RESEARCH AND DEVELOPMENT DEPARTMENT

REPORT NO. 05-5

RESEARCH AND DEVELOPMENT

2004

ANNUAL REPORT

March 2005

Metropolitan Water Reclamation District of Greater Chicago
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RESEARCH AND DEVELOPMENT
2004
ANNUAL REPORT

Research and Development Department
Richard Lanyon, Director

March 2005

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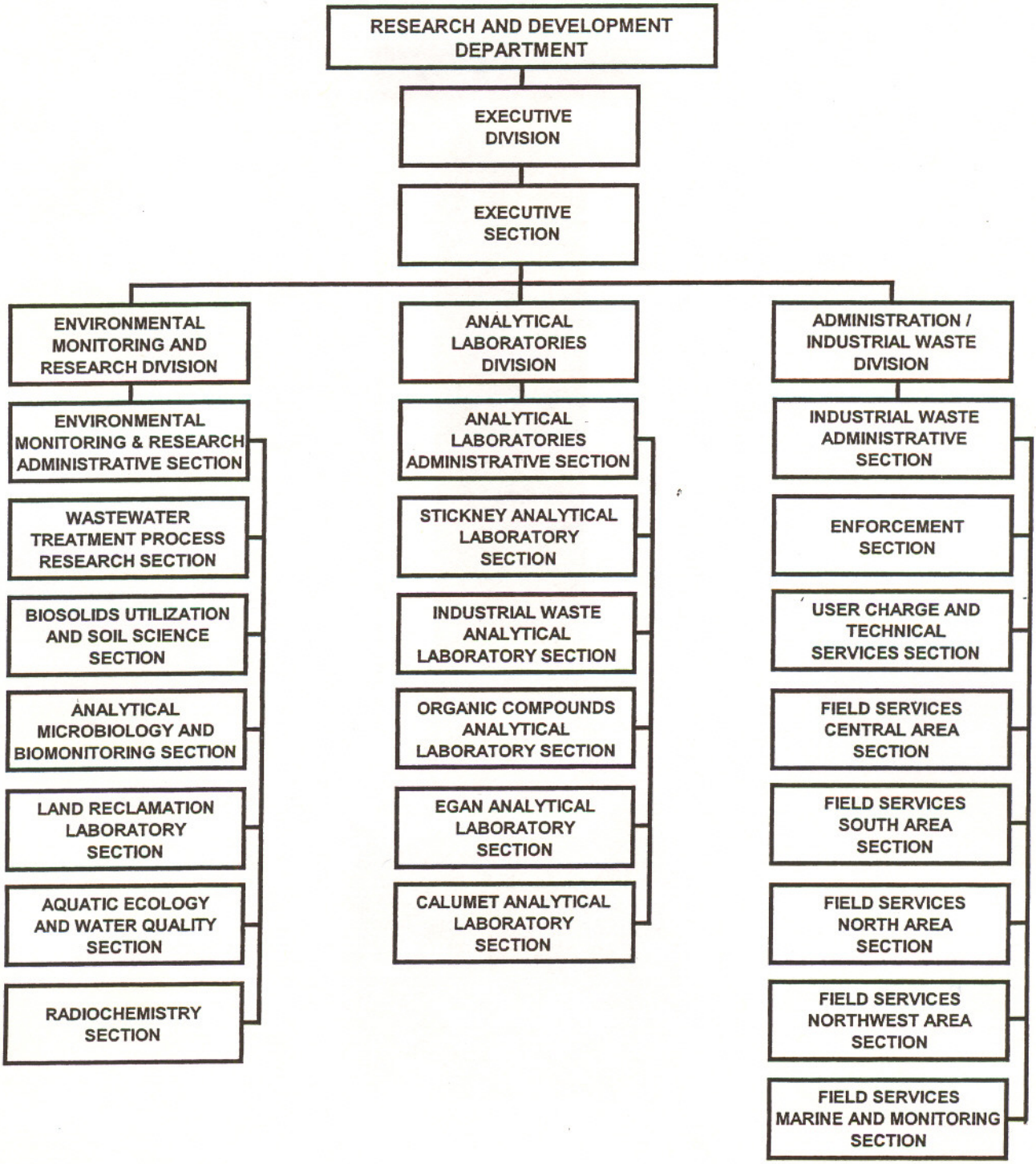
RESEARCH AND DEVELOPMENT DEPARTMENT
ORGANIZATION CHART FOR 2004



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 326 budgeted positions during 2004 with an adjusted total salary and wage appropriation of $21,220,600. 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 2004, the Department reviewed personnel actions relative to eight retirements. In addition, as part of adopting the 2004 Budget and the District's attrition program, five existing positions were eliminated when vacated during 2003. By year-end, actual positions eliminated upon vacancy by incumbents totaled 11. In addition, effective January 1, 2004, three Management Analyst positions in the Administration Division were reassigned to General Administration. This decrease in positions led to an average expenditure to appropriation ratio of over 96 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 2004, the Center provided onsite technical assistance to seven companies, primarily metal finishers (CFR 413 and 433) and food processors.

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

Computer Systems Administration

In 2004, 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.

In April 2001, the District implemented the use of an IT-designed program for budget preparation. This Budget Preparation Tool (BPT) was used to prepare the 2004 line item and position budgets. The Enterprise System, which was implemented in 2000, proved inadequate for preparing the Dis-

trict's budget and BPT was developed to assist in this area. The Administration Division prepared the 2004 budget using this new system. Enhancements were made to this budgeting tool for preparation of the 2005 budget.

Budget Administration

A comparison of appropriations to expenditures for 2004 shows the following:

	Appropriation	Expenditure
Personnel (Line Item 101) (Adjusted)	$21,220,600	$20,430,164
Other Line Items	4,507,900	3,227,798
Total	$25,728,500	$23,657,962

Purchasing Administration

During 2004, more than 382 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 2004, the Division was involved in the preparation and administration of 14 contracts for a total cost of approximately $1,131,559, including multiyear contracts. This involved the preparation of detail specifications, Board letters, advertisements, coordination of the receipt and review of bids, recommendations to award, processing of purchase requisitions, change orders, payment of invoices, and release of bid deposits.

The Division administered 23 consulting services agreements with individual values of $9,000 or more and having a total value of approximately $2,043,078 during 2004. The Division also administered 22 maintenance agreements with individual values of $10,000 or more and a total value of $1,152,934. This involved preparation and processing of purchase requisitions, change orders, Board letters, and management of fund reservations, preparation and execution of consultant agreements, preparation of requests for proposals, and coordination of the receipt and review of proposals.

Laboratory Accreditation

In 2004, the seven R&D 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 Ac-

creditation 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 2004. 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 drinking waste and public water supplies by the Illinois Department of Public Health (IDPH).

In June 2001, the Radiochemistry Laboratory was certified by the Illinois Department of Nuclear Safety (IDNS) for the radiochemical analysis of potable water.

The certification programs administered by the IDPH and the IDNS 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 is developing an unsteady-state hydraulic and water quality model of the waterway system. In addition, the District will be supplying technical support through review of study reports and proposals for water quality improvement projects.

Departmental Reports

During 2004, the Department published 40 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 2004

	Report Title	Author (s)	Date	Organization or Conference Which Presented
2004-1	Biological Conditions in the West Branch of the DuPage River During 1994 and 1995	Dennison, S.G., M. Sopcak, M.L. Hartford, I. Polls	Jan-04	Internal District Report
2004-2	Annual Biosolids Management Report for 2003		Feb-04	USEPA
2004-3	An Investigation of Salinity in Bio-Solids generated by the MWRDGC	Granato, T.C., A. Cox, O. Dennison, R. Pietz	Feb-04	Internal District Report
2004-4	A Study of the Benthic Macroinvert-brate Community in Selected Chicago Metropolitan Area Water-ways during 2001 and 2002		Mar-04	Prepared by EA Engineering, Science and Technology, Inc.
2004-5	R&D 2003 Annual Report		Mar-04	Internal District Report
2004-6	Continuous Dissolved Oxygen Monitoring from Wilmette to Joliet in the Chicago Wagterway System during August 2000 through December 2001	Dennison, S.G., M. Sopcak, J. Wasik, M.L. Hartford, I. Polls	May-04	Internal District Report
2004-7	Characteristics of Stormwater Runoff Discharged to the Chicago Waterway System from Three Illinois Dept of Transportation Pumping Stations	Zhang, H., J.J.Jain, Z. Abedin, B. Sawyer	Jun-04	Internal District Report

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 1 (Continued)

RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2004

	Report Title	Author (s)	Date	Organization or Conference Which Presented
2004-8	2003 Bubbly Creek Water Quality Improvement Demonstration Project	Sopcak, M.	Jun-04	Internal District Report
2004-9	Calculation of User Charge Rates and Administrative Costs for 2004		Jul-04	Internal District Report
2004-10	Estimation of the Escherichia Coli to Fecal Coliform Ratio in Wastewater Effluents and Ambient Waters of the MWRDGC	Zmuda, J.T., R. Gore, Z. Abedin	Jul-04	Internal District Report
2004-11	2003 Annual Summary Report Water Quality within the Waterways System of the MWRDGC	Abedin, Z., D. Emery, R.I. Pietz	Aug-04	Internal District Report
2004-12	Corn Yields and Nutrient Composition During Long-Term Biosolids Applications to Calcareous Strip-Mine Soil	Pietz, R.I., Z. Abedin, T.C. Granato, C.R. Carlson, Jr.	Aug-04	Internal District Report
2004-13	Reclamation of the St. David, Illinois, Coal Refuse Pile with Biosolids and Other Amendments: Effects on chemical Composition of Coal Refuse, Forage and Surface Runoff Water		Sep-04	Internal District Report

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 1 (Continued)

RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2004

	Report Title	Author (s)	Date	Organization or Conference Which Presented
2004-14	Preliminary Calibration of a Model for Simulation of Water Quality During Un-steady Flow in the Chicago Waterway System and Application to Proposed Changes to Navigation Make-Up Diversion Procedures	Alp, E., M.S, C.S Melching, Ph.d, P.E.	Aug-04	Institue for Urban Environmental Risk Management Marquette University, Milwaukee, WI
2004-15	Water and Sediment Quality along the Illinois Waterway from the Lockport Lock to the Peoria Lock during 2003	Wasik, J.	Sep-04	Internal District Report
2004-16	Report on O'Hare Cup Reservoir Fill Event Experiment Conducted from Mary 30, 2004 through June 30, 2004	Jain, J.S., D. MacDonald, B. Sawyer	Sep-04	Internal District Report
2004-17	Odor Monitoring Program at District Facilities during 2003	Lordi, D.T., B. Sawyer	Sep-04	Internal District Report
2004-18	Continuous Dissolved Oxygen Monitoring in the Chicago Waterway System during 2001 and 2002	Dennison, S.G., M. Sopcak, J.L. Wasik	Oct-04	Internal District Report
2004-19	Environmental Monitoring and Research Division 2003 Annual Report		Nov-04	Internal District Report

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 1 (Continued)

RESEARCH AND DEVELOPMENT NUMBERED REPORTS PUBLISHED DURING 2004

	Report Title	Author (s)	Date	Organization or Conference Which Presented
2004-20	Chlorophyll Monitoring in Chicago Area Waterways during 2002 and 2003	Wasik, J.L., S. Dennison, Z. Abedin, B. Sawyer	Nov-04	Internal District Report
2004-21	Biosolids Chemical Characteristics	Lindo, P., A.E. Cox, T. Granato	Dec-04	Internal District Report
2004-22	Radioactivity in Biosolids-Amended Soil and Uptake by Corn	Khalique, A., A..E. Cox, T.C. Granato, R.I. Pietz	Dec-04	Internal District Report
2004-23	Determination of Phtotoxic Zinc Thresholds in Leaves of Grasses and Food and Fiber Crops	Granato, T.C., O. Dennison	Dec-04	Internal District Report

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 2

RESEARCH AND DEVELOPMENT UNNUMBERED REPORTS PUBLISHED DURING 2004

Report Title	Author (s)	Date	Organization or Conference Which Presented
Fultion County IEPA October 2003	R&D Department Granato, T.C., P. Lindo	Jan-04	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Fultion County IEPA November 2003	R&D Department Granato, T.C., P. Lindo	Jan-04	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Fultion County IEPA December 2003	R&D Department Granato, T.C., P. Lindo	Feb-04	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Fultion County IEPA January 2004	R&D Department Granato, T.C., P. Lindo	Mar-04	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Fultion County IEPA February 2004	R&D Department Granato, T.C., P. Lindo	Apr-04	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Fultion County IEPA March 2004	R&D Department Granato, T.C., P. Lindo	Apr-04	Illinois Environmental Protection Agency, United States Environmental Protection Agency

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 2 (Continued)

RESEARCH AND DEVELOPMENT UNNUMBERED REPORTS PUBLISHED DURING 2004

Report Title	Author (s)	Date	Organization or Conference Which Presented
Fultion County IEPA May 2004	R&D Department Granato, T.C., P. Lindo	Jul-04	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Fultion County IEPA June 2004	R&D Department Granato, T.C., P. Lindo	Sep-04	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Fultion County IEPA July 2004	R&D Department Granato, T.C., P. Lindo	Sep-04	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Fultion County IEPA Aug 2004	R&D Department Granato, T.C., P. Lindo	Oct-04	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Fultion County IEPA Sept 2004	R&D Department Granato, T.C., P. Lindo	Nov-04	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Fultion County IEPA Oct 2004	R&D Department Granato, T.C., P. Lindo	Dec-04	Illinois Environmental Protection Agency, United States Environmental Protection Agency

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

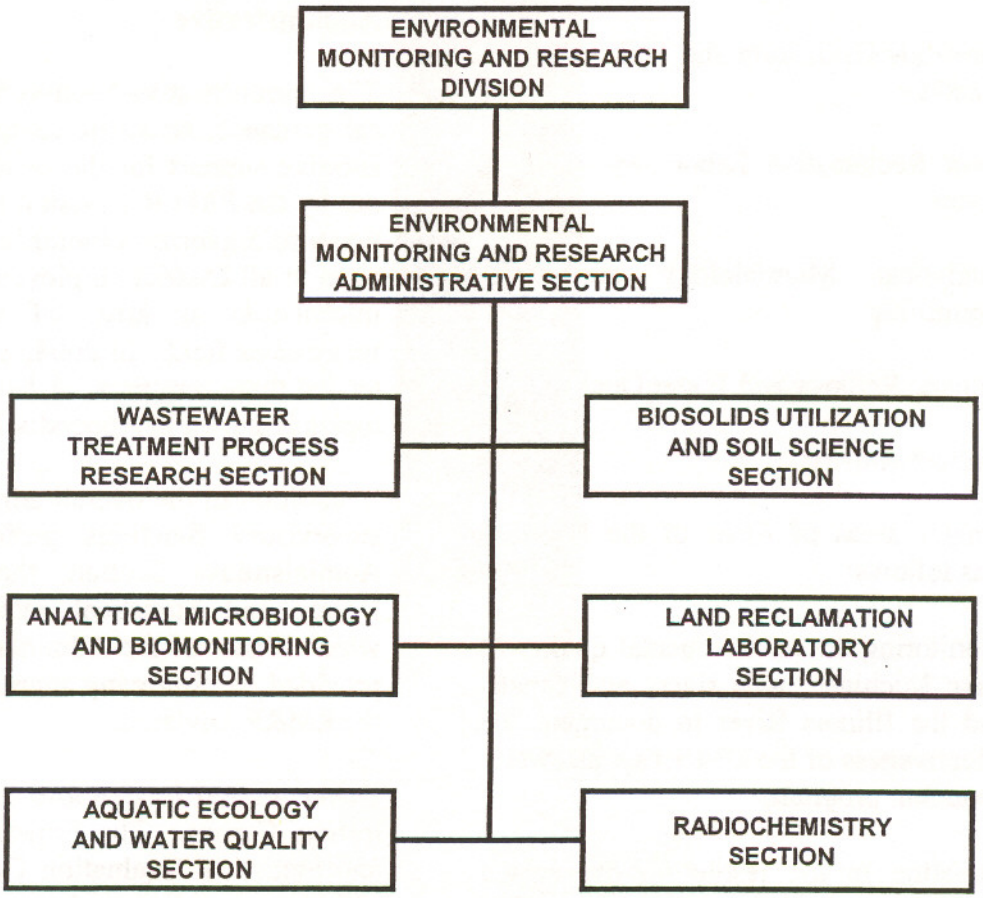
TABLE 2 (Continued)

RESEARCH AND DEVELOPMENT UNNUMBERED REPORTS PUBLISHED DURING 2004

Report Title	Author (s)	Date	Organization or Conference Which Presented
Fischer Farm Report for 1st Quarter of 2004	Granato, T.C., P. Lindo		Agency, United States Environmental Protection Agency
Hanover Park Water Reclamation Plant Fischer Farm Report for 2nd Quarter of 2004	R&D Department Granato, T.C., P. Lindo	Nov-04	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Hanover Park Water Reclamation Plant Fischer Farm Report for 3rd Quarter of 2004	R&D Department Granato, T.C., P. Lindo	Nov-04	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Biomonitoring Report 2004 Kirie WRP NPDES Permit IL0047741	Zmuda, J.T.	Feb-04	Internal District Report
Biomonitoring Report 2004 Hanover Park WRP NPDES Permit IL0036137	Zmuda, J.T.	Jun-04	Internal District Report

Figure 1

ENVIRONMENTAL MONITORING AND RESEARCH DIVISION ORGANIZATION CHART



ENVIRONMENTAL MONITORING AND RESEARCH DIVISION

The Environmental Monitoring and Research (EM&R) Division has 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 2004, 1,019 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 method, and statistical analyses. Since 1999, Group personnel have been performing these tasks using PC computing media. They also developed programs to interconnect Visual Basic with SAS, Access, Excel, Outlook, and PowerPoint software programs. This has enabled the Group 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 2004, 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 Analytical Microbiology & Biomonitoring Section to study the trend, and average fecal coliform concentrations in the Des Plaines River and Chicago Sanitary and Ship Canal at Lockport for the 2000-2001 period.

2. Statistical support was provided to the Analytical Microbiology & Biomonitoring Section to study estimation of the *Escherichia coli* to fecal coliform ratio in wastewater effluents and ambient waters of the District. The statistical analyses for the project were completed in April 2004.

3. Statistical support was provided to the Biosolids Utilization and Soil Science Section on the study of corn yields and nutrient composition during long-term biosolids applications to calcareous strip-mine soil. All statistical analyses, including stability analyses, were completed. Final report of the project was completed.

4. Statistical support was provided to the USEPA, Region V, Office of Water, for assessment of the accuracy of analysis of biosolids generated by publicly owned treatment works (POTWs).

5. Statistical support was provided to the Analytical Microbiology & Biomonitoring Section for the project, "Protecting Lake Michigan Water Quality: Addressing Beach Issues."

6. Statistical support was provided to the Aquatic Ecology and Water Quality Section to study the project "Chlorophyll Monitoring in Chicago Area Waterways."

7. Substantial statistical consulting was provided to the Biosolids Utilization and Soil Science Section of the EM&R Division on miscellaneous projects.

Water Quality Data. Each year, the Group prepares an annual report describing the water quality of the streams and channels within the District's jurisdiction for the preceding year. Surface water quality data for 2003 were evaluated regarding compliance with water quality standards set by the Illinois Pollution Control Board (IPCB). In 2003, 68 water quality parameters, biochemical oxygen demand; carbonaceous biochemical oxygen demand; dissolved oxygen; temperature; pH; alkalinity (total); chloride; turbidity; total kjeldahl nitrogen; ammonium nitrogen; un-ionized ammonia; organic nitrogen; nitrite plus nitrate nitrogen; total solids; total suspended solids; volatile suspended solids; total dissolved solids; phenols; 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 assayed.

Out of 68 water quality parameters, 31 water quality parameters (dissolved oxygen, temperature, pH, chloride, ammonium nitrogen, total dissolved solids, phenols, sulfate, weak acid dissociable cyanide, fluoride, fecal coliform, gross beta radioactivity, benzene, ethylbenzene, toluene, xylene, total silver, total barium, total boron, total hexavalent chromium, total manganese, total selenium, soluble arsenic, soluble cadmium, soluble copper, soluble chromium, soluble iron, soluble lead soluble nickel, soluble mercury, and soluble zinc) had IPCB General Use Standards. Benzene and total mercury had IPCB Human Health standards.

Twenty-three 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 hexavalent chromium, total manganese, total selenium, soluble 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.

Six of the remaining 8 parameters, viz., dissolved oxygen, temperature, pH, chloride, sulfate, and fluoride had compliance rates of greater than 86.5 percent in all river systems. Total dissolved solids had a compliance rate greater than 75.4 percent in all river systems. Fecal coliform had the lowest compliance rate, and it was in the range of 30.1 to 57.8 percent in the Chicago, Calumet, and the Des Plaines River Systems.

Compliance of Secondary Contact Waters. Twenty-three water quality parameters measured in the Secondary Contact waters during 2003 had applicable IPCB standards. They were dissolved oxygen; temperature; pH; un-ionized ammonia; total dissolved solids; phenols; fats, oils, and greases; total cyanide; fluoride; total silver; total arsenic; total barium; total cadmium; total copper; total hexavalent chromium; total iron; total lead; total nickel; total manganese; total mercury; total zinc; total selenium; and soluble iron.

Eighteen parameters were in complete compliance with the IPCB standards for the Chicago and the Calumet River Systems in 2003. They were temperature; pH; total dissolved solids; phenols; total cyanide; fluoride; total silver; total arsenic; total barium; total cadmium; total copper; total hexavalent chromium; total nickel; total manganese; total mercury; total zinc; total selenium; and soluble iron. The percent compliance of the remaining 5 parameters (dissolved oxygen; un-ionized ammonia; fats, oils, and greases; total iron; and total lead), which were not in total compliance in both the river systems varied from 90.0 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 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 2004 included the following.

Polymer Testing. Full-scale polymer tests for the comparison of winter and summer polymers used at the Stickney WRP postdigestion centrifuges were conducted in 2004. The test procedures are described in R&D Department Report No. 01-13.

Polymer testing was also carried out in 2004 at the Hanover Park WRP for the selection and purchase of polymers used in the gravity belt thickening of primary and waste activated sludge.

Sources of Polychlorinated Biphenyls (PCBs) to the Atmosphere. The R&D Department is cooperating with Dr. Thomas M. Holsen of Clarkson University in a study to evaluate potential emissions of PCBs from sludge drying areas. Four air samplers were set up around the perimeter of selected drying cells at the Calumet WRP. Air samples were collected using a HiVol sampler with a fiberglass filter followed by polyurethane foam filter (PUF) every 12 days over the summer period of 2002. The samples were sent to Clarkson University for analysis. The R&D Department's Toxic Substances Laboratory also analyzed a portion of the samples in 2004 as part of a round robin test. The analyses were completed during 2004 and a draft report was submitted for review by Clarkson University at the end of 2004.

Emission of Hazardous Air Pollutants (HAPs) from District WRPs. As part of the NPDES permits and regulations under the Clean Air Act, an estimate of the emission of 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 Toxic Substances Section for 87 compounds which are HAPs of concern for 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 all 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.

Association of Metropolitan Sewerage Agencies (AMSA) Air Quality Committee. The WTPR Section staff also served on AMSA's Air Quality Committee. This committee addresses various issues regarding the Clean Air Act regulations which are pertinent to POTWs. During 2004, an evaluation of the USEPA's WATER9 model and two other collection system models for estimating volatile organic compounds (VOCs) and HAP emissions from wastewater collection systems was made. After discussions with the USEPA, AMSA has initiated studies to review the mechanics of the

modeling methodologies used. Future work will also include development of field data from interceptor sewers for use in the models.

Grit Testing. During the course of the Stickney Master Plan meetings in 2004, the subject of predigestion centrifuge maintenance was raised as to whether it was related to uncaptured grit that may end up in the Southwest preliminary sludge. A study was conducted using a mobile vortex degritting unit, which was rented by the Engineering Department, in order to separate the "grit" from the preliminary sludge. The unit was operated over a period of three days in cooperation with M&O Department personnel at the Stickney WRP. Sieve analyses of the collected material were performed by the Biosolids Utilization and Soil Science Section.

The volume of "grit" collected was approximately 5.5 gallons per million gallons of preliminary sludge. This separated material contained approximately 31 percent total solids of which 74 percent was organic (volatile) material and 26 percent was inert. The particle size distribution showed 22 percent of the mass smaller than 150 μm, 58 percent between 150 and 425 μm, and 20 percent equal to or greater than 425 μm in size. A majority of grit material collected did not look like typical grit either in composition or in appearance, and the finer fractions were relatively light.

Phosphate Detergents. In view of pending requirements for removal of phosphorus from WRP effluents, an evaluation of phosphorus contributions from phosphate-containing automatic dishwasher detergents (ADWDs) was made. Based upon factors developed in a study by the Minnesota Pollution Control Agency, it was estimated that ADWDs account for 6.24 percent of the phosphorus load to the District's WRPs.

O'Hare CUP Reservoir Fill Event Experiments. One full-scale experiment was conducted in 2004 to study the potential for odor formation during the storage of combined sewer overflows (CSOs) in the O'Hare CUP Reservoir without mechanical aeration. The objective of this experiment was to use the information collected in this full-scale experiment at the existing O'Hare CUP Reservoir in the evaluation of aeration systems of the future McCook Reservoir and the Thornton Reservoir.

The experiment was conducted during a fill event which occurred on June 1, 2004, through June 30, 2004. CSOs were stored without aeration for a 30-day period without noticeable odor formation. The final R&D Department Report No. 04-16 on this fill event was published in September 2004.

The results of this experiment were provided to the U. S. Army Corps of Engineers (ACOE) to aid in their design of the McCook and Thornton Reservoirs.

Thornton Transitional Reservoir Fill Events for 2004. One of the reporting requirements for the Thornton Transitional Reservoir as specified by the Illinois Environmental Protection Agency (IEPA) is a written, narrative report of fill events that have occurred during the year.

There were a total of two fill events at the Thornton Transitional Reservoir during 2004. The events took place on March 5, 2004, and June 1, 2004.

The first fill event took place on March 5, 2004. This fill event resulted in 22.5 million gallons of CSO stored in the reservoir. The second fill event which took place on June 1, 2004, resulted in 93 million gallons of CSO stored in the reservoir.

In both fill events samples were collected from the reservoir and the four water quality monitoring wells surrounding the reservoir.

Technical Assistance to the United States Army Corps of Engineers. Under contract with the ACOE, the R&D Department is providing technical assistance to support the design of the aeration and washdown systems of the McCook Reservoir. Regular monthly meetings between ACOE and District personnel are being held to review progress on the design. Alternative design criteria and technologies are being investigated to lessen the District's eventual operating and maintenance costs for this facility as well as the Thornton Reservoir.

Groundwater Monitoring Fill Event Experiments. Groundwater monitoring reports for the year 2003 were prepared for the five TARP systems which included the Mainstream Tunnel System, the Calumet Tunnel System, the Des Plaines Tunnel System, the Upper Des Plaines Tunnel System and the O'Hare CUP Reservoir. These reports were submitted to the IEPA as well as to the USEPA.

Characteristics of Stormwater Runoff from Three IDOT Pumping Stations. Stormwater runoff from three Illinois Department of Transportation (IDOT) pumping stations were sampled during several storm events between October 2002 and July 2003 by the Industrial Waste Division (IWD) of the R&D Department. This project was to collect sampling and storm data, perform data analysis, and prepare an R&D report, describing the characteristics of stormwater runoff sampled at these locations. The report, containing the description of background information on sampling stormwater runoff discharged to the Chicago Waterway System from the three IDOT pumping stations, methodology of sample collection and data analysis and results of data analysis, was completed in 2004, and published as R&D Report No 04-7.

Additional Digestion Tests for Calumet WRP. This project was to monitor whether the requirements for vector attraction reduction could be met during the biosolids processing at the Calumet WRP, using Option 2 of Section 503.33(b) of the CFR 40 503 Regulations. Volatile solids reduction of 38 percent, which is the requirement for achieving vector attraction reduction under Option 1 of Section 503.33(b) of the 503 Regulations, cannot be consistently achieved at the Calumet WRP through its two-step anaerobic digestion. Option 2 states that vector attraction reduction is demonstrated if after anaerobic digestion of the biosolids, the volatile solids in the biosolids are reduced by less than 17 percent in an additional 40 days bench-scale anaerobic digestion at a temperature between 30° and 37°C. Additional anaerobic digestion tests for the digester draw from the Calumet WRP were conducted in the R&D wastewater treatment research laboratory once or twice a month in 2004. The test procedure proposed by USEPA was generally followed in each test. Fourteen tests were conducted in 2004, and the volatile solids reduction in all these tests were less than 17 percent. This indicated that the requirement for vector attraction reduction for the biosolids produced at the Calumet WRP can consistently be met by using Option 2 of the 503 Regulations. The test results were to be included in the annual biosolids management report to USEPA.

Stickney Master Plan Project. This project was to participate in a study conducted by a consultant team on the future infrastructure and process needs for the Stickney WRP, which is called the Stickney Master Plan Study. The project involved attending workshops, which were held by the

consultant team, to discuss and evaluate the alternatives for improving and updating infrastructure and process facilities of the Stickney WRP to meet the future needs. Also, another major task of the project was to review the documents generated by the consultant team as a result of the Stickney Master Plan Study, check the accuracy and suitability of documents pertinent to the study, and to make comments on the documents.

Water Environment Research Foundation (WERF) Study on Nutrient Removal Full-Scale Testing at the Egan WRP. This project was a part of the District commitment to the WERF Project No. 02-CTS-1, Sustainable Technology for Achieving Very Low Nitrogen and Phosphorus Effluent. The project involved coordinating, preparing for and implementing the experimental plan of full-scale testing of biological nutrient removal at the John E. Egan WRP. Field sampling for obtaining nitrogen and phosphorus profiles along the testing aeration tank was conducted. The analytical and operational data collected during the test period were gathered and tabulated to be provided to the principal investigator of the WERF project.

Unsteady Flow Water Quality Modeling for the Chicago Waterway System. This project was to work with a consultant, who was contracted by the District, to develop an unsteady flow water quality model for the Chicago Waterway System. The project involved working as a member of a liaison committee, assisting on data collection for the model development, reviewing the documents prepared for the District by the consultant, evaluating the model simulation results during model calibration, and attending the training on how to run the software used for the model.

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 that may be emitted to the surrounding areas. One station is located south of the plant area on 130th Street. Another station is located north of the plant area inside the fence line.

The continuous hydrogen sulfide analyzers were fully operational in 2004. The hydrogen sulfide concentration data from each analyzer was recorded and compared to determine reliability of each in detecting hydrogen sulfide in the low part per billion range. The lead acetate technology proved to be desirable, and therefore continuous odor monitoring at both the locations is being done using monitors based on lead acetate technology.

Odor Studies for the Upper Des Plaines 14 Interceptor Sewer. An evaluation of the Upper Des Plaines collection sewer 14 (UDP14) was conducted to determine the source of odor problems in the vicinity of Drop Shaft 5 (DS5) near the James C. Kirie WRP. The parameters evaluated were pH, temperature, ORP, BOD, FOG, suspended solids, conductivity, sulfides, and sulfates. The results showed a high component of food industry type waste. The food industry waste has increased BOD_5, FOG, and sulfides.

The M&O Department installed a chemical dosing station upstream of DS5. Nitrate salt solution was dosed into UDP14 to reduce the concentration of sulfides in the wastestream. The wastestream and manhole airspace were monitored to determine the effectiveness of the dosing. In general, the addition of the nitrate salt helped reduce odors at DS5 as well as in the vicinity.

Re-Evaluation of Local Pretreatment Limits—2004. The pollutants of concern from the April 2003 Report are tracked to evaluate loading increases which may approach the maximum allowable headworks loading.

GPS-X Model for the Stickney Master Plan. The Hydromantis GPS-X software has been chosen to develop the Stickney Master Plan. The initial data needed for input into the model was collected and evaluated in conjunction with the consulting firm. The input involved new analytical data, as well as historical analytical and operations data.

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 applications 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 2004, 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 consists of studies to support the local marketing of biosolids such as: establishing research plots in farmers' fields to demonstrate the safety of farmland application of biosolids, establishing cooperative research with consulting soil scientists and the IEPA to study availability of biosolids phosphorus to plants and its environmental impacts, studying the beneficial effects of biosolids use on golf course turf, and studying soluble salts in biosolids and their effect on plant growth. The research component also consists of studies to demonstrate the protection afforded to human health and the environment by the USEPA's Part 503 biosolids regulations, such as: studying the toxicity of trace elements to plants, and studying changes over time in the bioavailability of trace elements to plants in biosolids-amended soils.

The Section also conducts applied research to support land reclamation activities at the District's lands in Fulton County, including maintaining experimental corn plots which have received cumulative applications of 923 tons of biosolids per acre (maximum-amended plots) from 1973 through 2004. These plots are utilized to study changes in the fertility of mine soil, the uptake of trace elements into corn, and the fate of nutrients from continuous annual applications of biosolids.

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 Research and Development Complex.

Analytical Microbiology and Biomonitoring Section

In 2004 the Analytical Microbiology and Biomonitoring Section was composed of 4 professional and 12 technical personnel. 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 2004 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. Results collected to date indicate that FRNA coliphages are a good alternate indicator for assessing the efficiency of wastewater sludge treatment.

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 2004.

Analytical Microbiology Sub-Group. Fecal coliform 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, FC, and total heterotrophic bacteria. A research study begun in 2000 to find the *Escherichia coli* (EC) to fecal coliform (FC) ratio in the District's WRP effluents and ambient waters was completed.

Biomonitoring Sub-Group. Acute whole effluent toxicity (WET tests) with fish (*Pimephales promelas)* and daphnids (*Ceriodaphnia dubia)* were conducted on an effluent sample from the James C. Kirie WRP. Chronic toxicity tests with these same organisms were conducted on effluent samples from the Hanover Park, Stickney, Calumet, and North Side WRPs. Biomonitoring reports for the Hanover Park and Kirie WRPs were submitted to the IEPA in compliance with the respective NPDES permits. Results of chronic tests conducted on the Stickney, Calumet, and North Side WRPs, which were conducted as part of a cooperative study with the USEPA and IEPA, were submitted to the USEPA and IEPA.

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 Chicago area waterways. 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 Chicago area waterways. 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 2004 by the Aquatic Ecology and Water Quality Section included the following.

Benthic Invertebrate Monitoring. During the period of June through October 2004, benthic invertebrates were assessed at 29 monitoring stations in the Calumet, Chicago, and the Des Plaines River Systems. Eight stations were located on the deep-draft waterways and 21 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 2004, at 29 stations in the Calumet, Chicago, and Des Plaines River Systems. Eight stations were located on the deep-draft waterways and 21 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. Sixty-eight fish were filleted from 11 Ambient Water Quality Monitoring (AWQM) stations to comprise 19 fish tissue composites, which were sent to IEPA for contaminant analyses.

Monitoring for Asian carp was also performed during April and October 2004, 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 2004, a physical habitat assessment was conducted at 29 monitoring stations in the Chicago, Calumet, and Des Plaines River Systems. In order to assess sediment chemistry and sediment toxicity, sediment samples were collected at 20 monitoring stations in the Des Plaines River System. The results of the habitat assessments, chemical analyses of sediments, and sediment toxicity testing will be provided to the IEPA for their use in preparing the Illinois 305(b) assessment report.

Chlorophyll Monitoring. During 2004, 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 2004 at 20 stations in the Calumet and Chicago River Systems. 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 and Chicago River Systems.

Illinois Waterway Monitoring. During May, August, and October 2004, 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.

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 on the Des Plaines River, Salt Creek, and the North Branch of the Chicago River for this 3-year project. Starting in April 2004, water samples were collected two times per month through November, once in December (winter sampling only once per month), and on four consecutive days during three rain events. Water samples were analyzed for nutrients and other relative 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 sample from each station for analysis by the District contractor.

Fecal Coliform Density Sampling Study. In order to assess the distribution and die off of FC bacteria in District waterways, an FC density sampling study was implemented from April 1 until December 31, 2004. During this period, there were nine dry weather and three wet weather sampling events at six stations on the North Shore Channel and North Branch Chicago River, as well as routine monthly monitoring samples. Six stations on the Little Calumet River and the Calumet-Sag Channel were sampled eight times during dry weather and four times during wet weather events, as well as during routine monthly monitoring sampling events. Wet weather events required water sampling for a maximum of three days following a rain event. The results of this study may impact the current Chicago Area Waterways UAA study.

Radiochemistry Section

The Radiochemistry Section is responsible for the radiological monitoring of waters, wastewaters, and biosolids, and the maintenance of radiation safety at the District. It also performs any special tasks involving the use of ionizing radiation and radioisotopes. The Section performed 4,937 tests in 2004.

Radiological Monitoring of Waterways. The radiological monitoring of the area's waterways under the jurisdiction of the District includes the Calumet, Chicago, and Des Plaines River Systems. The concentration of radioactivity in water samples analyzed from all three river systems were within the USEPA Drinking Water Standards for gross alpha and gross beta radioactivity.

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 Area Waterways.

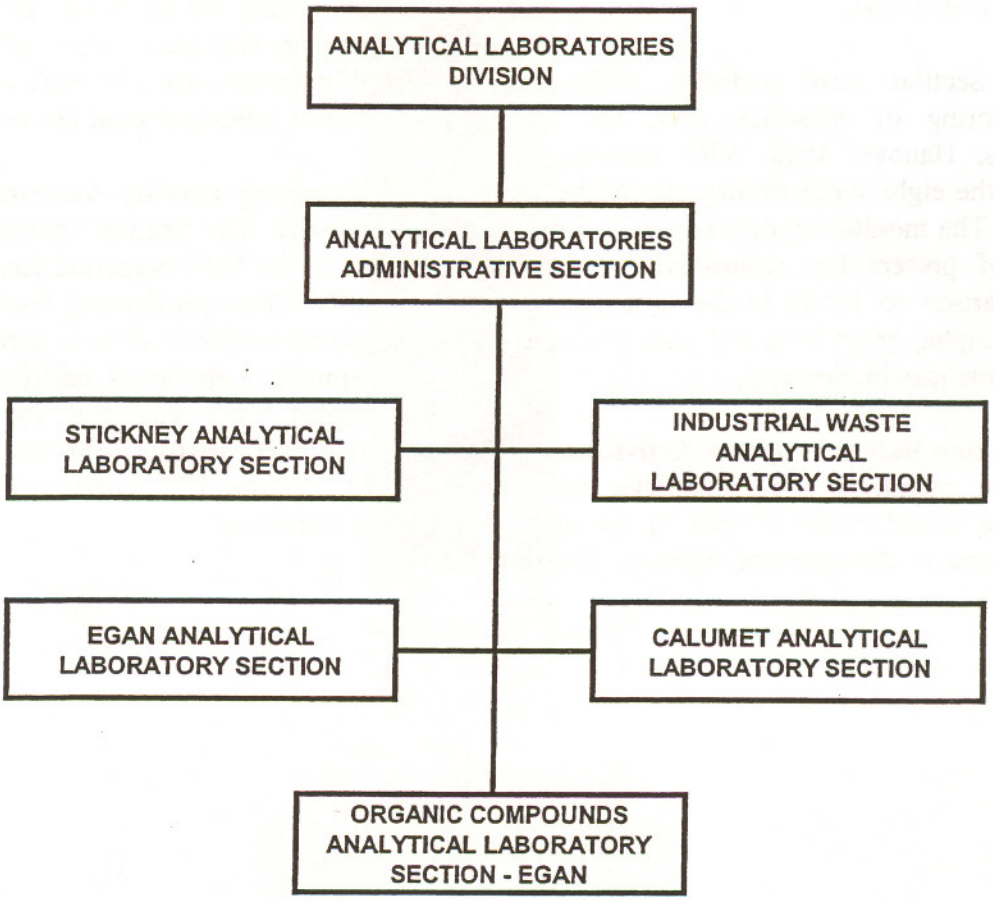
The Section also performs radiological monitoring of biosolids from the seven WRPs, Hanover Park WRP lagoons, and from the eight solids drying sites of the District. The monitoring data serves as a measure of present-day radioactivity levels in comparison to levels in the past years for gross alpha,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

Radiation Safety Program Activities. The Section maintains the 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 radiological monitoring of personnel and work areas in the Radiochemistry Laboratory, leak testing of nickel-63 detectors in gas chromatographs at the R&D laboratories, leak testing of nuclear gauges used by the Engineering Department, leak testing of an X-ray fluorescent paint analyzer, and leak testing of an APD2000 CW 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 RadChem proficiency testing 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.

Figure 2

ANALYTICAL LABORATORIES DIVISION ORGANIZATION CHART



ANALYTICAL LABORATORIES DIVSION

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 26, could not be accomplished without automation and instrumentation. To improve automated data acquisition, tracking, storage and reporting from these instruments, the Laboratory Information Management System (LIMS) upgrade to Windows was completed and in production in 2004. This migration to the Windows environment will increase processing and reporting speed, take advantage of new functionality, and ensure continued technical and software support for a less customized system. Through its LIMS team, the ALD provided ongoing support during 2004 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. The first laboratory audit inspection was conducted in December 2003 and the four other ALD laboratories were audited in 2004.

The five analytical laboratories maintained laboratory accreditation by the IEPA during 2004 in accordance with National Environmental Laboratory Accreditation Conference standards.

Stickney Analytical Laboratory (SAL)

This laboratory is located at the Lue-Hing R&D Complex and performed 563,375 analyses for solids, nutrients, and metals on 42,734 samples in providing analytical services for the following:

M&O Department.

1. Process Control, Operations Monitoring, and NPDES 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.

TABLE: TOTAL NUMBER OF ANALYSES PERFORMED IN 2004

Program	Nutrients	Oxygen Demands	Metals	Solids	Organic Compounds	Others	Total Program
4652 Liquid Monitoring	116,503	83,341	169,462	57,280	44,522	61,477	532,585
TARP	4,740	1,720	2,432	1,272	0	4,190	14,354
Treatment Facilities	111,764	81,620	167,030	56,008	44,522	57,286	518,231
4653 Solids Monitoring	16,935	1,195	52,397	112,739	13,260	36,130	232,655
4666 Sewage & Waste Control	1,207	177	250,936	373	55,369	17,830	325,892
4663 User Charge	0	61,855	0	21,652	0	33,917	117,423
4671 Lake Michigan	132	0	0	21	0	47	200
4672 Waterways	16,237	5,227	60,347	3,609	61,531	20,622	167,573
4673 Inspection Events	0	0	0	0	0	0	0
4674 IPCB Water Quality	0	0	0	0	0	0	0
4681 Assistance to M&O	303	98	6,106	2,887	645	10,108	20,147
4682 Assistance to Others	290	1,315	1,174	201	0	716	3,696
4690 Operations & Research	10,307	817	74,779	1,374	3,578	904	91,759
Totals	161,915	154,025	615,201	200,134	178,905	181,750	1,491,930

5. TARP Groundwater Monitoring Program.

6. Stickney Master Plan Study.

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.

2. Ambient Water Quality Monitoring Network Program.

3. Solids Management Areas at LASMA, Marathon, Vulcan, Egan, HASMA, and RASMA.

4. NANI analysis for Biosolids samples from LASMA, Marathon, Vulcan, HASMA, RASMA, SWRP Lagoons, and Stony Island Avenue.

5. Analytical Support for Biosolids Marketing.

6. Illinois Waterways Monitoring Program.

7. TARP Monitoring Wells (Thornton and Calumet).

8. Full-Scale Evaluation of Centrifuge Dewatering.

9. Laboratory IDPH Certification, Annual Quality Control.

10. Octopus Centrifuge Optimization Testing.

11. Hanover Park Fischer Farm Biosolids/Field Soils.

12. Biosolids Leaching Study.

13. Calumet Master Plan Study.

14. Grit Determination of Preliminary Sludge.

15. CFAR Nutrient 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 221,193 analyses on 24,381 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, and NPDES Permit Compliance Monitoring for the District's seven WRPs.

EM&R Division. Various environmental monitoring and research programs, such as: (1) Ambient Water Quality Monitoring Network Program, (2) Illinois Waterways Monitoring Program, and (3) Stickney and Calumet Master Plan Studies.

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).

In 2004, the laboratory upgraded several major pieces of equipment and purchased other equipment to facilitate the analytical work of the laboratory:

1. A robotic BOD analyzer was purchased and will be used to determine the final dissolved oxygen content of sample BODs of a non-industrial origin. This is the first step in the semi-automation of the BOD analysis.

2. A third automated solid-phase extraction system for FOG analysis was purchased and put in service increasing the analytical capability for this analysis by at least one-third. The other two systems were upgraded with new stainless steel valves that offer greater valve control and a longer operating life. These systems benefit employee health by reducing solvent usage and thereby analyst exposure.

3. The twenty-year-old automated weak acid dissociable cyanide and cyanide after manual distillation equipment and data collection software were replaced with new state of the art equipment that was put into service in March.

The IWAL continued an assessment of the use of a synthetic BOD seed material.

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 2004, the OCAL performed 178,905 analyses on 639 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 trihalomethanes in the effluent samples from Egan and Hanover Park WRPs to evaluate an alternative way of disinfection instead of sodium hypochlorite.

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.

3. Analyzed Chicagoland and Illinois waterways samples, including aqueous and sediment samples.

4. Various land reclamation projects.

5. Analyzed for organic compounds in water samples from Calumet Union Drainage, City of Markham, during dry and wet conditions.

6. Analyzed culture or millipore water samples.

7. Analyzed extracts of air samples for the PCB congener study as a joint project with Clarkson University (New York).

8. Analyzed for organic compounds in Lockport Powerhouse drinking water samples semiannually.

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 to help monitor possible sources from the industrial discharges.

3. Analyzed emergency spill samples from the local sewer of Riverside, including air and water samples.

John E. Egan Analytical Laboratory (EAL)

This laboratory is located at the John E. Egan WRP and performed 239,089 analyses on 27,375 samples in providing analytical services for the following:

M&O Department.

1. Process Control Analyses and NPDES Compliance Monitoring for Egan, Kirie, Hanover Park and North Side WRPs.

2. Process Stream Evaluations of Suspected Incidents of Toxic Interferences 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. Development, Implementation and Support of LIMS Reports for Use by M&O Personnel at the four North Area WRPs.

EM&R Division.

1. Soluble Copper Study of Kirie and Hanover Park WRPs.

2. Egan WRP Centrifuge Cake Testing for Application of Sludge to Land, Part 503 Reporting Requirements.

3. Hanover Park WRP Lagoon Sludge Testing for Application of Sludge to Land, Part 503 Reporting Requirements.

4. WERF Nutrient Removal Study.

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 281,707 analyses on 31,275 samples in 2004 by providing analytical services for the following:

M&O Department.

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

2. Analytical Support for the Calumet Master Plan.

3. Monitoring of diurnal fluctuations to the Calumet raw influent on a monthly basis.

4. Ongoing Assistance to Investigate Increased Zinc Loadings to the Calumet WRP.

5. USEPA and IEPA Split Sampling Program.

6. Monitoring of Hydrogen Sulfide Concentrations at the Kirie WRP.

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

EM&R Division.

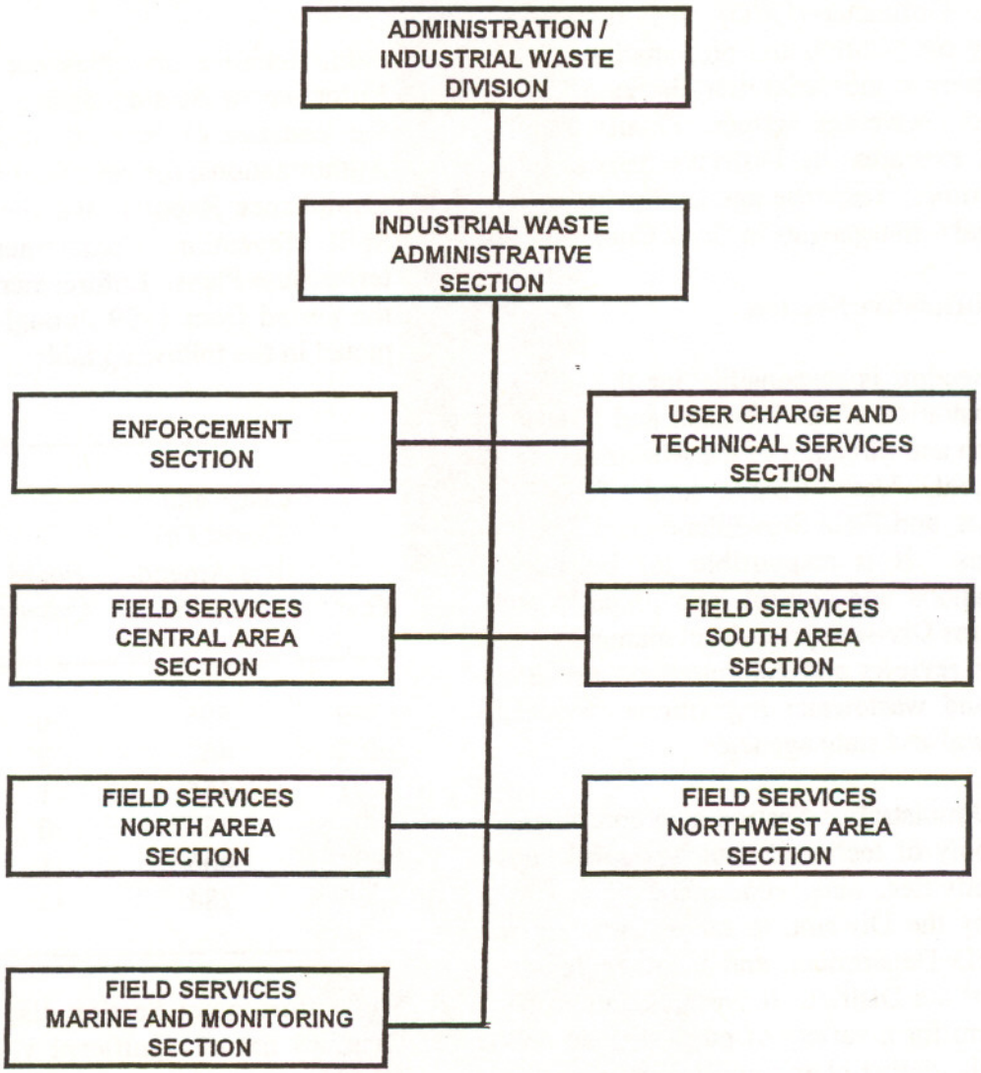
1. Calumet Biosolids Processing Operations and the Fulton County Prairie Plan Project.

2. Sulfate Analyses of Waterways, TARP, and Lysimeter Samples.

3. Sulfate and Trace Metals Analyses for the USX Project.

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 2004 included the issuance or renewal of 228 Discharge Authorizations; the review of 885 Continued Compliance Reports; and the review of 40 Spill Prevention, Containment and Countermeasure Plans. Enforcement activities for the period from 1999 through 2004 are depicted in the following table.

Year	Cease and Desist Orders/Amendments	Board Orders	Legal Actions/ Amendments
1999	595	6	58
2000	462	2	0
2001	456	1	6
2002	429	0	11
2003	406	1	18
2004	284	11	4

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 1999 through 2004 is depicted in the following table.

Year	Effluent Limitations	Reporting Requirements	Other Requirements[1]	Total Number of Industrial Users Published
1999	30	36	0	66
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

[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 2004, the Section received and reviewed reports filed by 3,560 users (920 commercial-industrial and 2,640 tax-exempt users) containing calculations of their User Charge liabilities under the UCO and documentation corroborating their data. The Section classified 56 new large commercial-industrial and tax-exempt users and 108 small nonresidential-commercial users in 2004.

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 2004, the Section reviewed 951 District inspection and sampling reports from the Field Surveillance Section; 54 user proposals for sampling, monitoring and/or installations; sealed 35 privately owned water meters used for reporting volume deductions or discharge volumes; and conducted 437 field inspections to verify user data and/or compliance with the UCO. As of the end of 2004, the Section had also identified 251 industrial 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.

Effective January 1, 2001, the UCO was comprehensively amended to provide for the direct recovery of costs for administration of the SWCO and UCO from industrial users, through Minimum Pretreatment Requirements charges, Noncompliance Enforcement (NCE) charges and User Charge Verification charges. However, effective January 1, 2005, the recovery of NCE charges will be administered through the Sewage and Waste Control Ordinance.

The following table shows the User Charge revenue, as reported by the District's Finance Department, collected over the period from 2000 through 2004.

Year	User Charge Receipts
2000	$49,297,496
2001	$50,037,292
2002	$47,061,518
2003	$50,474,317
2004	$48,007,510

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 2004, 1,759 SWCO and 1,282 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 2004, 16,493 water quality samples were collected. Further, all groundwater monitoring wells installed for the District's TARP were routinely sampled. In 2004, 1,726 samples were obtained at 131 TARP groundwater monitoring wells. Chemical toilet service companies who, under District permit, discharge cleanings at the Stickney WRP are also monitored and sampled. During 2004, three chemical toilet service companies made 352 disposals at the Stickney WRP. For these disposal events, 60 samples were randomly obtained.

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

In 2004, 240 investigations were conducted in response to requests from federal, state and local agencies, municipalities and private citizens; 51 investigations were conducted in response to self-reported industrial activities; and 42 investigations were conducted in response to requests from the District's M&O Department.

APPENDIX I

MEETINGS AND SEMINARS 2004

1. Aquatic Nuisance Species Dispersal Barrier Meeting, Chicago, Illinois, January 2004.
2. Asian Carp Rapid Response Planning Team Meeting, Chicago, Illinois, January 2004.
3. Calumet Government Working Group, 2004 First Quarter Meeting, Chicago, Illinois, January 2004.
4. Chicago Airport System Environmental Conference, Chicago, Illinois, January 2004.
5. Chicago Biodiversity Plan, Chicago Department of Planning and Development Meeting, Chicago, Illinois, January 2004.
6. Illinois Water Environment Association, Government Affairs in Water Pollution Control Seminar, Lisle, Illinois, January 2004.
7. Midwest Water Analysts Association, Winter Expo 2004, Kenosha, Wisconsin, January 2004.
8. United States Department of Agriculture, CSRS Regional Research Committee W-170 Annual Meeting, Lake Buena Vista, Florida, January 2004.
9. Association of Metropolitan Sewerage Agencies, 2004 Winter Conference, Los Angeles, California, February 2004.
10. Illinois Nutrient Standards Science Committee Meeting, Springfield, Illinois, February 2004.
11. Illinois Soil Classifiers, Annual Education Seminar, Wheaton, Illinois, February 2004.
12. Illinois Water Environment Association, Industrial Pretreatment and Hazardous Waste Winter Meeting, Lombard, Illinois, February 2004.
13. Lake Michigan Air and Waste Management Association, Technical Tools for Air Emission Management Seminar, Willowbrook, Illinois, February 2004.
14. Midwest Section of Air and Waste Management Association, Luncheon Meeting, Chicago, Illinois, February 2004.

APPENDIX I

MEETINGS AND SEMINARS 2004

15. United States Environmental Protection Agency, Region V, 2004 Midwest Surface Water Monitoring and Standards Meeting, Chicago, Illinois, February 2004.

16. United States Geological Survey, United States Environmental Protection Agency, Region V, and St. Cloud State University, Workshop on Environmental Fate and Effects of Alkylphenols in the Aquatic Environment, Mounds View, Minnesota, February 2004.

17. Water Environment Federation, 18th Annual Residuals and Biosolids Management Conference, Salt Lake City, Utah, February 2004.

18. American Chemical Society, 227th National Meeting, Anaheim, California, March 2004.

19. Asian Carp Rapid Response Planning Team Meeting, Chicago, Illinois, March 2004.

20. Illinois Association of Wastewater Agencies, Mini-Conference, Springfield, Illinois, March 2004.

21. Illinois Water Environment Association, 25th Annual Conference, Rockford, Illinois, March 2004.

22. Industrial Water, Waste, and Sewage Group Dinner Meeting, Chicago, Illinois, March 2004.

23. Northwestern Indiana Regional Planning Commission, Interagency Task Force on E. coli, Portage, Indiana, March 2004.

24. Pittsburgh Conference, Chicago, Illinois, March 2004.

25. Third World Conference, 30th Annual Conference, Global Change: Development, Peace, and Security, Chicago, Illinois, March 2004.

26. Universal Imaging Institute, Quantitative Imaging Microscopy Training, Downington, Pennsylvania, March 2004.

27. Water Environment Research Foundation, Joint Research Council and Subscriber Meeting, Phoenix, Arizona, March 2004.

28. Water Environment Research Foundation, PSC Meeting, Lewisburg, Pennsylvania, March 2004.

APPENDIX I

MEETINGS AND SEMINARS 2004

29. Association of Metropolitan Sewerage Agencies, CSO Partnership Issues Workshop, Chicago, Illinois, April 2004.

30. Calumet Government Working Group, 2004 Second Quarter Meeting, Chicago, Illinois, April 2004.

31. Central States Water Environment Association, Annual Education Seminar, Madison, Wisconsin, April 2004.

32. Hydromantis GPS-X Software Training, Hamilton, Ontario, April 2004.

33. Midwest Water Analysts Association, Spring Planning Meeting, Gurnee, Illinois, April 2004.

34. National Biosolids Appeals Board Meeting, Washington, D.C., April 2004.

35. Water Environment Federation, Odors and Air Emissions Conference, Bellevue, Washington, April 2004.

36. American Society for Microbiology, 104th General Meeting on Infectious Diseases, New Orleans, Louisiana, May 2004.

37. Aquatic Nuisance Species Dispersal Barrier Meeting, Chicago, Illinois, May 2004.

38. Association of Metropolitan Sewerage Agencies, 2004 National Environmental Policy and 34th Annual Meeting, Washington, D.C., May 2004.

39. DuPage River, Salt Creek Watershed Workgroup Meeting, Elmhurst, Illinois, May 2004.

40. Illinois Environmental Protection Agency, Nutrient Criteria Workgroup Meeting, Springfield, Illinois, May 2004.

41. Illinois Environmental Protection Agency, Public Hearing, Impaired Waters of Illinois, Draft Section 303(d) List, Springfield, Illinois, May 2004.

42. Industrial Water, Waste, and Sewage Group Dinner Meeting, Chicago, Illinois, May 2004.

APPENDIX I

MEETINGS AND SEMINARS 2004

43. Midwest Water Analysts Association, 2004 Spring Meeting, Kenosha, Wisconsin, May 2004.

44. Thermo Electron Corporation Seminar, Schaumburg, Illinois, May 2004.

45. Garden Clubs of Illinois, Annual Meeting, Barrington, Illinois, June 2004

46. New Solutions for Trace Metals Analysis Seminar, Chicago, Illinois, June 2004.

47. North American Benthological Society, Annual Meeting, Vancouver, British Columbia, June 2004.

48. United States Army Corps of Engineers, Hearing on Integrated River Management for Upper and Illinois Waterway System, Peoria, Illinois, June 2004.

49. Association of Metropolitan Sewerage Agencies, 2004 Summer Conference, Denver, Colorado, July 2004.

50. Association of Metropolitan Sewerage Agencies and United States Environmental Protection Agency, Water9 Model Evaluation Meeting, Research Triangle Park, North Carolina, July 2004.

51. DuPage River, Salt Creek Watershed Workgroup Meeting, Elmhurst, Illinois, July 2004.

52. Illinois Association of Wastewater Agencies, Technical Committee Meeting, Utica, Illinois, July 2004.

53. United States Environmental Protection Agency, Region V, Water Environment Federation, Innovative Uses of Biosolids and Animal Manure Symposium, Chicago, Illinois, July 2004.

54. Water Environment Federation, Conference on Innovative Uses of Biosolids and Animal Manure, Chicago, Illinois, July 2004.

55. American Fisheries Society, 134th Annual Meeting, Madison, Wisconsin, August 2004.

56. Five Cities Plus, 2004 Conference, St. Louis, Missouri, August 2004.

APPENDIX I

MEETINGS AND SEMINARS 2004

57. Illinois Pollution Control Board, Hearing on Dissolved Oxygen Standards RO4-25, Springfield, Illinois, August 2004.

58. Illinois Water Environment Association, State Fair Watershed Park Booth, Springfield, Illinois, August 2004.

59. Northwestern Indiana Regional Planning Commission, Interagency Task Force on E.coli, Portage, Indiana, August 2004.

60. United States Geological Survey, Streamgage Cooperators Meeting, Alton, Illinois, August 2004.

61. Water Environment Federation, Central States Water Environment Association, Collection Systems 2004 Conference, Milwaukee, Wisconsin, August 2004.

62. Water Environment Research Foundation, Web Seminar on Land Application of Biosolids, Online, August 2004.

63. DuPage River, Salt Creek Watershed Workgroup Meeting, Elmhurst, Illinois, September 2004.

64. Illinois Association of Wastewater Agencies, Annual Meeting, Galena, Illinois, September 2004.

65. Illinois Emergency Management Conference, Springfield, Illinois, September 2004.

66. Industrial Water, Waste, and Sewage Group Dinner Meeting, Chicago, Illinois, September 2004.

67. Midwest Water Analysts Association, 2004 Fall Meeting, Milwaukee, Wisconsin, September 2004.

68. Association of Metropolitan Sewerage Agencies, Pretreatment Coordinators Workshop, Norfolk, Virginia, October 2004.

69. CSO Partnership and Association of Metropolitan Sewerage Agencies Conference, Cracking the UAA Code: Wet Weather Water Quality Assessments, Chicago, Illinois, October 2004.

APPENDIX I

MEETINGS AND SEMINARS 2004

70. Calumet Government Working Group, 2004 Third Quarter Meeting, Chicago, Illinois, October 2004.

71. Chicago River Summit, Chicago, Illinois, October 2004.

72. DUFLOW Model Training, Cicero, Illinois, October 2004.

73. DuPage River, Salt Creek Watershed Workgroup Meeting, Elmhurst, Illinois, October 2004.

74. FACSS, 2004 31st Annual Meeting, Portland, Oregon, October 2004.

75. Great Lakes Withdrawal Meeting, Gurnee, Illinois, October 2004.

76. Illinois Pollution Control Board, Hearing on Interim Phosphorus Effluent Standard, Springfield, Illinois, October 2004.

77. Illinois Water 2004 Conference, Urbana, Illinois, October 2004.

78. Illinois Water Environment Association, Program Planning Committee Meeting, Aurora, Illinois, October 2004.

79. Marquette University Environmental Engineering Seminar, Microbial Source Tracking by Fatty Acid Methyl Ester Profiles of Indicator Organisms, Milwaukee, Wisconsin, October 2004.

80. Midwest Water Analysts Association, Board and Steering Fall Planning Meeting, Gurnee, Illinois, October 2004.

81. Soil Science Society of America, Annual Meeting, Seattle, Washington, October 2004.

82. Soil, Sediments, and Water Conference, Boston, Massachusetts, October 2004.

83. Thermo Informatics World 2004, Tucson, Arizona, October 2004.

84. United States Environmental Protection Agency, Region V, Product Expo Seminar, Chicago, Illinois, October 2004.

APPENDIX I

MEETINGS AND SEMINARS 2004

85. Unsteady Flow Water Quality Model Duflow Training, Cicero, Illinois, October 2004.

86. Water Environmental Federation, 77th Annual Technical Exhibition and Conference, New Orleans, Louisiana, October 2004.

87. Aquatic Nuisance Species Dispersal Barrier Meeting, Chicago, Illinois, November 2004.

88. DuPage River, Salt Creek Watershed Workgroup Meeting, Elmhurst, Illinois, November 2004.

89. Great Lakes Beach Association, 2004 Annual Conference on Recreational Water Quality, Parma, Ohio, November 2004.

90. Industrial Water, Waste, and Sewage Group Dinner Meeting, Chicago, Illinois, November 2004.

91. Water Environment Research Foundation, Web Seminar on Nutrients, Online, November 2004.

92. Calumet Government Working Group, 2004 Fourth Quarter Meeting, Chicago, Illinois, December 2004.

93. DePaul University, Landscaping for Native Plants Symposium, Chicago, Illinois, December 2004.

94. DuPage River, Salt Creek Watershed Workgroup Meeting, Elmhurst, Illinois, December 2004.

95. Great Lakes By-products Management Association, 5th Annual Conference, Chicago, Illinois, December 2004.

96. Midwest Environmental Laboratory, Stakeholders Summit, Chicago, Illinois, December 2004.

97. Midwest Water Analysts Association, Expo Planning Meeting, Gurnee, Illinois, December 2004.

98. Perkin Elmer Midwest Region Plasma Spectroscopy User Meeting, Oak Brook, Illinois, December 2004.

APPENDIX I

MEETINGS AND SEMINARS 2004

99. Water Environment Research Foundation, Web Seminar on Wet Weather Management, Online, December 2004.

APPENDIX II

PRESENTATIONS 2004

1. "Could Dioxins Accumulate in Biosolids-Amended Soil?" Presented at the Sustainable Land Application Conference, Lake Buena Vista, Florida, by Lakhwinder S. Hundal, Thomas C. Granato, and Richard I. Pietz, January 2004. PS

2. "Phosphorus Release in Chicago Biosolids and Biosolids Amended Soil." Presented at the Sustainable Land Application Conference, Lake Buena Vista, Florida, by Albert E. Cox and Thomas C. Granato, January 2004. PS

3. "Using Chlorophyll Monitoring to Estimate Nutrient Enrichment in Chicago Area Waterways." Presented at the Midwest Water Analysts Association Winter Expo, Kenosha, Wisconsin, by Jennifer L. Wasik, January 2004. PP

4. "Wetland Technology for Removal of Nutrients." Presented at the Chicago Biodiversity Plan, Chicago Department of Planning and Development Meeting, Chicago, Illinois, by Richard Lanyon, January 2004. PP

5. "Characteristics of Chicago Biosolids and Their Use as a Conditioner to Enhance Soil Restoration." Presented at the Illinois Soil Classifiers Association, Wheaton, Illinois, by Thomas C. Granato, Albert E. Cox, and Lakhwinder S. Hundal, February 2004. PP

6. "Surface Water Quality During Thirty-One Years of Biosolids Application to Mine Spoil Soils for Land Reclamation." Presented at the Water Environment Federation 18th Annual Residuals and Biosolids Management Conference, Salt Lake City, Utah, by Guanglong Tian, Thomas C. Granato, Richard I. Pietz, and Carl Carlson, Jr., February 2004. B

7. "Use Attainability Analysis Studies in Chicago Waterways." Presented at the General Superintendent Staff Meeting, Chicago, Illinois, by Richard Lanyon, February 2004. PP

8. "Anaerobic Digestion of Biosolids to Meet the Requirement for Vector Attraction Reduction at the Calumet Water Reclamation Plant." Presented at the Illinois Water Environment Association Annual Meeting, Rockford, Illinois, by Heng Zhang, Jain S. Jain, Antonio Quintanilla, and Yiping Zhou. March 2004. B

9. "Emerging Pathogens Issues in 21st Century." Presented at the 30th Third World Conference (An Interdisciplinary and Intercultural Conference), Global Change: Development, Peace, and Security, Chicago, Illinois, by Geeta Rijal, March 2004. PP

APPENDIX II

PRESENTATIONS 2004

10. "Use Attainability Analysis of the Chicago Metropolitan Area Waterways." Presented at the Illinois Water Environment Association Annual Meeting, Rockford, Illinois, by Richard Lanyon, March 2004. PP

11. "Use Attainability Analysis Studies." Presented at the Illinois Association of Wastewater Agencies, Springfield, Illinois, by Richard Lanyon, March 2004. PP

12. "Using Chlorophyll Monitoring to Estimate Nutrient Enrichment in Chicago Area Waterways." Presented at the Illinois Water Environment Association Annual Meeting, Rockford, Illinois, by Jennifer L. Wasik, March 2004. PP

13. "Beneficial Use of Biosolids in Metropolitan Chicago." Presented at the University of Illinois, Department of Environmental Science and Natural Resources, Urbana, Illinois, by Thomas C. Granato, April 2004. PP

14. "Beneficial Use of Class A Biosolids from Low Tech PFRP Equivalent Processing." Presented at the Central States Water Environment Association Annual Education Seminar, Madison, Wisconsin, by Thomas C. Granato, April 2004. PP

15. "Sensitive Areas in Chicago." Presented at the National CSO Issues Workshop, Chicago, Illinois, by Richard Lanyon, April 2004. PP

16. "Evaluation of Six Estimators to Determine the *Escherichia coli* to Fecal Coliform Ratio in Wastewater Effluents and Ambient Waters." Presented at the American Society of Microbiology 104th General Meeting, New Orleans, Louisiana, by James Zmuda, Richard Gore, and Zainul Abedin, May 2004. PS

17. "Usefulness of Monitoring Class A. Biosolids for FRNA Coliphages." Presented at the American Society of Microbiology 104th General Meeting, New Orleans, Louisiana, by Geeta Rijal and James Zmuda, May 2004. PS

18. "Chlorophyll Monitoring in Chicago's Urban Waterways." Presented at the North American Benthological Society Annual Meeting, Vancouver, British Columbia, by Jennifer L. Wasik, June 2004. PP

19. "Endocrine Disruptors and Other Emerging Pollutants in the Water Environment." Presented at the Garden Clubs of Illinois Annual Meeting, Barrington, Illinois, by Bernard Sawyer, June 2004. PP

APPENDIX II

PRESENTATIONS 2004

20. "Simulation of Water Quality during Unsteady Flow in the Chicago Waterway System." Presented at Watershed 2004, Dearborn, Michigan, by Charles S. Melching, Emre Alp, Ram Lal Shrestha, and Richard Lanyon, July 2004. PP

21. "Occurrence and Levels of Organic Priority Pollutants in Combined Sewer Overflows in the Chicago Metropolitan Area." Presented at the Water Environment Federation and Central States Water Environment Association Collection Systems 2004 Conference, Milwaukee, Wisconsin, by Heng Zhang, Jain S. Jain, Bernard Sawyer, and Mary Khalil. August 2004. B

22. "Use Attainability Analysis Studies." Presented at the Five Cities Plus Conference, St. Louis, Missouri, by Richard Lanyon, August 2004. PP

23. "Illinois Surface Water Use Designations Wastewater Treatment Perspective." Presented at Water 2004 Conference, Urbana, Illinois, by Richard Lanyon, October 2004. PP

24. "Long-Term Effect of Biosolids Application on Soil Microbial Biomass and Potentially Mineralizable N." Presented at the American Society of Agronomy/Soil Science Society of America/Crop Science Society of America Annual Meeting, Seattle, Washington, by Guanglong Tian, Thomas C. Granato, Richard I. Pietz, and Carl Carlson, Jr., October 2004. PP

25. "Monitoring Improvement in Water Quality Following Reclamation of Acidic Coal Refuse with Biosolids." Presented at the Proceedings of Soil Sediments and Water Conference, Boston, Massachusetts, by Pauline V. Lindo, Thomas C. Granato, and Richard I. Pietz, and Carl Carlson, Jr., October 2004. PS

26. "Successful Uses of Biosolids in Urban Reclamation in Metropolitan Chicago." Presented at the American Society of Agronomy/Soil Science Society of America/Crop Science Society of America Annual Meeting, Seattle, Washington, by Thomas C. Granato, Albert E. Cox, and Lakhwinder S. Hundal, October 2004. PP

27. "Use Attainability Analysis Studies." Presented at the CSO Partnership and AMSA Conference, Cracking the UAA Code: Wet Weather Water Quality Assessments, Chicago, Illinois, by Richard Lanyon, October 2004. PP

APPENDIX II

PRESENTATIONS 2004

28. "Use of Biosolids as a Topsoil Substitute for Greening-up a Steel Mill Slag Brownfield in Metro Chicago." Presented at the American Society of Agronomy/Soil Science Society of America/Crop Science Society of America Annual Meeting, Seattle, Washington, by Lakhwinder S. Hundal, Thomas C. Granato, and Richard I. Pietz, October 2004. PP

29. "VOCs in CSOs and CSO Storage Facilities in the Chicago Metropolitan Area." Presented at the Water Environment Federation 77th Annual Technical Exhibition and Conference, New Orleans, Louisiana, by Jain S. Jain, Heng Zhang, Bernard Sawyer, and Mary Khalil. October 2004. B

30. "Written Testimony of Richard Lanyon and the Metropolitan Water Reclamation District of Greater Chicago in the Matter of: Interim Phosphorus Effluent Standard, Proposed 35 ILL. ADM. 304.123 (G-K)." Filed with the Illinois Pollution Control Board (IPCB) September 2004, and Presented before the IPCB in Springfield, Illinois, October 2004. P

31. "Chicago and Illinois Tackle Nutrients." Presented at Water Environment Research Foundation Web Seminar Series, by Richard Lanyon, November 2004. PP

32. "Estimation of the *Escherichia coli* to Fecal Coliform Ratio in Wastewater Effluents and Ambient Waters of the Metropolitan Water Reclamation District of Greater Chicago." Presented at the Fourth Annual Great Lakes Beach Association Conference, Parma, Ohio, by James Zmuda, Richard Gore, and Zainul Abedin, November 2004. PS

33. "Fish Populations in Chicago Area Waterways." Presented at the Metropolitan Water Reclamation District of Greater Chicago, Research and Development Department, 2004 Seminar Series, by Samuel G. Dennison, November 2004. PP

34. "Regulatory Update: Pretreatment, User Charge and Water Quality Issues." Presented at the Industrial Water, Waste & Sewage Group Conference, Chicago, Illinois, by Richard Lanyon, November 2004. PP

35. "Environmental Risk Assessment and Benefits of Using Biosolids for Greening-up a Steel Mill Slag Brownfield in Metro Chicago." Presented at the Great Lakes By-products Management Association 5th Annual Conference, Chicago, Illinois, by Lakhwinder S. Hundal, Thomas C. Granato, Bernard Sawyer, and Richard Lanyon, December 2004. PP

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*P = Available as a paper

APPENDIX II

PRESENTATIONS 2004

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

APPENDIX III

PAPERS PUBLISHED 2004

1. Granato, T. C., "Beneficial Use of Class A Biosolids from Low Tech PFRP Equivalent Processing." Proceedings of Central States Water Environment Association Annual Education Seminar, Madison, Wisconsin, 2004.

2. Granato, T. C., R. I. Pietz, G. J. Knafl, C. R. Carlson, P. Tata, and C. Lue-Hing, "Trace Element Concentrations in Soil, Corn Leaves, and Grain After Cessation of Biosolids Applications." Journal of Environmental Quality, 33: 2078-2089, 2004.

3. Tian, G., T. C. Granato, R. I. Pietz, and C. Carlson, "Surface Water Quality During 31 Years of Biosolids Application to Mine Spoil Soils for Land Reclamation." Proceedings of the Water Environment Federation 18th Annual Residuals and Biosolids Management Conference, Salt Lake City, Utah, 2004.

4. Zhang, H., J. S. Jain, B. Sawyer, and M. Khalil. "Occurrence and Levels of Organic Priority Pollutants in Combined Sewer Overflows in the Chicago Metropolitan Area." Proceedings of the Water Environment Federation and Central States Water Environment Association Collection Systems 2004 Conference, Milwaukee, Wisconsin, 2004.

5. Zhang, H., J. S. Jain, B. Sawyer, and M. Khalil. "VOCs in CSOs and CSO Storage Facilities in the Chicago Metropolitan Area." Proceedings of the Water Environment Federation 77th Annual Technical Exhibition and Conference, New Orleans, Louisiana, 2004.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO
RESEARCH AND DEVELOPMENT DEPARTMENT
2004 SEMINAR SERIES

Date	Subject
Friday February 27, 2004	***Overview of New Microbiological Methods for Environmental Decision Making*** Professor Joan Rose Michigan State University, East Lansing, Michigan
Friday March 26, 2004	***Impact of Alkylphenol Ethoxylates and Other Endocrine Disruptors on the Aquatic Environment*** Mr. Peter Howe, Life Scientist, Water Division Mr. Dan Hopkins, Regional Team Manager Toxics Reduction Team United States Environmental Protection Agency Region V, Chicago, Illinois
Friday April 30, 2004	***Preparing an Environmental Management System (EMS) for Biosolids*** Mr. Michael Moore, Manager Environmental Compliance Monitoring Orange County Sanitation District Fountain Valley, California
Friday May 21, 2004	***Using Source Tracking as a Tool for Studying Lake Michigan Beach Closings*** Mr. Mark Pfister, Aquatic Biologist Lake County Health Department Waukegan, Illinois
Friday June 25, 2004	***Development of a Dynamic Model for Predicting Dissolved Oxygen Concentrations in the Chicago River*** Professor Charles Melching Marquette University, Milwaukee, Wisconsin

RESERVATIONS REQUIRED (at least 24 hours in advance)
CONTACT:
Mr. Bernard Sawyer, Assistant Director of Research & 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
2004 SEMINAR SERIES

Date	Subject
Friday July 30, 2004	***Update on the Chicago Waterways System Use Attainability Analysis (UAA)*** Mr. Ronald French, Senior Scientist CDM, Inc., Chicago, Illinois
Friday August 27, 2004	***Large Scale Nutrient Removal Pilot-Plant Studies for New York City Wastewater*** Mr. Louis Carrio, Chief, Process Planning Section New York City Dept. of Environmental Protection Flushing, New York
Friday September 24, 2004	***Land Application of Biosolids: A Benefit or Risk to Soil Ecosystem Health?*** Professor Nicholas Basta Ohio State University, Columbus, Ohio
Friday October 29, 2004	***Update on Stickney Water Reclamation Plant Master Plan Study*** Mr. Christopher Haite, Principal Civil Engineer Engineering Department Metropolitan Water Reclamation District of Greater Chicago (District), Chicago, Illinois Mr. Gary Shimp, Project Manager Black and Veatch, Chicago, Illinois
Friday November 19, 2004	***Fish Populations in the Chicago Area Waterways*** Mr. Samuel Dennison, Biologist IV Research and Development Department District, Cicero, Illinois

RESERVATIONS REQUIRED (at least 24 hours in advance)
CONTACT:
Mr. Bernard Sawyer, Assistant Director of Research & 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.