days during two rain events. Water samples were analyzed for nutrients and other relative constituents. During the summer of 2005, the Aquatic Ecology and Water Quality Section conducted full-scale biological sampling at each of the three locations, including benthic invertebrate and fish collection, sediment chemistry analyses, and habitat assessments.

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

Radiochemistry Section

The Radiochemistry Section is responsible for the radiological monitoring of waters, wastewaters, and biosolids, and the maintenance of radiation safety at the District. It also performs any special tasks involving the use of ionizing radiation and radioisotopes. The Section performed 4,443 tests in 2005.

Radiological Monitoring of Waterways. The radiological monitoring of the CWS is a part of the Ambient Water Quality Monitoring program of the District. The waterways under the jurisdiction of the District include the Calumet, Chicago, and Des Plaines River Systems. The gross alpha and gross beta radioactivity was measured monthly at 45 sampling locations. The radioactivity concentrations in water samples analyzed from all three river systems were within the Illinois Pollution Control Board's General Use Water Quality Standards.

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

The Section also performs radiological monitoring of biosolids from the seven

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

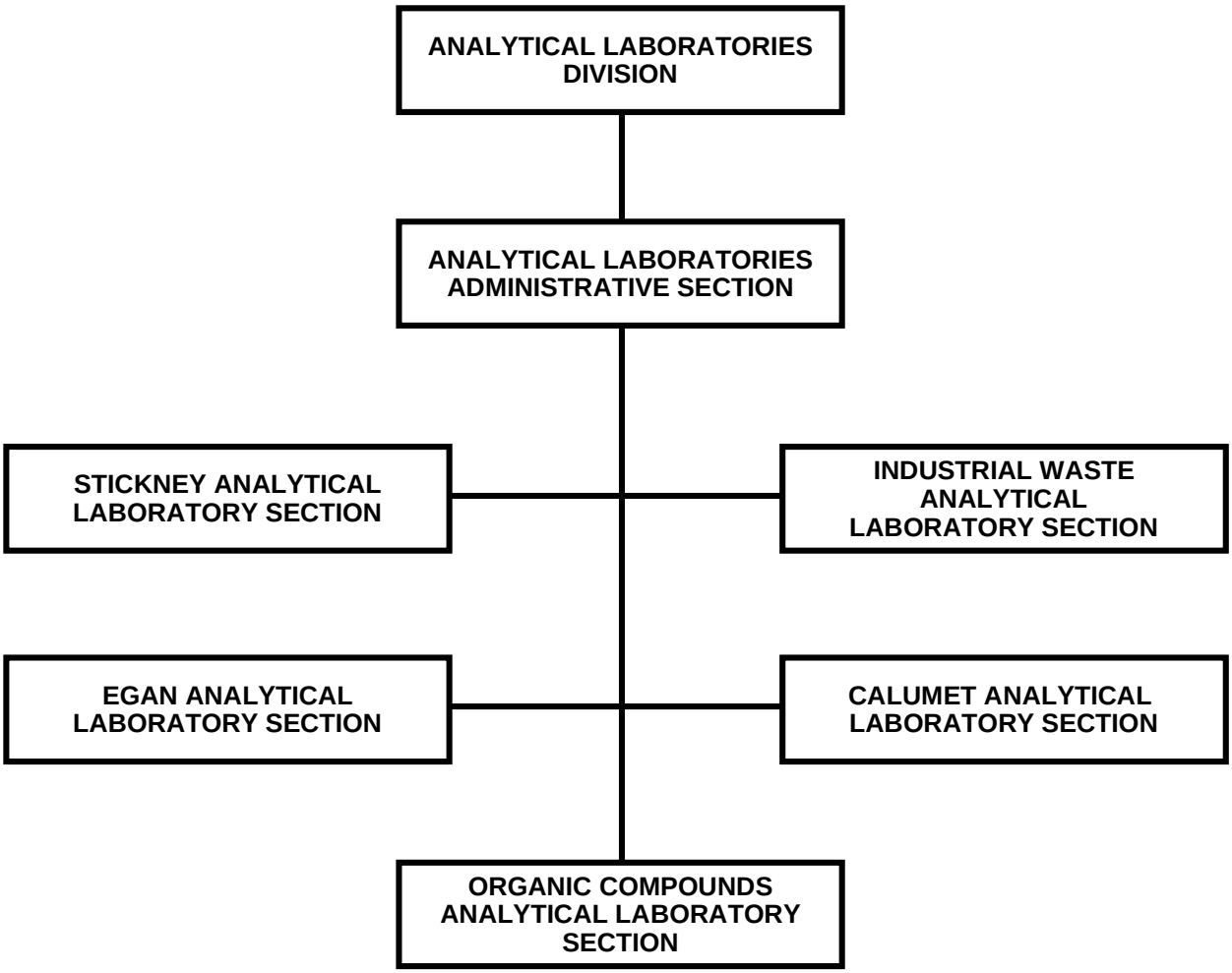
Radiation Safety Program Activities. The Section maintains a radioactive material license issued to the District by the Illinois Emergency Management Agency, Division of Nuclear Safety (DNS), assuring that activities are conducted according to the license conditions and regulations. These activities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

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

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

FIGURE 2

ANALYTICAL LABORATORIES DIVISION
ORGANIZATION CHART



ANALYTICAL LABORATORIES DIVISION

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

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

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

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

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

The large number of analyses performed by the ALD, as shown in Table 3 on page 24, could not be accomplished without automation and instrumentation. Staff from the R&D and IT Departments worked together to further improve the Laboratory Information Management System (LIMS) to increase data processing and reporting, and to enhance data acquisition from automated instruments. Through its LIMS team, the ALD provided ongoing support during 2005 to the EM&R Division, the IWD, and M&O Department personnel.

In mid-2003, the ALD implemented a chemical hygiene plan for its analytical laboratories, which was revised in 2005.

The five analytical laboratories maintained laboratory accreditation by the IEPA during 2005 in accordance with NELAP.

Stickney Analytical Laboratory (SAL)

This laboratory is located at the Lue-Hing R&D Complex and performed 555,340 analyses for solids, nutrients, and metals on 54,510 samples in providing analytical services for the following:

M&O Department.

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

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

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

4. USEPA and IEPA split sampling program.

5. TARP Groundwater Monitoring Program.

EM&R Division.

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

TABLE 3: TOTAL NUMBER OF ANALYSIS PERFORMED IN 2005

Program	Nutrients	Oxygen Demands	Metals	Solids	Organic Compounds	Others	Total Program
4652 Liquid Monitoring	117,606	78,377	173,043	62,484	26,052	61,100	518,663
TARP	3,684	1,165	4,911	779	0	3,072	13,612
Treatment Facilities	113,922	77,212	168,131	61,706	26,052	58,028	505,052
4653 Solids Monitoring	19,125	1,104	60,459	109,474	15,294	35,657	241,113
4666 Sewage & Waste Control	1,431	361	213,648	577	41,505	16,037	273,559
4663 User Charge	0	60,906	0	17,374	0	33,893	112,173
4672 Waterways	17,371	2,986	68,451	3,802	69,182	18,979	180,772
4681 Assistance to M&O	163	76	2,041	962	9,813	7,302	20,356
4682 Assistance to Others	1,272	1,402	345	415	0	763	4,199
4690 Operations & Research	9,692	886	73,452	1,586	15,527	369	101,510
Totals	166,661	146,098	591,439	196,674	177,373	174,100	1,452,345

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

3. Solids management areas at LASMA, Marathon, Vulcan, Egan, HASMA, and RASMA.

4. Analytical support for biosolids marketing.

5. Illinois Waterways Monitoring Program.

6. Full-Scale evaluation of centrifuge dewatering.

7. Hickory Hills Country Club: biosolids utilization.

8. Biosolids Salinity Study.

9. Solids Management Areas: pathogen & metals content of Class A biosolids.

10. Grit Determination of Preliminary Sludge.

11. CFAR Nutrient Study.

12. Trace Element Toxicity Study.

13. Salt Creek Nutrient Demonstration Project.

14. Technical support of $FeC1_3$ dose tests to the North Side WRP.

15. North Side WRP Master Plan special sampling program.

16. Stickney M&O Blower Cooling Water & Contamination.

17. Lemont First Flush Determination Study.

18. Full-Scale evaluation for gravity belt thickener (GBT) at Hanover Park.

19. Biosolids phosphorus runoff studies for Fulton County.

20. Lab-Scale Disinfection Study.

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

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

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

Industrial Waste Analytical Laboratory (IWAL)

This laboratory is located at the Lue-Hing R&D Complex and performed 201,621 analyses on 23,860 samples. The laboratory performs analyses for fats, oils and greases (collectively, FOG); several methods for cyanide and phenols; total organic carbon (TOC); biochemical oxygen demand; chemical oxygen demand; total and suspended solids; pH; and dissolved oxygen in support of the following:

M&O Department. Process control, operations monitoring, TARP groundwater

monitoring, and NPDES permit compliance monitoring for the District's seven WRPs.

EM&R Division. Various environmental monitoring and research programs, such as: (1) AWQMNP, (2) Illinois Waterways Monitoring Program, and (3) Egan and North Side WRPs Master Plan Studies, (4) WERF Study on Nutrient Removal Testing at the Egan WRP, (5) CFAR Nutrient Study, and (6) Fulton County Retention Basin Monitoring.

IWD. Analytical assistance for administration of the Sewage and Waste Control Ordinance and the User Charge Ordinance. This includes in addition to sample analysis: (1) maintaining evidentiary laboratory chain of custody for all samples obtained from various industrial dischargers; and (2) providing records as required for various legal proceedings, hearings and/or Freedom of Information Act requests. Vital technical assistance continued to be provided for the interfacing of the new Sample Manager for Windows (SMW) LIMS upgrade to the Pretreatment Information Management System (PIMS) as well as ongoing support for the User Charge Information Management System (UCIMS).

In 2005, the laboratory upgraded several major pieces of equipment and purchased other equipment to facilitate the analytical work of the laboratory:

1. Expanded use of the robotic BOD analyzer to determine the final DO content of the sample BODs of a non-industrial origin. Started evaluating the feasibility of using this system for determining the final DO content of BODs for industrial samples.

2. Purchased midi-distillation system to be used for the manual total and amenable cyanide distillations. This system will reduce costs due to decreased reagent consumption and reduced waste generation.

3. Replaced eleven-year-old TOC analyzer with a new system including state of the art data collection and system controlling software. This new system fully complies with all laboratory accreditation guidelines and is capable of integrating with LIMS.

4. Replaced twenty-year old automated phenol analyzer system with a new state of the art system. The old system used chloroform extraction to improve sensitivity. Several health issues are related to chloroform and its removal from the laboratory benefits both employee health and the environment, and eliminates associated waste disposal costs.

Organic Compounds Analytical Laboratory (OCAL)

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

During 2005, the OCAL performed 177,373 analyses on 809 samples in providing analytical support services to the following:

M&O Department.

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

2. Analyzed for organic compounds to assist the M&O Department.

EM&R Division.

1. Conducted analysis for emission of volatile organic compounds in District raw sewage samples from the seven District WRPs semiannually.

2. Conducted analysis for alkylphenol compounds in raw sewage and sludge samples from the seven District WRPs semiannually and North Side WRP interceptors.

3. Analyzed culture or millipore water samples.

4. Analyzed for organic compounds in Lockport Powerhouse drinking water.

5. Analyzed for volatile organics in the Kirie WRP Tunnel and Reservoir Drop Shaft samples.

6. Analyzed for organic compounds in 503 biosolids samples.

7. Analyzed water and sediment samples from Turning Basins for Collateral Channel Project.

8. Analyzed Kankakee County lysimeters and cake samples.

IWD.

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

2. Analyzed alkylphenols and alkylphenol ethoxylates to monitor the usage of endocrine disruptors by the laundry services.

John E. Egan Analytical Laboratory (EAL)

This laboratory is located at the John E. Egan WRP and performed 250,037 analyses on 31,027 samples in providing analytical services for the following:

M&O Department.

1. Process control, operations monitoring, and NPDES permit compliance monitoring for Egan, Kirie, Hanover Park and North Side WRPs.

2. Process stream evaluations of suspected incidents of toxic interference's or pass-through events.

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

4. Polymer testing for raw sludge dewatering at the Egan and Hanover Park WRPs.

5. Materials and boiler water testing programs.

6. USEPA and IEPA split sampling program.

7. Soluble metal analyses of the influent and outfall of the four North Area Treatment Plants.

8. 503 compliance monitoring of sludge from the four North Area treatment plants.

9. Development, implementation and support of LIMS reports for use by M&O personnel at the four North Area WRPs.

10. Ongoing assistance to develop, implement, audit and put into place corrective actions concerning North Area M&O sampling manual and sampling practices.

EM&R Division.

1. WERF study of nutrient removal at Egan WRP.

2. Hanover Park Fischer Farms wells and biosolids.

3. Full-Scale evaluation of the GBT at Hanover Park and Egan WRPs.

4. North Side Master Plan sampling program.

IWD.

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

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

Calumet Analytical Laboratory

This laboratory is located at the Calumet WRP and performed 270,907 analyses on 31,347 samples in 2005 by providing analytical services for the following:

M&O Department.

1. Process control, operations monitoring, and NPDES permit compliance monitoring for the Calumet and Lemont WRPs.

2. Analytical support for the Calumet Master Plan.

3. USEPA and IEPA split sampling program.

4. Monitoring of hydrogen sulfide concentrations at the Kirie WRP.

5. Ongoing assistance to develop, implement, audit and put into place corrective actions concerning Calumet M&O sampling manual and sampling practices.

6. Provide assistance to the Stickney laboratory to develop low level methods for TKN and total phosphorous.

7. Calumet laboratory began analyzing for cobalt and vanadium in the Calumet and Lemont 503 sludges.

8. Provided analytical support during Wastewater Emergency Response Plan Event, March – April 2005.

EM&R Division.

1. Calumet biosolids processing operations and the Fulton County Prairie Plan project sulfate analyses of waterways, TARP, and lysimeter samples.

2. Sulfate and trace metals analyses for the greenhouse samples.

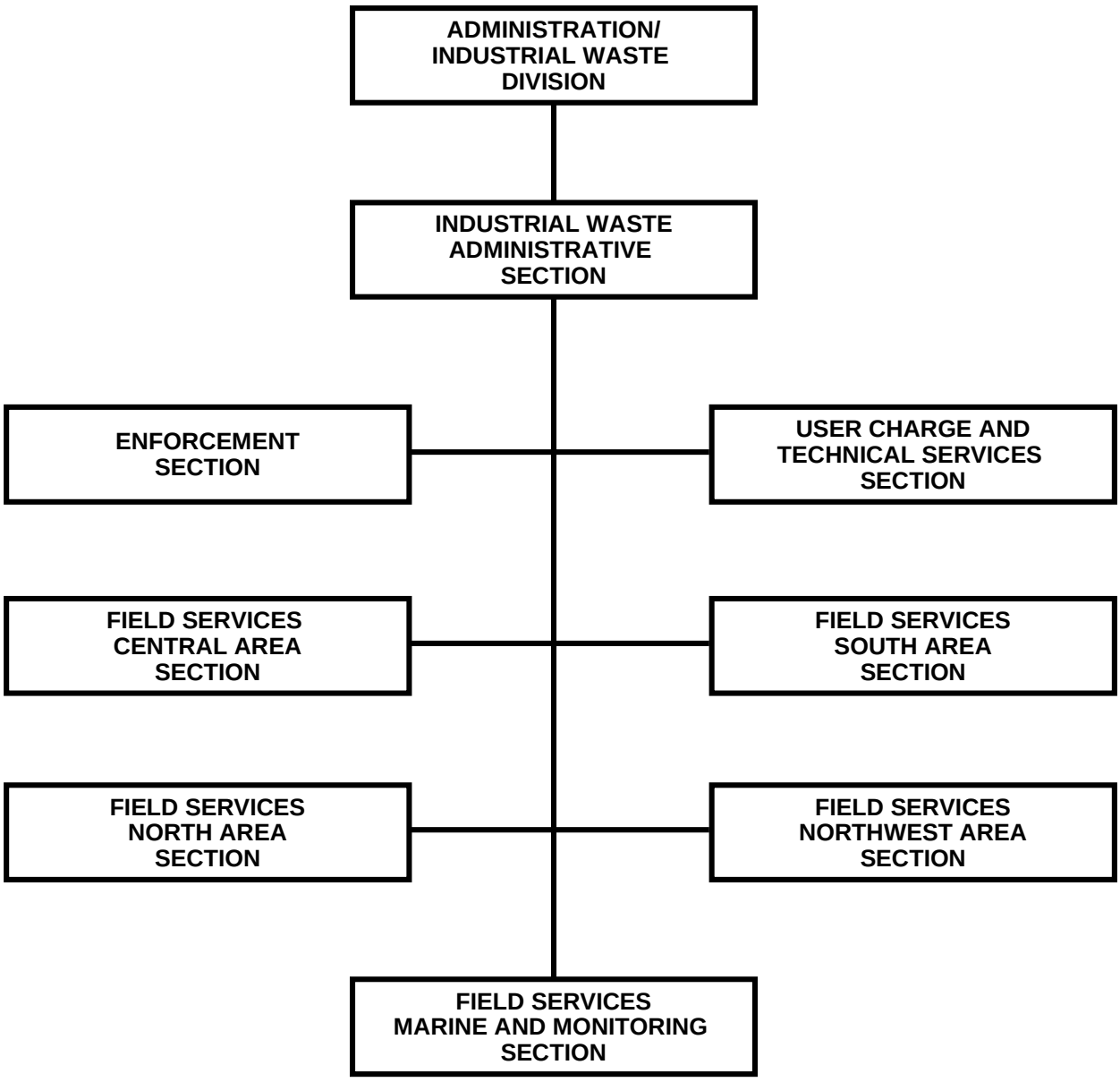
3. Provided analytical and LIMS assistance for the RARE study conducted in the South area drainage basin.

4. Assisted EM&R in the evaluation of different polymer vendor formulations for the Centrifuge Dewatering Study.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

FIGURE 3

ADMINISTRATION / INDUSTRIAL WASTE DIVISION ORGANIZATION CHART



INDUSTRIAL WASTE DIVISION

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

Administrative Section

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

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

Enforcement Section

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

Administrative activities performed by the Enforcement Section during 2005 included the issuance or renewal of 184 Discharge Authorizations; the review of 871 Continued Compliance Reports; and the review of 56 Spill Prevention, Containment and Countermeasure Plans. Enforcement activities for the period from 2000 through 2005 are depicted in the following table.

Year	Cease and Desist Orders/Amendments	Board Orders	Legal Actions/ Amendments
2000	462	2	0
2001	456	1	6
2002	429	0	11
2003	406	1	18
2004	284	11	4
2005	152	2	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 the newspaper with the largest daily circulation within the jurisdiction of the District. The trend for the period from 2000 through 2005 is depicted in the following table.

Year	Effluent Limitations	Reporting Requirements	Other Requirements[1]	Total Number of Industrial Users Published
2000	22	59	1	79
2001	11	61	0	68
2002	15	49	0	62
2003	18	64	2	76
2004	21	55	0	72
2005	11	54	0	61

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

User Charge and Technical Services Section

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

In 2005, the Section received and reviewed reports filed by 3,500 users (900 commercial-industrial and 2,600 tax-exempt users) containing calculations of their User Charge liabilities under the UCO and documentation corroborating their data. The Section classified 68 new large commercial-industrial and tax-exempt users and 66 small nonresidential-commercial users in 2005.

The Section requests verification sampling of certain facilities by the Field Surveillance and Studies Section, and determines the acceptability of the user's proposed sampling methodology. In 2005, the Section reviewed 747 District inspection and sampling reports from the Field Surveillance Section; 93 user proposals for sampling, monitoring and/or installations; sealed 35 privately owned water meters used for reporting volume deductions or discharge volumes; and conducted 975 field inspections to verify user data and/or compliance with the UCO. As of the end of 2005, the Section had also identified 194 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 2001 through 2005.

Year	User Charge Receipts
2001	$50,037,292
2002	$47,061,518
2003	$50,474,317
2004	$48,007,510
2005	$44,571,653

Field Surveillance and Studies Section

The Field Surveillance and Studies 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 2005, 2,381 SWCO and 1,579 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 2005, 15,644 water quality samples were collected. Further, all groundwater monitoring wells installed for the District's TARP were routinely sampled. In 2005, 1,113 samples were obtained at 123 TARP groundwater monitoring wells. Chemical toilet service companies who, under District permit, discharge cleanings at the Stickney WRP are also monitored and sampled. During 2005, three chemical toilet service companies made 384 disposals at the Stickney WRP. For these disposal events 105 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 tot he Cook County Department of Environmental Control for toxic gas release incidents.

In 2005, 239 investigations were conducted in response to requests from federal, state and local agencies, municipalities and private citizens; 67 investigations were conducted in response to self-reported industrial activities; and 35 investigations were conducted in response to requests from the District's M&O Department.

APPENDIX I

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MEETINGS AND SEMINARS 2005

1. Calumet Government Working Group, 2005 First Quarter Meeting, Chicago, Illinois, January 2005.

2. DuPage River, Salt Creek Watershed Workgroup Meeting, Elmhurst, Illinois, January 2005.

3. Evanston Board of Environment Meeting, Evanston, Illinois, January 2005.

4. Illinois Association of Wastewater Agencies, Technical Committee Meeting, Utica, Illinois, January 2005.

5. Illinois Water Environment Association, Government Affairs in Water Pollution Control Seminar, Lisle, Illinois, January 2005.

6. Industrial Water, Waste, and Sewage Group Dinner Meeting, Chicago, Illinois, January 2005.

7. Midwest Water Analysts Association, Winter Expo 2005, Kenosha, Wisconsin, January 2005.

8. United States Department of Agriculture, CSRS Regional Research Committee W-170 Annual Meeting, Las Vegas, Nevada, January 2005.

9. United States Environmental Protection Agency, Nutrient Mapping Workshop, Chicago, Illinois, January 2005.

10. Water Environment Research Foundation, Meeting on Nutrient Projects, Washington, D.C., January 2005.

11. DuPage River, Salt Creek Watershed Workgroup Monitoring Dissolved Oxygen Subcommittee Meeting, Downers Grove, Illinois, February 2005.

12. Illinois Chapter Soil and Water Conservation Society Meeting, Countryside, Illinois, February 2005.

13. Illinois Environmental Protection Agency, Nutrient Standards Workgroup and Science Committee Meeting, Springfield, Illinois, February 2005.

14. Illinois Pollution Control Board, Hearing on Dissolved Oxygen Standards, Springfield, Illinois, February 2005.

APPENDIX I

MEETINGS AND SEMINARS 2005

15. Illinois Water Environment Association, Industrial Pretreatment and Hazardous Waste Winter Meeting, Lombard, Illinois, February 2005.

16. United States Environmental Protection Agency, Region V, 2005 Midwest Surface Water Monitoring and Standards Meeting, Chicago, Illinois, February 2005.

17. United States Geological Survey, Major Accomplishments and Future Directions in Public Health Microbiology Workshop, Columbus, Ohio, February 2005.

18. University of Illinois Chicago, Nitrogen Isotope Study, Chicago, Illinois, February 2005.

19. Water Environment Research Foundation, Specialty Conference Disinfection 2005, Mesa, Arizona, February 2005.

20. Water Environment Research Foundation, Workshop on Microbial Source Tracking, San Antonio, Texas, February 2005.

21. DuPage River, Salt Creek Watershed Workgroup Meeting, Elmhurst, Illinois, March 2005.

22. Great Lakes Pollution Prevention Roundtable, Chicago, Illinois, March 2005.

23. Illinois Association of Wastewater Agencies, Mini-Conference, Springfield, Illinois, March 2005.

24. Illinois Chapter of American Fisheries Society Meeting, Moline, Illinois, March 2005.

25. Illinois Water Environment Association, 26th Annual Conference, Rockford, Illinois, March 2005.

26. Industrial Water, Waste, and Sewage Group Dinner Meeting, Chicago, Illinois, March 2005.

27. Pittsburgh Conference, Orlando, Florida, March 2005.

28. United States Environmental Protection Agency, Nutrient Regional Technical Assistance Group Meeting, Chicago, Illinois, March 2005.

29. Water Environment Research Foundation, Meeting on Nutrient Projects, Washington, D.C., March 2005.

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MEETINGS AND SEMINARS 2005

30. Calumet Government Working Group, 2005 Second Quarter Meeting, Chicago, Illinois, April 2005.

31. Designated Uses/Tiered Use Classification System Meeting, Springfield, Illinois, April 2005.

32. Illinois Association of Pollution Control Operators, 2005 Annual Conference, Springfield, Illinois, April 2005.

33. Illinois Water Environment Association, Executive Board Meeting, Bloomington, Illinois, April 2005.

34. Midwest Water Analysts Association, Spring Planning Meeting, Gurnee, Illinois, April 2005.

35. Technical Emergency Response Training, Anniston, Alabama, April 2005.

36. Upper Mississippi River, Sub-Basin Hypoxia Nutrient Committee Meeting, Moline, Illinois, April 2005.

37. Water Environment Federation, Joint Residuals and Biosolids Management Conference 2005, Nashville, Tennessee, April 2005.

38. DuPage River, Salt Creek Watershed Workgroup Meeting, Itasca, Illinois, May 2005.

39. Illinois Association of Wastewater Agencies, Technical Meeting, Utica, Illinois, May 2005.

40. Industrial Water, Waste, and Sewage Group Dinner Meeting, Chicago, Illinois, May 2005.

41. National Biosolids Appeals Board Meeting, Washington, D.C., May 2005.

42. North American Benthological Society, Annual Meeting, New Orleans, Louisiana, May 2005.

43. Soil Ecology Society, 2005 Conference, Argonne, Illinois, May 2005.

44. Water Environment Research Foundation, Biosolids Research Summit TCR Steering Committee Meeting, Washington, D.C., May 2005

APPENDIX I

MEETINGS AND SEMINARS 2005

45. American Society for Microbiology, 105th General Meeting on Infectious Diseases, Atlanta, Georgia, June 2005.

46. Aquatic Nuisance Species Dispersal Barrier Advisory Panel Meeting, Chicago, Illinois, June 2005.

47. Midwest Water Analysts Association, 2005 Spring Meeting, Dundee, Illinois, June 2005.

48. New Solutions for Trace Metals Analysis Seminar, Chicago, Illinois, June 2005.

49. Technical Emergency Response Training, Anniston, Alabama, June 2005.

50. Troubleshooting and Preventive Maintenance, 6890 GC, Chicago, Illinois, June 2005.

51. Water Environment Federation, 2005 Conference Series, Innovative Uses of Agricultural Animal Manure, Biosolids, and Paper Mill Residuals, Chicago, Illinois, June 2005.

52. Water Environment Federation, TMDL 2005 Workshop, Philadelphia, Pennsylvania, June 2005.

53. DuPage River, Salt Creek Watershed Workgroup Meeting, Itasca, Illinois, July 2005.

54. Illinois Association of Wastewater Agencies, Technical Committee Meeting, Utica, Illinois, July 2005.

55. National Environmental Monitoring Conference, 21st Annual, Washington, D.C., July 2005.

56. National Forum on Synergies Between Water Quality Trading and Wetland Mitigation Banking, Washington, D.C., July 2005.

57. Technical Emergency Response Training, Anniston, Alabama, July 2005.

58. DuPage River, Salt Creek Watershed Workgroup Meeting, Downers Grove, Illinois, August 2005.

59. DuPage River, Salt Creek Watershed Workgroup Meeting, Elmhurst, Illinois, August 2005.

60. DuPage River, Salt Creek Watershed Workgroup Meeting, Oak Brook, Illinois, August 2005.

APPENDIX I

MEETINGS AND SEMINARS 2005

61. Illinois Environmental Protection Agency and Illinois Association of Wastewater Agencies, Dissolved Oxygen Meeting, Springfield, Illinois, August 2005.

62. Illinois Pollution Control Board, Hearing on Proposed Change in Dissolved Oxygen Standards, Chicago, Illinois, August 2005.

63. Illinois Water Environment Association, Laboratory Committee Meeting, Kankakee, Illinois, August 2005.

64. Technical Emergency Response Training, Anniston, Alabama, August 2005.

65. United States Environmental Protection Agency, Meeting on Pharmaceuticals in the Environment, Las Vegas, Nevada, August 2005.

66. United States Environmental Protection Agency, Region V, Mussel Toxicity Testing Workshop, Chicago, Illinois, August 2005.

67. United States Geological Survey, Streamgage Cooperators Meeting, Utica, Illinois, August 2005.

68. DuPage River, Salt Creek Watershed Workgroup Meeting, Elmhurst, Illinois, September 2005.

69. Friends of the Chicago River, North Branch Dam Removal Meeting, Chicago, Illinois, September 2005.

70. Illinois Association of Wastewater Agencies, Annual Conference, Grafton, Illinois, September 2005.

71. Illinois Emergency Management Conference, Springfield, Illinois, September 2005.

72. Illinois Water Environment Association, Executive Board Meeting, Bloomington, Illinois, September 2005.

73. Industrial Water, Waste, and Sewage Group Dinner Meeting, Chicago, Illinois, September 2005.

74. Midwest Water Analysts Association, 2005 Fall Meeting, Glencoe, Illinois, September 2005.

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MEETINGS AND SEMINARS 2005

75. Northwest Biosolids Management Association Conference, Chelan, Washington, September 2005.

76. Technical Emergency Response Training, Anniston, Alabama, September 2005.

77. Thermo Informatics World 2005 (LIMS), Bonita Springs, Florida, September 2005.

78. United States Environmental Protection Agency, Eighth Conference on Air Quality Monitoring, Research Triangle Park, North Carolina, September 2005.

79. Upper Mississippi River, Sub-Basin Hypoxia Nutrient Committee Workshop, Ames, Iowa, September 2005.

80. Air and Waste Management Association, Lake Michigan Section, 2005 Air Quality Management Conference, Oak Brook, Illinois, October 2005.

81. Calumet Government Working Group, 2005 Third Quarter Meeting, Chicago, Illinois, October 2005.

82. DuPage River, Salt Creek Watershed Workgroup Meeting, Downers Grove, Illinois, October 2005.

83. DuPage River, Salt Creek Watershed Workgroup Meeting, Elmhurst, Illinois, October 2005.

84. DuPage River, Salt Creek Watershed Workgroup Monitoring Dissolved Oxygen Subcommittee Meeting, Itasca, Illinois, October 2005.

85. Governors Conference on Management of the Illinois River, Peoria, Illinois, October 2005.

86. Hazmat Incident Management, Stickney, Illinois, October 2005.

87. Illinois Association of Water Pollution Control Operators, Regional Wastewater Operators Conference, Aurora, Illinois, October 2005.

88. Illinois Environmental Protection Agency, Biocriteria Meeting, Springfield, Illinois, October 2005.

89. Illinois Water Environment Association, Program Planning Committee Meeting, Aurora, Illinois, October 2005.

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MEETINGS AND SEMINARS 2005

90. Midwest Water Analysts Association, 2005 Fall Meeting, Glencoe, Illinois, October 2005.

91. Midwest Water Analysts Association, Board and Steering Fall Planning Meeting, Gurnee, Illinois, October 2005.

92. Mississippi River Nutrient Science Workgroup, St. Louis, Missouri, October 2005.

93. RCRA Training, Chicago, Illinois, October 2005.

94. Radiobioassay and Radiochemical Measurements 51st Annual Conference, Stateline, Nevada, October 2005.

95. Thermo Electron Corporation Seminar, Arlington Heights, Illinois, October 2005.

96. Water Environmental Federation, 78th Annual Technical Exhibition and Conference, Washington, D.C., October 2005.

97. Water Environment Research Foundation, Program Directed Research Initiative Meeting, Modeling of Activated Sludge Processes Workshop, Odor and Air Emissions Workshop, and Workshop on Biosolids Sampling and Handling Methods for United States Environmental Protection Agency Approved Microbial Detection Techniques, Washington, D.C., October 2005.

98. Great Lakes Beach Association, Lake Michigan: State of the Lake Meeting, Green Bay, Wisconsin, November 2005.

99. Illinois Association of Wastewater Agencies, Technical Committee Meeting, Utica, Illinois, November 2005.

100. Industrial Water, Waste, and Sewage Group Dinner Meeting, Chicago, Illinois, November 2005.

101. Society of Environmental Toxicology and Chemistry, North America 26th Annual Meeting, Baltimore, Maryland, November 2005.

102. Soil Science Society of America, Annual Meeting, Salt Lake City, Utah, November 2005.

103. Calumet Government Working Group, 2005 Fourth Quarter Meeting, Chicago, Illinois, December 2005.

APPENDIX I

MEETINGS AND SEMINARS 2005

104. DuPage River, Salt Creek Watershed Workgroup Hydrolab Workshop, Woodridge, Illinois, December 2005.

105. DuPage River, Salt Creek Watershed Workgroup Monitoring Dissolved Oxygen Subcommittee Meeting, Downers Grove, Illinois, December 2005.

106. Hazmat Incident Management, Stickney, Illinois, December 2005.

107. Illinois Environmental Protection Agency, Nutrient Standards Workgroup and Science Committee Meeting, Springfield, Illinois, December 2005.

108. Midwest Environmental Laboratory, Stakeholders Summit, Chicago, Illinois, December 2005.

109. Midwest Water Analysts Association, Expo Planning Meeting, Gurnee, Illinois, December 2005.

APPENDIX II

APPENDIX II

PRESENTATIONS 2005

1. "Environmental Management: Perspectives of a Regulated and Regulatory Agency." Presented at the Environmental Compliance and Monitoring Course, Chicago, Illinois, by Richard Lanyon, January 2005. PP

2. "Role of UAA Studies in Establishing Designated Use Water Quality Standards." Presented at the Illinois Water Environment Association, Government Affairs in Water Pollution Control Seminar, Lisle, Illinois, by Richard Lanyon, January 2005. PP

3. "Tunnel and Reservoir Plan History, Status, and Benefits." Presented at the Illinois Chapter Soil and Water Conservation Society Meeting, Countryside, Illinois, by Richard Lanyon, February 2005. PP

4. "Chlorophyll and Nutrient Monitoring in Chicago's Urban Waterways." Presented at the Nutrient Regional Technical Assistance Group Meeting, Chicago, Illinois, by Jennifer Wasik, March 2005. PP

5. "Effect of Wastewater Biological Nutrient Removal on Biosolids Phosphorus." Presented at the Illinois Association of Pollution Control Operators Annual Conference, Springfield, Illinois, by Albert E. Cox and Thomas C. Granato, April 2005. PP

6. "Marketing Biosolids for Beneficial Use in the Chicago Metropolitan Area." Presented at the Water Environment Federation, Joint Residuals and Biosolids Management Conference 2005, Nashville, Tennessee, by Thomas C. Granato, Albert E. Cox, Lakhwinder Hundal, Bernard Sawyer, and Richard Lanyon, April 2005. B

7. "Point Source Nutrient Loads and Reduction Opportunities." Presented at the Upper Mississippi River, Sub-Basin Hypoxia Nutrient Committee Meeting, Moline, Illinois, by Richard Lanyon, April 2005. PP

8. "Evaluation of the Impact of Biosolids Application on Soil Microorganisms: Nitrifier and Denitrifier Populations." Presented at the Soil Ecology Society Conference, Argonne, Illinois, Guanglong Tian, Thomas C. Granato, Richard I. Pietz, and Albert E. Cox, May 2005. PP

9. "Comparison of Fecal Coliform Concentrations in Two Urban Rivers: The Chicago Sanitary and Ship Canal and the Des Plaines River." Presented at the American Society of Microbiology, 105th General Meeting of Infectious Diseases, Atlanta, Georgia, by Geeta K. Rijal, Zainul Abedin, James Zmuda, Richard Gore, Bernard Sawyer, and Richard Lanyon, June 2005. PS

APPENDIX II

PRESENTATIONS 2005

10. "Permits and UAA Studies for an Effluent Dominated Waterway." Presented at the Water Environment Federation, TMDL 2005 Workshop, Integration of Urban Wet Weather Controls into a Watershed Framework Workshop, Philadelphia, Pennsylvania, by Richard Lanyon, June 2005. PP

11. "The Metropolitan Water Reclamation District of Greater Chicago's Efforts to Reduce Pharmaceuticals that Enter the Water Reclamation Plants." Presented at the United States Environmental Protection Agency, Meeting on Pharmaceuticals in the Environment, Las Vegas, Nevada, by Catherine O'Connor, Thomas C. Granato, and Richard Lanyon. August 2005. B

12. "Biosolids as a Resource for Managing Golf Course Turfgrasses." Presented at the Midwest Association of Golf Course Superintendents Meeting, Worth, Illinois, by Thomas C. Granato, Lakhwinder Hundal, Pauline V. Lindo, Guanglong Tian, Thomas Voigt, and Dan Dinelli. September 2005. PP

13. "Biosolids Management at the Metropolitan Water Reclamation District of Greater Chicago." Presented at the Northwest Biosolids Management Conference, Chelan, Washington, by Albert E. Cox and Thomas C. Granato, September 2005. PP

14. "Ambient Monitoring of Low Level Hydrogen Sulfide." Presented at the Water Environment Federation, 78th Annual Technical Exhibition and Conference, Washington, D.C., by Doris Bernstein, Jain S. Jain, and Bernard Sawyer, October 2005. B.

15. "Chlorophyll a and Nutrient Monitoring in the Illinois Waterway." Presented at the Mississippi River Nutrient Science Workshop, St. Louis, Missouri, by Jennifer Wasik, October 2005. PP

16. "Radon Monitoring at the Metropolitan Water Reclamation District of Greater Chicago." Presented at the Radiobioassay and Radiochemical Measurements 51st Annual Conference, Stateline, Nevada, by Abdul Khalique, Richard I. Pietz, and Richard Lanyon, October 2005. PP

17. "Effect of Biosolids Land Application on Turfgrass Performance." Presented at the Soil Science Society of America Annual Meeting, Salt Lake City, Utah, by Pauline V. Lindo, Albert E. Cox, and Thomas C. Granato, November 2005. PS

APPENDIX II

PRESENTATIONS 2005

18. "Innovative and Beneficial Uses of Biosolids – The Metropolitan Water Reclamation District of Greater Chicago Experience." Presented at the University of Toledo, Department of Civil Engineering Seminar Series, Toledo, Ohio, by Lakhwinder Hundal, November 2005. PP

19. "Long-term Biosolids Land Application on Potential for P Runoff Losses." Presented at the Soil Science Society of America Annual Meeting, Salt Lake City, Utah, by Albert E. Cox, Thomas C. Granato, Guanglong Tian, George O'Connor, and Herschel Elliott, November 2005. PP

20. "Regulatory Update: Pretreatment, User Charge, and Water Quality Issues." Presented at the Industrial Water, Waste, and Sewage Group Dinner Meeting, Chicago, Illinois, November 2005. PP

21. "Continuous Dissolved Oxygen Monitoring in Chicago Area Waterways: Network Design and Operation." Presented at the DuPage, Salt Creek Watershed Workgroup Hydrolab Workshop, Woodridge, Illinois, by Michael Sopcak and Thomas Minarik, December 2005. PP

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

APPENDIX III

APPENDIX III

PAPERS PUBLISHED 2005

1. Bernstein, D., J. S. Jain, and B. Sawyer, "Ambient Monitoring of Low Level Hydrogen Sulfide." Proceedings of Water Environment Federation, 78th Annual Technical Exhibition and Conference, Washington, D.C., 2005.

2. Cox, A. E., T. C. Granato, G. Tian, G. O'Connor, and H. Elliott, "Long-term Biosolids Land Application on Potential for P Runoff Losses." Proceedings of the Soil Science Society of America, Annual Meeting, Salt Lake City, Utah, 2005.

3. Granato, T. C., A. E. Cox, L. Hundal, B. Sawyer, and R. Lanyon, "Marketing Biosolids for Beneficial Use in the Chicago Metropolitan Area." Proceedings of the Water Environment Federation, Joint Residuals and Biosolids Management Conference 2005, Nashville, Tennessee, 2005.

4. Khalique, A, R. I. Pietz, and R. Lanyon, "Radon Monitoring at the Metropolitan Water Reclamation District of Greater Chicago." Proceedings of the Radiobioassay and Radiochemical Measurements 51st Annual Conference, Stateline, Nevada, 2005.

4. Lindo, P., A. E. Cox, and T. C. Granato, "Effect of Biosolids Land Application on Turfgrass Performance." Proceedings of the Soil Science Society of America, Annual Meeting, Salt Lake City, Utah, 2005.

5. O'Connor, C., T. C. Granato, and R. Lanyon, "The Metropolitan Water Reclamation District of Greater Chicago's Efforts to Reduce Pharmaceuticals that Enter the Water Reclamation Plants." Proceedings of the United States Environmental Protection Agency, Meeting on Pharmaceuticals in the Environment, Las Vegas, Nevada, 2005.

6. Rijal, G. K., Z. Abedin, J. Zmuda, R. Gore, B. Sawyer, and R. Lanyon, "Comparison of Fecal Coliform Concentrations in Two Urban Rivers: The Chicago Sanitary and Ship Canal and the Des Plaines River." Proceedings of the American Society of Microbiology, 105th General Meeting of Infectious Diseases, Atlanta, Georgia, 2005.

7. Wasik, J., "Chlorophyll a and Nutrient Monitoring in the Illinois Waterways." Proceedings of the Mississippi River Nutrient Science Workshop, St. Louis, Missouri, 2005.

APPENDIX IV

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO
RESEARCH AND DEVELOPMENT DEPARTMENT
2005 SEMINAR SERIES

Date	**Subject**
Friday **January 28, 2005**	***Ecosystem-Based Approach to Remediation of PCB Contaminated River Sediments: A Case Study*** Dr. Cecil Lue-Hing Cecil Lue-Hing & Associates, Chicago, Illinois
Friday **February 25, 2005**	***Mechanism Explaining Seasonal Biological Foaming in Activated Sludge*** Professor Lutgarde Raskin University of Illinois, Champaign, Illinois
Friday **March 18, 2005**	***Nutrients, Chlorophyll, and Dissolved Oxygen in Illinois Rivers and Streams*** Professor Mark David University of Illinois, Champaign, Illinois
Friday **April 22, 2005**	***Endocrine Disruptors and Other Trace Contaminants in Wastewater*** Professor Makram Suidan University of Cincinnatti, Cincinnatti, Ohio
Friday **May 20, 2005**	***Clean Air Act Issues Related to Wastewater Treatment Plants*** Mr. Jay Witherspoon, Director CH2M Hill,Oakland, California
Friday **June 24, 2005**	***Hydraulic Modeling of the Calumet TARP System*** Professor Arthur Schmidt University of Illinois, Champaign, Illinois

RESERVATIONS REQUIRED (at least 24 hours in advance)
CONTACT:
Mr. Bernard Sawyer, Assistant Director of Research and Development
Environmental Monitoring and Research Division
(708) 588-4264 or (708) 588-4059

(Note: Some seminars may be eligible for Professional Development Credits/CEUs)

LOCATION:
Stickney Water Reclamation Plant
Lue-Hing Research and Development Complex
6001 West Pershing Road, Cicero, Illinois 60804-4112
(Picture ID required for plant entry)

TIME: 10:00 A.M.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO
RESEARCH AND DEVELOPMENT DEPARTMENT
2005 SEMINAR SERIES

Date	**Subject**
Friday **July 29, 2005**	***Calumet Water Reclamation Plant Master Plan*** Mr. Jeffrey Weber, Principal Mechanical Engineer Engineering Department Metropolitan Water Reclamation District of Greater Chicago (District), Chicago, Illinois Mr. Dean Schmidtke, Project Manager Metcalf and Eddy Engineers, Chicago, Illinois
Friday **August 26, 2005**	***Development of a Biosolids EMS*** Mr. Sergio Serafino, Supervising Civil Engineer Maintenance and Operations Department District, Chicago, Illinois
Friday **September 30, 2005**	***District/USEPA/IEPA Cooperative WET Testing Study*** Dr. James Zmuda, Microbiologist Research and Development Department District, Cicero, Illinois
Friday **October 21, 2005**	***A Review of Disinfection Technologies and their Applicability to Future District Needs*** Dr. David Zenz, Senior Associate CTE Engineers, Chicago, Illinois
Friday **November 18, 2005**	***Full Scale Nutrient Removal Test at Egan Water Rec****lamation Plant/WERF Nutrient Removal Project* Dr. Heng Zhang, Research Scientist Research and Development Department District, Cicero, Illinois

RESERVATIONS REQUIRED (at least 24 hours in advance)
CONTACT:
Mr. Bernard Sawyer, Assistant Director of Research and Development
Environmental Monitoring and Research Division
(708) 588-4264 or (708) 588-4059

(Note: Some seminars may be eligible for Professional Development Credits/CEUs)

LOCATION:
Stickney Water Reclamation Plant
Lue-Hing Research and Development Complex
6001 West Pershing Road, Cicero, Illinois 60804-4112
(Picture ID required for plant entry)

TIME: 10:00 A.M.