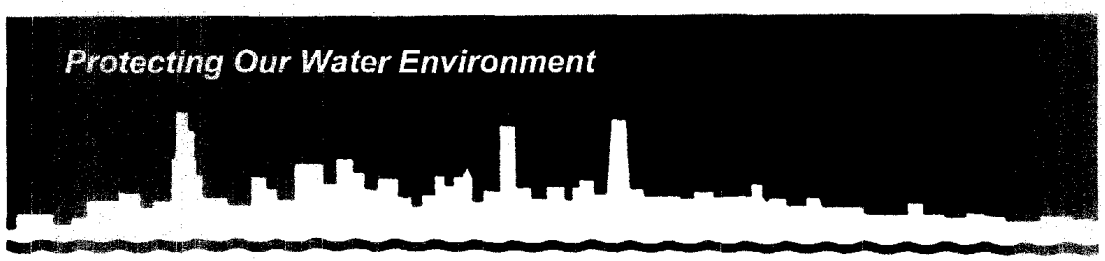

Metropolitan Water Reclamation District of Greater Chicago

RESEARCH AND DEVELOPMENT DEPARTMENT

REPORT NO. 02-5

RESEARCH AND DEVELOPMENT

2001

ANNUAL REPORT

March 2002

Metropolitan Water Reclamation District of Greater Chicago
100 East Erie Street Chicago, IL 60611-2803 (312) 751-5600

RESEARCH AND DEVELOPMENT
2001
ANNUAL REPORT

Research and Development Department
Richard Lanyon, Director

March 2002

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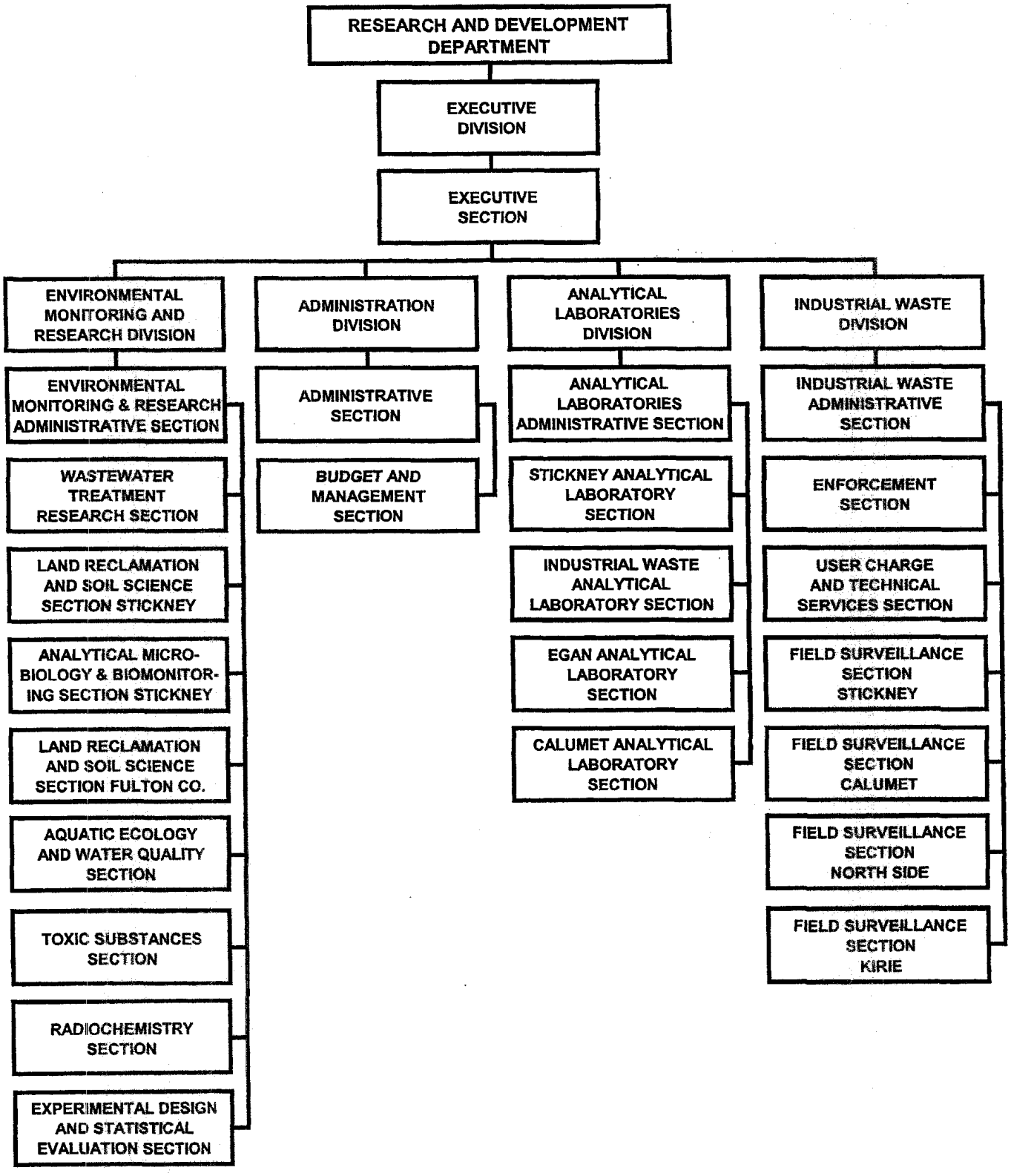
DISCLAIMER

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

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

RESEARCH AND DEVELOPMENT DEPARTMENT ORGANIZATION CHART FOR 2001



ADMINISTRATIVE DIVISION

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 documents; preparation and administration of contract documents; 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 352 budgeted positions during 2001 with a total salary and wage appropriation of $19,723,200. 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 2001, the Department reviewed personnel actions relative to 27 retirements. In ad-

dition, as part of adopting the 2001 Budget and the District's attrition program, 11 existing positions were designated for elimination when vacated during 2001. By year-end, actual positions eliminated upon vacancy by incumbents totaled five. This decrease in positions led to an average expenditure to appropriation ratio of 99 percent.

Greater Chicago Pollution Prevention Program

In January 1994, the Greater Chicago Pollution Prevention Program (GCP3) was initiated as a cooperative project between the Metropolitan Water Reclamation District of Greater Chicago (District) and the Illinois Waste Management and Research Center (Center), which is funded by a grant from the United States Environmental Protection Agency (USEPA).

Technical assistance is provided directly to companies requesting such assistance by a member of the Center's staff located in the District offices. During 2001, 49 industrial site visits or assessments to provide technical assistance were conducted under GCP3.

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. For-

mal presentations on the GCP3 were given to five organizations in 2001.

The Annual District Pollution Prevention Award program honors industrial and/or commercial dischargers for outstanding multimedia pollution prevention efforts.

The District and the Center are participating in the USEPA's Common Sense Initiative - Strategic Goals Program for Metal Finishers. This program includes commitments by industry to go beyond compliance, substantially reducing pollution from their operations. The Center, working with other local stakeholders has developed a proposal for providing technical assistance to achieve these reductions to the participating metal finishers.

Computer Systems Administration

In 2001, the Administration Division continued a broad 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 Information Technology Department-designed program for 2002 budget preparation. This Budget Preparation Tool (BPT) was used to prepare the 2002 line item and position budgets. It was determined that the Enterprise System, which was implemented in 2000, contained inadequacies for preparing the Dis-

trict's budget and BPT was developed to assist in this area. The Administration Division prepared the 2002 budget using this new system. Plans are already underway to enhance this budgeting tool for preparation of the 2003 budget.

Budget Administration

A comparison of appropriations to expenditures for 2001 shows the following:

	Appropriation	Expenditure
Personnel (Line Item 101)	$19,723,200	$19,522,772
Other Line Items	5,723,500	3,673,792
Total	$25,446,700	$23,196,564

Purchasing Administration

During 2001, more than 520 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 2001, the Division was involved in the preparation and administration of 17 contracts for a total cost of ap-

proximately $2,030,120, including multiyear contracts. This involved the preparation of detail specifications, Board letters, advertisements, coordination of the receipt and review of bids, recommendations to award, and management of fund reservations (used to ensure availability of funds for items costing $10,000 or more) and processing of purchase requisitions and change orders.

The Division administered 15 consulting services agreements with individual values of $10,000 or more and having a total value of approximately $2,075,344 during 2001. The Division also administered 21 maintenance agreements with individual values of $10,000 or more and a total value of $787,578. This involved processing purchase requisitions and change orders, preparation of Board letters, management of fund reservations, preparation and execution of agreements, preparation of requests for proposals, and coordination of the receipt and review of proposals.

Laboratory Accreditation

In 2001, the Division coordinated laboratory accreditation with the State of Illinois for six R&D laboratories. As an accrediting authority for the National Environmental Laboratory Accreditation Conference, the Illinois Environmental Protection Agency accredited the Calumet Analytical Laboratory (ALD) and the Toxic Substances Section in January 2001. The

Calumet Analytical Laboratory has been accredited for inorganic analysis of wastewater. The Toxic Substances Section has been accredited for organic analysis of wastewater, and organic analysis of solid and hazardous waste.

The Egan, Stickney and Industrial Waste Analytical Laboratories received accreditation on July 30, September 24 and October 15, 2001, respectively, for inorganic analysis of wastewater.

On June 30, 2001, the Radiochemistry Laboratory was certified by the Illinois Department of Nuclear Safety. This certification program is administered by the IDNS under the USEPA guidelines for certification of laboratories engaged in the radiochemical analysis of drinking water and public water supplies.

All R&D laboratories are now accredited under the appropriate accrediting authority. It should be noted that the Microbiology Laboratory has for many years maintained certification with the Illinois Department of Public Health (IDPH). This certification program is administered by the IDPH under the USEPA's guidelines for certification of laboratories engaged in the microbiological analysis of drinking water and public water supplies.

Departmental Reports

During 2001, the Department published 37 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 REPORTS PUBLISHED DURING 2001

	Report Title	Author (s)	Date	Organization or Conference Which Presented
2001-1	Peer Review of MWRDGC's Application for Designation of Processes to Further Reduce Pathogens	C.N. Hass, R.C. Loehr, N.S. Raju, R. Reimers, M. Sobsey, L. Wilcher	Jan-01	Internal District Report
2001-1-A	Peer Review of MWRDGC's Application for Designation of Processes to Further Reduce Pathogens - Addendum: Statistical Evaluation of Pathogen Inactivation for a Conventional Low-Cost Technology Class A Biosolids Process	P. Tata, C. Lue-Hing, G.J. Knafl	Jan-01	Internal District Report
2001-2	Literature Search of Possible Aeration Systems and Washdown Procedures for Use with the Proposed McCook Reservoir Part I: Comparison of U-Tube, Cryogenic Oxygen, and Diffused Air Technology Alternatives for Aeration of Deep Reservoirs and Reservoirs with Large Depth Variations-A Lit. Search and Review Part 2: Comparison of Washdown Procedures for Deep Reservoirs and Reservoirs with Large Depth Variations-Lit Search/Rvw	P. O'Brien	Feb-01	Internal District Report
2001-3	Investigation of Final Effluent Ammonia Spike Incidents on April 7 and July 22, 2000, at the Stickney WRP and the Impact of Major Ammonia-Contributing Sources	H. Zhang, J.S. Jain, B. Sawyer, P. Tata	Feb-01	Internal District Report
2001-4	Abundance and Distribution of Fish in the North Branch of the Chicago River During 1996 and 1997	S.G. Dennison, I. Polls, B. Sawyer, P. Tata	Feb-01	Internal District Report
2001-5	Dissolved Oxygen Monitoring from Wilmette to Lockport in the Chicago Waterway System During August 1998 through July 1999 (Revision No. 2)	I. Polls, B. Sawyer, P. Tata	Feb-01	Internal District Report
2001-6	Calculation of User Charge Rates and Administrative Costs for 2001	User Charge Department	Mar-01	Internal District Report

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO
TABLE 1 (Continued)

RESEARCH AND DEVELOPMENT REPORTS PUBLISHED DURING 2001

	Report Title	Author (s)	Date	Organization or Conference Which Presented
2001-7	R&D EM&R Division 1999 Annual Report	P. Tata	Mar-01	Internal District Report
2001-8	Measurement of Oxygen Transfer Efficiencies in Selected Aeration Tanks at the North Side Water Reclamation Plant	H. Zhang, J.S. Jain, Z. Abedin, B. Sawyer, P. Tata	Mar-01	Internal District Report
2001-9	Elevated Nitrate-N Concentrations in Groundwater at Field 10, Fulton County, Illinois	S.R. Nelson, T.C. Granato, C.R. Carlson, R.I. Pietz, P. Tata	Apr-01	Internal District Report
2001-10	Research and Development 2000 Annual Report		May-01	Internal District Report
2001-11	Radiological Monitoring of the Raw Sewage, Final Effluent, Sludges, and Biosolids of the MWRDGC - 1999 Annual Report	S. Kawalko, A. Khalique, R. Pietz, P. Tata	May-01	Internal District Report
2001-12	1999 Annual Summary Report Water Quality Within the Waterways System of the MWRDGC	Z. Abedin, R.I. Pietz, P. Tata	Oct-01	Internal District Report
2001-12-A	1999 Annual Summary Report Water Quality Within the Waterways System of the MWRDGC - Addendum - Appendix III	Z. Abedin, R.I. Pietz, P. Tata	Oct-01	Internal District Report
2001-13	A Study of the Benthic Macroinvertebrate Community in the Chicago Sanitary and Ship Canal and Lower Des Plaines River During 2000		Oct-01	Prepared by: E A Engineering, Science & Technology, Inc.
2001-14	Radiological Monitoring of the Raw Sewage, Final Effluent, Sludges, and Biosolids of the MWRDGC - 2000 Annual Report	S. Kawalko, A. Khalique, R.I. Pietz, P. Tata	Dec-01	Internal District Report
2001-15	Mineralization of Organic Carbon does not Produce a "Time Bomb Effect" in Biosolids-Amended Soil	T.C. Granato, R.I. Pietz, Carl R. Carlson, Jr., P. Tata, C. Lue-Hing, G. Knafl	Dec-01	Internal District Report

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO
Table 2
RESEARCH AND DEVELOPMENT UNNUMBERED REPORTS PUBLISHED DURING 2001

Report Title	Author (s)	Date	Organization or Conference Which Presented
Fulton County Environmental Protection System Jan 2001	R&D Department G. Pump, T.C. Granato	Apr-01	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Fulton County Environmental Protection System Feb 2001	R&D Department G. Pump, T.C. Granato	Apr-01	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Fulton County Environmental Protection System Mar 2001	R&D Department G. Pump, T.C. Granato	May-01	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Fulton County Environmental Protection System Apr 2001	R&D Department	Jun-01	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Fulton County Environmental Protection System May 2001	R&D Department	Jul-01	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Fulton County Environmental Protection System June 2001	R&D Department	Aug-01	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Fulton County Environmental Protection System July 2001	R&D Department	Sep-01	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 2001

Report Title	Author (s)	Date	Organization or Conference Which Presented
Fulton County Environmental Protection System August 2001	R&D Department	Oct-01	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Fulton County Environmental Protection System September 2001	R&D Department	Sep-01	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Fulton County Environmental Protection System October 2001	R&D Department	Dec-01	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Hanover Park Water Reclamation Plant Fischer Farm Report for 4th Quarter of 2000	R&D Department G. Pump, T.C. Granato	Feb-01	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Hanover Park Water Reclamation Plant Fischer Farm Report for 1st Quarter of 2001	R&D Department G. Pump, T.C. Granato	May-01	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Hanover Park Water Reclamation Plant Fischer Farm Report for 2nd Quarter of 2001	R&D Department	Nov-01	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 2001

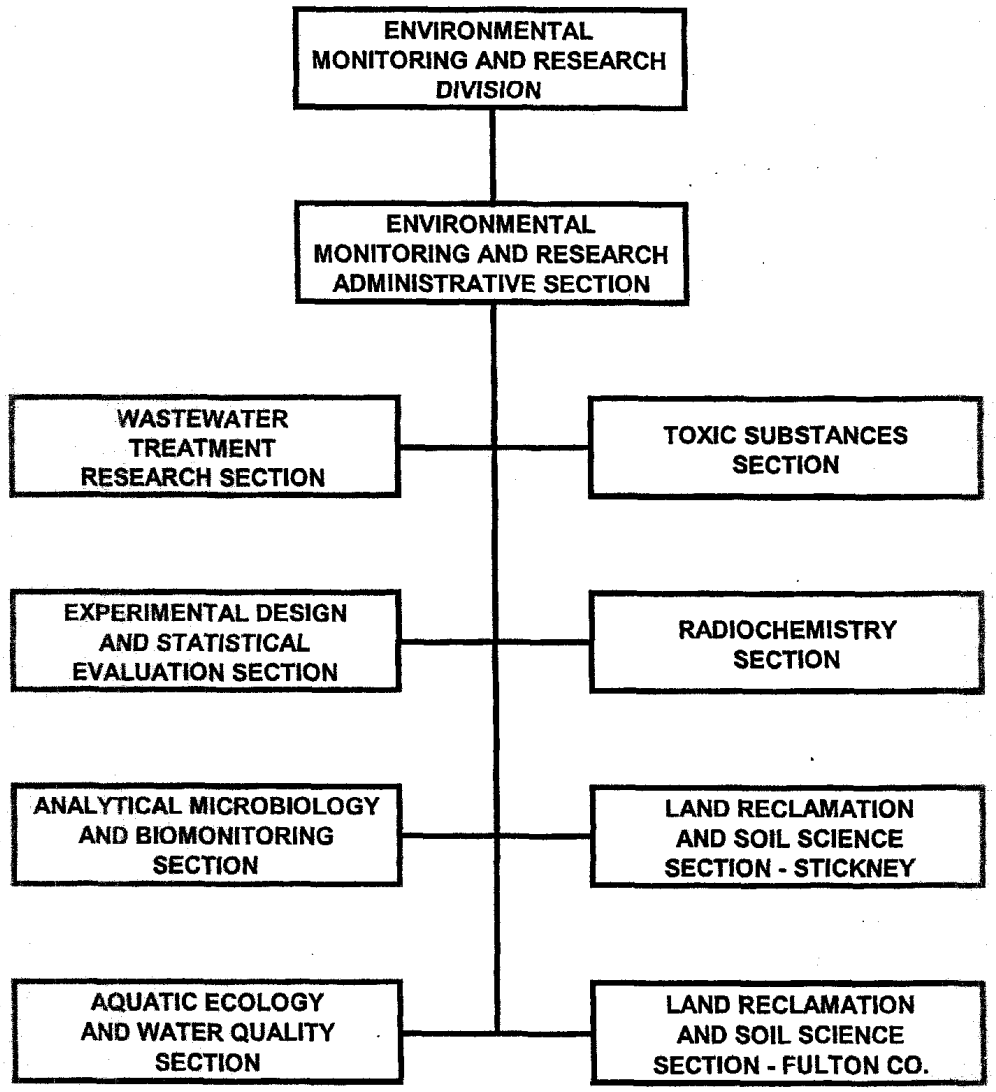
Report Title	Author (s)	Date	Organization or Conference Which Presented
Hanover Park Water Reclamation Plant Fischer Farm Report for 3rd Quarter of 2001	R&D Department	Nov-01	Illinois Environmental Protection Agency, United States Environ-
Groundwater Monitoring Report, Tunnel and Reservoir Plan Des Plaines Tunnel System 2000 Annual Report	R&D Department	Jun-01	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Groundwater Monitoring Report, Tunnel and Reservoir Plan Upper Des Plaines Tunnel System 2000 Annual Report	R&D Department	Jun-01	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Groundwater Monitoring Report, Tunnel and Reservoir Plan Mainstream Tunnel System 2000 Annual Report	R&D Department	Jun-01	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Groundwater Monitoring Report, Tunnel and Reservoir Plan Calumet Tunnel System 2000 Annual Report	R&D Department	Jun-01	Illinois Environmental Protection Agency, United States Environmental Protection Agency
Groundwater Monitoring Report, Tunnel and Reservoir Plan O'Hare Cup Reservoir Water Quality Monitoring Wells 2000 Annual Report	R&D Department	Jun-01	Illinois Environmental Protection Agency, United States Environmental Protection Agency

ENVIRONMENTAL MONITORING AND RESEARCH DIVISION

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

Figure 1

ENVIRONMENTAL MONITORING AND RESEARCH DIVISION ORGANIZATION CHART



ENVIRONMENTAL MONITORING AND RESEARCH DIVISION

The Environmental Monitoring and Research (EM&R) Division has 83 employees, and is comprised of nine sections, viz.,

1. Administrative
2. Wastewater Treatment Research
3. Land Reclamation and Soil Science - Stickney
4. Land Reclamation and Soil Science - Fulton County
5. Analytical Microbiology and Biomonitoring
6. Aquatic Ecology and Water Quality
7. Toxic Substances
8. Radiochemistry
9. Experimental Design and Statistical Evaluation

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 activities.
- Assessing the impacts of new or proposed regulations on District activities.

Wastewater Treatment Research Section

The Wastewater Treatment Research (WTR) 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 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 included the following:

TECHNICAL ASSISTANCE TO THE UNITED STATES ARMY CORPS OF ENGINEERS

Under contract with the U.S. Army Corps of Engineers (ACOE), the R&D Department is providing technical assistance to support the design of the aeration system and washdown of the McCook Reservoir. Reports on the literature search of possible aeration systems and washdown procedures for use with the proposed McCook Reservoir have been submitted to the ACOE Chicago Office. Further work on this project involves feasibility studies as well as possible laboratory and field work.

AMMONIA AND ORGANIC NITROGEN SOURCE INVESTIGATION FOR THE STICKNEY WRP

This project was undertaken at the request of the M&O Department to investigate the impact of major ammonia and organic nitrogen contributing sources to the Stickney WRP. The project included planning for field sampling, conducting site visits, collecting field samples, analyzing samples and pertinent data, and writing a report. Field sampling, sample

analysis, and collection of flow and other related data have been completed. The final report on this project will be prepared in 2002.

OXYGEN TRANSFER EFFICIENCY OF DIFFUSER PLATES

Tests were conducted to determine oxygen transfer efficiency (OTE) of the aeration tanks diffuser plates at the North Side WRP during the summer and fall of 2001. The main objective of this study was to evaluate the changes of OTE of the diffuser plates in selected tanks of Batteries B and D since the previous tests conducted in 1999. Field test and data collections were completed in 2001, and data analysis and report writing are planned to be completed in 2002.

VECTOR ATTRACTION REDUCTION STUDY FOR THE CALUMET AND STICKNEY WRPs

This study is being conducted to determine whether the requirements of Option 2 in the 40 CFR Part 503 regulation for vector attraction reduction could be met in the sludge treatment processes at the Stickney and Calumet WRPs. This option 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. The bench-scale test are being

conducted once a month for digester draws from the Calumet and Stickney WRPs, using a method developed by the USEPA. The tests started in August 2001 and will continue until October 2002. The data collected will be analyzed to evaluate if the anaerobically digested sludge from the Calumet and Stickney WRPs meet the requirements of Option 2 in 40 CFR Part 503.

NUTRIENT REMOVAL LITERATURE SEARCH

In response to the challenge of meeting up-coming stringent nutrient standards proposed by the USEPA, a literature search on the technologies used in nutrient removal for domestic sewage was initiated. This literature search began in the spring of 2001 and will continue through the end of 2002.

GROUNDWATER MONITORING OF THE TARP SYSTEMS

Groundwater monitoring reports for the year 2000 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.

LOCAL LIMIT REEVALUATION

The EM&R Division, working with the Industrial Waste Division, is evaluating the current pretreatment program local

limits based upon new USEPA methodologies. Local limits are intended to prevent site-specific plant passthrough and interference. This new method requires a detailed analysis of the fate and transport of each regulated pollutant through the treatment process in order to determine the limiting criteria controlling its allowable concentration. A mass balance approach is then used to convert concentrations into allowable headwork loadings. This approach traces the routes of each pollutant through the treatment process, taking into account pollutant removals in upstream processes. The initial evaluation consisted of 1999 data for two of the District plants, Hanover Park and Lemont. The reevaluation of all of the plants using 2000 data is expected to be completed in early 2002.

STUDY TO DETERMINE CAUSE OF ODORS FROM DROP SHAFT NO. 5 IN THE JAMES C. KIRIE WRP SERVICE AREA

At the request of the M&O Department, a comparison of the waste stream characteristics between Upper Des Plaines collection sewers UDP14 and UDP22 was conducted to determine the source of odor problems in the vicinity of Drop Shaft 5 (DS5). The parameters evaluated were pH, temperature, ORP, BOD_5, FOG, suspended solids, conductivity, sulfides, and sulfates. Four sites were sampled for four weeks, three times a week for each sewer. The results showed a higher component of food industry

waste in UDP14. The food industry waste had increased BOD_5, FOG, and hydrogen sulfides. The high BOD_5 at the northernmost end of the study led to an additional study of the feeder sewers. The studies confirmed the presence of hydrogen sulfide in the wastewater. The studies indicated there was not a specific point source of the sulfides or sulfates. The characteristics of the waste and the environment in the sewers both contribute to the production of hydrogen sulfides.

In consultation with the M&O Department, ferric chloride addition has been selected to precipitate the sulfides in the waste stream. The reduction of the sulfides should alleviate the odor at DS5. A location was identified upstream of DS5 on UDP14 to construct a dosing station. The dosing station will be constructed by the M&O Department. The dosing station is planned to be in operation by the spring of 2002. The R&D Department will develop a test protocol, collect wastewater samples, analyze the samples, and write a report on the effectiveness of ferric chloride in controlling odors at DS5.

ODOR MONITORING AT DISTRICT FACILITIES

A routine odor monitoring program at various locations in and around the District's WRPs was carried out. Odor monitoring personnel make subjective observations regarding the character and intensity of any observed odors. Quantitative H_2S

measurements are also taken. In addition, odor monitoring was also conducted at the District's biosolids management and air drying facilities, along with the determination of the odor potential of the dried biosolids.

An odor management plan was prepared and submitted to the IEPA as part of the Solids Drying Areas NPDES permits.

POLYMER TESTING

Full-scale polymer tests for selection of polymers to be used in the centrifuge dewatering of anaerobically digested sludge at both the Stickney WRP and Calumet WRP postdigestion centrifuge complexes were carried out in 2001. A comparison of summer vs. winter polymer at the Stickney WRP postdigestion centrifuge complex was also conducted in 2001. The test procedures are described in R&D Department Report No. 2001-13.

Polymer testing was also carried out at the Hanover Park WRP for the selection and purchase of polymers used in the gravity belt thickening of primary and waste activated sludge to obtain a cake solids of 5.5 percent.

POLYMER ENHANCED LAGOON DEWATERING

The M&O Department requested that a pilot study be undertaken to evaluate the use of polymers to enhance the lagoon dewatering of anaerobically digested sludge. Working with M&O Department personnel, several pilot lagoon tanks were designed

and constructed by M&O Department trades at the Stickney WRP. The pilot systems were set up at the Stickney WRP and an experimental plan was developed. This study will be started in January 2002.

CERTIFICATION OF DISTRICT'S SLUDGE PROCESSING TRAINS (SPTs) AS EQUIVALENT TO A PROCESS TO FURTHER REDUCE PATHOGENS (PFRP) OR CLASS A PROCESS

The petition submitted to the USEPA's Pathogen Equivalence Committee (PEC) by the District has been sent to the Region V office for a decision. Numerous discussions were held with Region V staff and PEC members during the year. It is hoped that a site-specific PFRP equivalency for the District's SPTs will be issued during 2002.

CONCEPTUAL STUDIES

Several desktop studies of potential systems for improving efficiency of existing systems and for improving energy usage were carried out in 2001. These concepts included: microturbines using digester gas, fuel cells, enclosed ambient air sludge drying systems, and full floor aeration systems. These concepts were presented to the Engineering Department for possible future studies.

Land Reclamation and Soil Science Section

The Land Reclamation 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.

The environmental monitoring component of the program includes the sampling and analyses of waters, soils, plants 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 2001 the Section submitted 56 permit required reports to the IEPA, one report to the USEPA, and 12 reports to the M&O Department for reporting to IEPA.

The research component consists of studies to support local marketing of biosolids such as: screening plants for suitability to grow in biosolids used as a soil conditioner or soil substitute, establishing demonstration plots for reclamation of slag deposits, designing a demonstration site for growing trees in biosolids in collaboration with Morton Arboretum, Lisle, Illinois, designing a test site for demonstrating the use of biosolids in final cover of landfill side slopes, establishing cooperative research with consulting

engineers and soil scientists to characterize the geotechnical and physical properties of biosolids, 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 15,003 acre site in Fulton County including maintaining experimental corn plots which have received cumulative applications of 833 tons of biosolids per acre (maximum-amended plots) from 1973 through 2001. These plots are utilized to study changes in fertility of mine soil, uptake of trace elements into corn, and 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 Cecil Lue-Hing Research and Development Complex, and provides technical information to biosolids users such as local landfill operators, golf course superintendents, park districts, and environmental consultants.

Analytical Microbiology and Biomonitoring Section

In 2001 the Analytical Microbiology and Biomonitoring Section was composed of 4 professional and 12 technical personnel. The Section was comprised of the following subgroups which performed specific monitoring or research activities: Virology, Parasitology, Analytical Microbiology, and Biomonitoring. The activities of the Section in 2001 are summarized below.

VIROLOGY AND PARASITOLOGY SUB-GROUPS

Air-dried biosolids (final product) were analyzed for viruses and viable *Ascaris* eggs for compliance with the Part 503 *Standards for the Use or Disposal of Sewage Sludge* (Standards). All biosolids produced from the District's codified process were determined to be Class A biosolids with respect to pathogens as defined by the Part 503 Standards.

ANALYTICAL MICROBIOLOGY SUB-GROUP

Fecal coliform (FC) and *E. coli* (EC) densities were measured in water samples from Lake Michigan, District WRPs, and the Chicago area waterways in order to determine the EC to FC ratio in each of these matrices. Monthly samples collected upstream and downstream of the Hanover Park, James C. Kirie, and John E. Egan WRPs were also analyzed for this study. A total of 932 analyses were conducted for this study in 2001. Work on

developing the EC/FC database was begun in 2000 in anticipation of the adoption of new water quality standards that will specify *E. coli* instead of FC limits.

Fecal coliform and other microbiological analyses were conducted in support of monitoring studies of the following areas: Illinois Waterway; Chicago Area Waterways; Lake Michigan beaches; offshore waters of Lake Michigan; biosolids monitoring for Part 503 compliance; solids area monitoring wells; and TARP monitoring. Potable water at District facilities was monitored for total coliforms, FC, and total heterotrophic bacteria. The Quality Assurance Plan for the Analytical Microbiological Laboratory was updated, and a copy was sent to the Illinois Department of Public Health.

BIOMONITORING AND TOXICITY SUB-GROUPS

Acute whole effluent toxicity (WET) tests with fish (*Pimephales promelas)* and daphnids (*Ceriodaphnia dubia)* were conducted on effluent samples from all seven of the District's WRPs. No acute toxicity was observed to be associated with any of the effluents. Chronic WET tests were also conducted on effluent samples from the Hanover Park WRP. No chronic toxicity was observed. Biomonitoring reports for the Hanover Park and James C. Kirie WRPs were submitted to the IEPA in compliance with the respective NPDES permits.

Aquatic Ecology and Water Quality Section

The Aquatic Ecology and Water Quality Section is responsible for assessing the water and sediment quality in Chicago area waterways. An additional responsibility is to review emerging federal and state water quality rules and regulations that directly relate to District NPDES permits and the effects of District pollution control activities on water quality in Chicago area waterways. These regulations include antidegradation, 305(b) assessment reporting, 303(d) listing, lower Des Plaines River use attainability analysis (UAA), total maximum daily loads (TMDLs), dissolved metals, and nutrients. Field monitoring activities conducted during 2001 include the following.

BENTHIC INVERTEBRATE MONITORING

During the period June through August 2001, benthic invertebrates were collected from 27 monitoring stations in the Calumet, Chicago, and the Des Plaines River Systems. Thirteen stations were located on the deep-draft waterways and fourteen stations were on wadeable streams. In the laboratory, the sediment samples were washed, screened, and the benthic organisms counted and identified. The benthic invertebrate data will be transmitted to the IEPA. The IEPA will use the

invertebrate data for preparing the Illinois 305(b) assessment report.

FISH MONITORING

Fish were collected during June through August 2001 at 27 stations in the Calumet, Chicago, and Des Plaines River Systems. Thirteen stations were located on the deep-draft waterways and fourteen stations were on wadeable streams. Almost 2,700 fish were identified, weighed, measured for length, and examined for parasites and disease. The fish data will be transmitted to the IEPA. The IEPA will use the fish data for preparing the Illinois 305(b) assessment report.

CONTINUOUS DISSOLVED OXYGEN (DO) MONITORING

Continuous hourly DO monitoring continued during 2001 at 18 stations in the Chicago River System from the Wilmette Pumping Station on the North Shore Channel to Jefferson Street on the lower Des Plaines River. In July 2001, continuous DO monitoring was initiated at 12 stations in the Calumet River System from the O'Brien Lock and Dam to the junction of the Calumet-Sag Channel and the Chicago Sanitary and Ship Canal. A summary report was prepared weekly for DO data monitored at ten selected stations.

ILLINOIS WATERWAY MONITORING

During May, August, and October 2001, water samples were collected from 49 sampling stations 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 trends along the waterway system from Chicago to Peoria. In order to characterize the chemical quality of the sediments, sediment samples were collected at 14 selected stations during October.

SEDIMENT OXYGEN DEMAND (SOD)

During October, November, and December 2001, the SOD was measured at 16 locations in Chicago area deep-draft waterways. The waterways include the North Shore Channel, North Branch of the Chicago River, Chicago River, South Branch of the Chicago River, Bubbly Creek, Chicago Sanitary and Ship Canal, Calumet River, Little Calumet River, and the Calumet-Sag Channel. These data will be used in the calibration of the unsteady-state water quality model currently under development for the District.

Toxic Substances Section

The Toxic Substances Section is responsible for the analysis of samples for all organic priority pollutants, including more than 100 organic parameters listed by the USEPA,

and the analysis for non-listed organic compounds when the detected peaks are ten times higher than the background. The Section currently analyzes for more than 120 non-listed organic compounds.

In January 2001, the Toxic Substances Laboratory was accredited under the National Environmental Laboratory Accreditation Program (NELAP).

Quality Assurance/Quality Control (QA/QC) requirements were conducted by the Section in 2001 to guarantee the high quality of the laboratory analyses and results, and to evaluate the analytical performance for the numerous parameters analyzed. A total of 1,011 samples were analyzed during 2001. These consisted of 20 samples from Lake Diversion, 154 from industrial users, 62 from WRPs, 11 from Toxicity Characteristic Leaching Procedure (TCLP), 226 from Illinois Waterways, 25 from the USX Demonstration Site, 24 air samples, 39 proficiency testing samples, and 450 to meet QA/QC requirements.

ANALYSIS OF WRP SAMPLES

Final effluent, raw sewage, and biosolids samples from the seven District WRPs are analyzed twice annually. Biosolids and scum are analyzed using TCLP to ensure that they are safe for disposal.

Raw sewage samples are analyzed twice annually for volatile organic compounds (VOCs) to estimate, through the use of mathematical models, the VOC air emissions from the WRPs. Actual VOC emissions will also be estimated by the analysis of organics in air samples collected at the WRPs. This year 24 air samples were collected from different District sites and were analyzed for 62 VOCs.

ANALYSIS OF INDUSTRIAL WASTE SAMPLES

The Section is also responsible for the analysis of organic priority pollutants in discharges from industrial users as part of the District's Pretreatment Program in order to ensure compliance with Discharge Authorizations and USEPA categorical standards.

ANALYSIS OF ENVIRONMENTAL MONITORING SAMPLES

As part of the District's monitoring of the quality of the environment, the Section analyzed samples collected from Lake Diversion, Illinois Waterways, and the USX Demonstration Project Site for organic priority pollutants.

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 5,086 tests in 2001.

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 affluent is also less than the USEPA standards for gross alpha and gross beta radioactivity contaminant levels 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 River Systems.

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.

RADIOLOGICAL ANALYSES OF BIOSOLIDS-AMENDED SOILS AND CROPS

The Section is studying the impact of long-term and one-time high rate biosolids applications on the radioactivity concentration in biosolids-amended soil and uptake of radioactivity by corn. Soil and corn samples from long-term experimental plots in Fulton County and the Hanover Park Fisher Farm are being analyzed.

RADIATION SAFETY PROGRAM ACTIVITIES

The Section maintains the radioactive material license issued to the District by the Illinois Department of Nuclear Safety, 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, and an x-ray fluorescent paint analyzer owned by the M&O Department.

LABORATORY QUALITY ASSESSMENT PROGRAM ACTIVITY

The Section continued to participate in the U.S. Department of Energy, Environmental Measurements Laboratory's Quality Assessment Program. Water samples were analyzed for gross alpha, gross beta, tritium, cobalt-60, and cesium-137 activity; and soil samples were analyzed for potassium-40, cesium-137, bismuth-212, lead-212, bismuth-214, lead-214, and actinium-228 radioactivity.

During this year, the Radiochemistry Section received its accreditation from the Illinois Department of Nuclear Safety.

Experimental Design and Statistical Evaluation Section

The Experimental Design and Statistical Evaluation Section 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, section personnel have been performing these tasks using PC computing media. They also developed programs to interconnect SAS with Visual Basic, Access, and Excel software programs. This has enabled the section to produce reports, tables, and texts in suitable

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

STATISTICAL AND COMPUTING SUPPORT

During 2001, statistical and computing support was provided to various projects. The following is a description of the major activities of this section:

1. Statistical support was provided to the WTR Section on the development of pretreatment local limits on the basis of USEPA's 1987 guidance manual. Guidelines provided by the USEPA were used to determine the limits for pollutants at each of the District's seven WRPs.

2. Statistical support was provided to the Land Reclamation and Soil Science Section on the concentration of metals in street dust collected from the drainage basins of the Stickney and Calumet WRPs. Statistical analyses were done to determine if significant differences existed in the mean concentrations of metals in the street dust, surface soil, auto graveyard, and scrap metal yards.

3. Statistical support was provided to the Aquatic Ecology and Water Quality Section. In addition, a graphic program was designed to produce graphs for the required weekly dissolved oxygen reports.

WATER QUALITY DATA

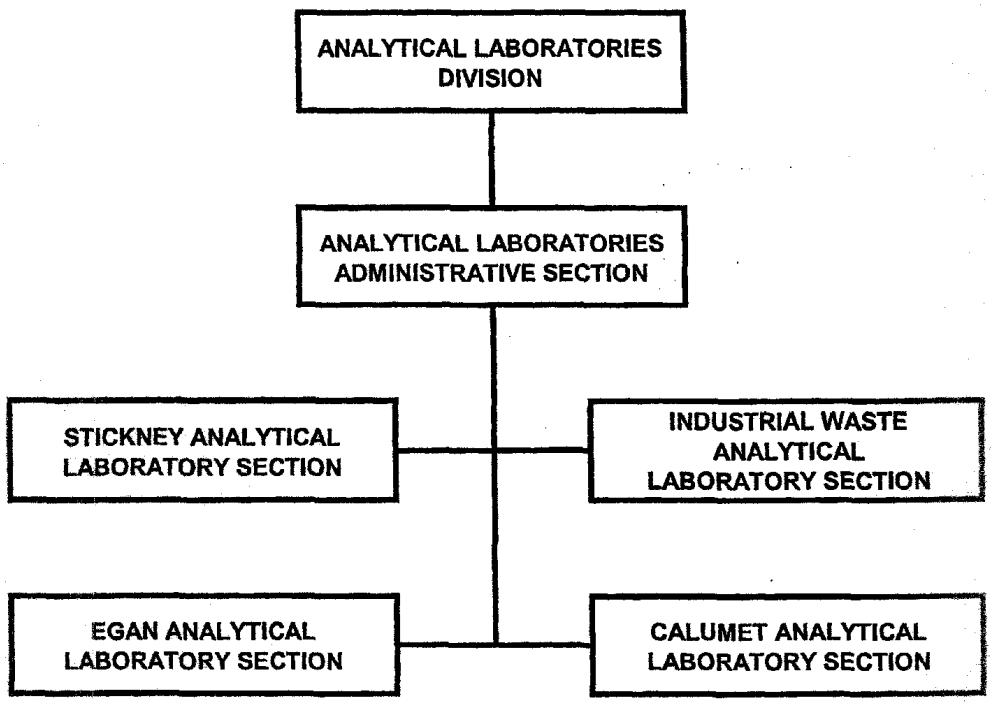
Each year, the Section prepares an annual report describing the water quality of the streams and channels within the District's jurisdiction for the preceding year. Surface water quality data for 1999 and 2000 were evaluated regarding compliance with water quality standards set by the Illinois Pollution Control Board. In 1999, 28 water quality parameters (temperature, phenols, ammonium nitrogen, un-ionized ammonia, zinc, cadmium, copper, chromium, nickel, lead, mercury, boron, arsenic, selenium, barium, soluble iron, silver, gross beta activity, dissolved oxygen, pH, chloride, total dissolved solids, sulfate, fecal coliform, fluoride, weak acid dissociable cyanide, iron, and manganese) were assayed. The first 16 parameters listed were in total compliance in General Use Waters of all river systems. A draft of 2000 water quality annual report was also prepared in 2001 and is currently under review.

ANALYTICAL LABORATORIES DIVISION

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHIAGO

Figure 2

ANALYTICAL LABORATORIES DIVISION ORGANIZATION CHART



ANALYTICAL LABORATORIES DIVISION

The Analytical Laboratories Division (ALD) functions as an analytical service to the District. The Maintenance and Operations (M&O) Department receives analytical support for operational control and process evaluations, and for the National Pollutant Discharge Elimination System (NPDES) reports to the USEPA, and the IEPA. The Engineering Department receives data necessary for the planning and design of future water reclamation plants (WRPs).

The Industrial Waste Division (IWD) receives analytical services pursuant to the monitoring of industrial discharges for verification of User Charge revenue, and for compliance with sewer discharge standards. Analytical support is supplied to the Environmental Monitoring and Research (EM&R) Division for a variety of long- and short-term studies and for environmental monitoring programs. In addition to these functions, analytical service is extended through intergovernmental cooperation to outside agencies such as the IEPA, the Illinois Attorney General, and various federal agencies.

In order to implement these functions, there are four laboratory sections, one each is located at the Calumet and John E. Egan WRPs and two are located at the Cecil Lue-Hing

Research and Development Complex (Lue-Hing R&D Complex) at the Stickney WRP.

The large number of analyses performed by the ALD, as shown in the table on the next page, could not be accomplished without automation and instrumentation. To automate data acquisition, storage and reporting from these instruments, the Laboratory Information Management System (LIMS) was in the process of being improved in 2001 to increase processing and reporting speed, and take advantage of new functionality and ensure continued technical support for a less customized system.

Stickney Analytical Laboratory (SAL)

This laboratory is located at the Lue-Hing R&D Complex and performed 732,712 solids, nutrients, and metals analyses on 50,947 samples in providing service for the following:

M&O DEPARTMENT

1. Analysis for Solids Management Areas at Harlem Avenue, Lawndale Lagoons, Ridgeland Avenue, Stony Island, and Calumet.
2. Process Control, Operations Monitoring, and NPDES Compliance Monitoring for the Stickney WRP.
3. USEPA and IEPA Split Sampling Program.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TOTAL NUMBER OF ANALYSES PERFORMED IN 2001

Program	Nutrients	Oxygen Demands	Metals	Solids	Others	Total Program
4652 Liquid Monitoring	80,389	73,924	131,828	61,112	90,637	437,890
TARP	4,258	911	0	1,654	5,893	12,716
Treatment Facilities	76,131	73,013	131,828	59,458	84,744	425,174
4653 Solids Monitoring	15,758	1,535	21,043	109,921	82,019	230,276
4666 Sewage & Waste Control	2,979	256	0	849	416,816	420,900
4663 User Charge	0	63,547	0	21,981	35,940	121,468
4671 Lake Michigan	805	538	0	547	523	2,413
4672 Waterways	9,405	5,881	0	3,120	74,273	92,679
4673 Inspection Events	0	0	4,170	0	0	4,170
4674 IPCB Water Quality	0	0	0	0	0	0
4681 Assistance to M&O	4,976	911	2,648	778	10,540	19,853
4682 Assistance to Others	97	1,517	0	218	1,399	3,231
4690 Operations & Research	13,035	0	10,178	351	10,383	33,947
Totals	127,444	148,109	169,867	198,877	722,530	1,366,827

4. Tunnel and Reservoir Plan (TARP) Groundwater Monitoring Program.

EM&R DIVISION

1. Environmental and Permit Compliance Monitoring for the Prairie Plan Project in Fulton County involving biosolids quality, test well water quality, surface water quality, and plant tissues.
2. USX South Works Reclamation Demonstration and Slag Leachate Study.
3. Analytical Support for Biosolids Marketing.
4. Biosolids Salinity Study.
5. Ambient Water Quality Monitoring Program.
7. Illinois Waterways Monitoring Program.
8. Study of Ammonia Sources to Stickey WRP.
9. Industrial Nutrient Loadings to Stickney WRP.

IWD

Metals analyses are conducted on regulated categorical industrial discharges to determine compliance with the Sewage and Waste Control Ordinance. The following 13 metals are regulated: arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, silver, and zinc.

OTHER SERVICES

In addition to typical water, wastewater, and biosolids analyses, this laboratory also performs analyses on materials such as lubricants, sodium hypochlorite, and ferric chloride purchased by the District 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) the boiler water operation, (2) the raw sludge thickening process; and (3) the biosolids dewatering operation.

During 2001, the SAL received accreditation by the IEPA in accordance with National Environmental Laboratory Accreditation Conference standards.

Industrial Waste Analytical Laboratory (IWAL)

The IWAL is located at the Lue-Hing R&D Complex and performed 217,528 analyses on 31,612 samples. The laboratory performs analysis for fats, oil and grease; several methods for cyanide and phenols; total organic carbon; total and suspended solids; biochemical oxygen demand 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.

IWD

Administration of the Sewage and Waste Control Ordinance and the User Charge Ordinance.

In 2001, this laboratory evaluated automated cyanide/phenol systems from different vendors. This resulted in the purchase of a new instrument that replaced an obsolete 25-year-old system. A new automated system for analyzing fats, oil and grease utilizing Solid Phase Extraction was also purchased and put into service.

During 2001, the IWAL received accreditation by the IEPA in accordance with National Environmental Laboratory Accreditation Conference standards.

Calumet Analytical Laboratory

This laboratory is located at the Calumet WRP and performed 304,777 analyses on 33,094 samples in providing service for the following:

M&O DEPARTMENT

1. Process Control and Operations Monitoring and NPDES Compliance Monitoring for the Calumet and Lemont WRPs.
2. USEPA and IEPA Split Sample Study.
3. Monitoring of Hydrogen Sulfide Concentrations at the Kirie WRP.
4. Ongoing Assistance to Investigate Increased Zinc Loadings to the Calumet WRP.

EM&R DIVISION

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

John E. Egan (Egan) Analytical Laboratory

This laboratory is located at the Egan WRP and performed 280,784 analyses on 28,476 samples in providing service for the following:

M&O DEPARTMENT

1. Process Control Analyses and NPDES Compliance Monitoring for Egan, Kirie, Hanover Park and North Side WRPs.
2. USEPA and IEPA Split Sampling Program.
3. Materials and Boiler Water Testing Programs.
4. Soluble Phosphorus Study at the Four North Area WRPs.
5. Process Stream Evaluations of Suspected Incidents of Toxic Interferences or Pass-Through.
6. Polymer Testing for Raw Sludge Dewatering at the Egan and Hanover Park WRPs.
7. Development, Implementation and Support of LIMS Reports for Use by M&O Personnel at the Four North Area WRPs.

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.

IWD

1. Determine pH's of Grab Samples Collected by Industrial Waste Personnel.
2. Preserve Cyanide Grab Samples before Holding Time is Exceeded.

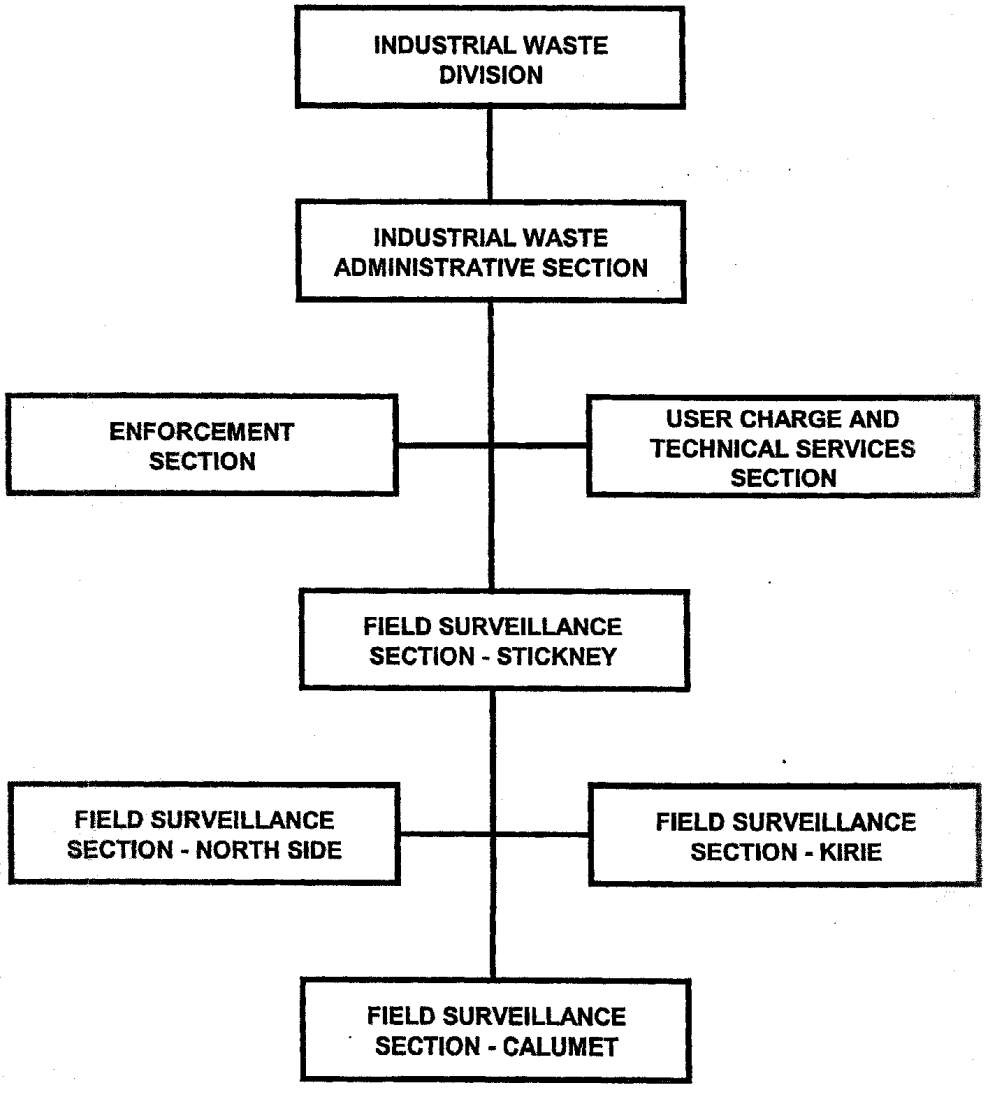
During 2001, Egan received accreditation by the IEPA in accordance with National Environmental Laboratory Accreditation Conference standards.

INDUSTRIAL WASTE DIVISION

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

Figure 3

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 De-

partment, 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 2001 included the issuance or renewal of 215 Discharge Authorizations, the review of 1,011 Continued Compliance Reports and the review of 31 Spill Prevention, Containment and Countermeasure Plans. Enforcement activities for the period from 1997 through 2001 are depicted in the following table.

Year	Cease and Desist Orders/Amendments	Board Orders	Legal Actions/Amendments
1997	618	8	110
1998	512	4	70
1999	595	6	58
2000	462	2	0
2001	456	1	6

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 1997 through 2001 is depicted in the following table.

Year	Effluent Limitations	Reporting Requirements	Other Requirements[1]	Total Number of Industrial Users Published
1997	50	61	2	113
1998	30	28	1	59
1999	30	36	0	66
2000	22	59	1	79
2001	11	61	0	68

[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 UCO.

In 2001, the Section received and reviewed reports filed by 3,745 users (1,005 commercial-industrial and 2,740 tax-exempt

users) containing calculations of their User Charge liabilities under the UCO and documentation corroborating their data. The Section classified 60 new large commercial-industrial and tax-exempt users and 28 small nonresidential-commercial users in 2001.

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 2001, the Section approved 53 user proposals for sampling, monitoring and/or installations, sealed 70 privately-owned water meters used for reporting volume deductions or discharge volumes, and conducted 231 field inspections to verify user data and/or compliance with UCO.

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 charges and User Charge Verification charges.

The following table shows the User Charge revenue, as reported by the District's Finance Department, collected over the period from 1997 through 2001.

Year	User Charge Revenue Collected
1997	$53,616,869
1998	$49,686,666
1999	$53,354,085
2000	$49,297,496
2001	$50,037,292

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 2001, 2,324 SWCO and 838 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 2001, 13,045 water quality samples were collected. Further, all groundwater monitoring wells installed for the District's TARP were routinely sampled. In 2001, 628 samples were obtained at 119 TARP groundwater monitoring wells. Chemical toilet service companies who, under District permit, discharge cleanings at the

Stickney WRP are also monitored and sampled. During 2001, three chemical toilet service companies made 750 disposals at the Stickney WRP. For these disposal events, 298 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 2001, 274 investigations were conducted in response to requests from federal, state and local agencies, municipalities and private citizens; 45 investigations were conducted in response to self-reported industrial activities; and 37 investigations were conducted in response to requests from the District's M&O Department.

Stickney WRP are also monitored and sampled. During 2001, three chemical toilet service companies made 750 disposals at the Stickney WRP. For these disposal events, 298 samples were randomly obtained.

The Section is also responsible for investigating discharges of hazardous, toxic or volatile materials to sewer systems and waterways within the District's boundaries, and for coordinating 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 2001, 274 investigations were conducted in response to requests from federal, state and local agencies, municipalities and private citizens; 45 investigations were conducted in response to self-reported industrial activities; and 37 investigations were conducted in response to requests from the District's M&O Department.

APPENDIX I

MEETINGS AND SEMINARS 2001

MEETINGS AND SEMINARS 2001

1. American Electroplaters and Surface Finishers' Association Meeting, Orlando, Florida, January 2001.

2. Association of Metropolitan Sewerage Agencies Winter Meeting, San Diego, California, January 2001.

3. Illinois Environmental Protection Agency, Meeting on TMDLs for the DuPage River Watershed, Lisle, Illinois, January 2001.

4. Illinois Water Environment Association Government Affairs in Water Pollution Control Seminar, Lisle, Illinois, January 2001.

5. Industrial Water, Waste and Sewage Group Dinner Meeting, Chicago, Illinois, January 2001.

6. Lake Michigan Water Analysts Winter Meeting, Kenosha, Wisconsin, January 2001.

7. National Advisory Council for Environmental Policy and Technology, Washington, D.C., January 2001.

8. United States Department of Agriculture, Annual Meeting of Regional Research Committee W-170, Las Vegas, Nevada, January, 2001.

9. Water Environment Research Foundation Research Council Meeting, Arlington, Virginia, January 2001.

10. Lake Michigan Water Analysts Board Meeting, Kenosha, Wisconsin, February 2001.

11. Low Level Mercury Sampling and Analysis Training Workshop, Springfield, Illinois, February 2001.

12. National Advisory Council for Environmental Policy and Technology Emerging Trends and Issues Workgroup, Washington, D.C., February 2001.

13. Pesticide/Herbicide Applicators Training/Examination for Fulton County Research and Development Department Staff, Jacksonville, Illinois, February 2001.

14. SAS Training on Application Development, Chicago, Illinois, February 2001.

15. United States Environmental Protection Agency, Metal Finishing Strategic Goals Program Summit, Washington, D.C., February 2001.

16. United States Environmental Protection Agency, Region V, Great Lakes Conference, Chicago, Illinois, February 2001.

17. Water Environment Federation/American Water Works Association/California Water Environment Association, Joint Residuals and Biosolids Management Conference, Biosolids 2001: "Building Public Support," San Diego, California, February 2001.

18. Central States Water Environment Association 2001 Education Seminar, Madison, Wisconsin, March 2001.

19. Chicago Chromatography Discussion Group 38th Introductory Course in Gas Chromatography, Schaumburg, Illinois, March 2001.

20. Illinois Water Environment Association 2001 Annual Conference, Rockford, Illinois, March 2001.

21. Industrial Water, Waste and Sewage Group Dinner Meeting, Chicago, Illinois, March 2001.

22. Los Angeles County Sanitation District and South Coast Air Quality Management District Air Monitoring Laboratories, Training for Air Analysis, Playa DelRay, California, March 2001

23. Michigan Water Environment Association Land Application of Biosolids Seminar, Lansing, Michigan, March 2001.

24. National Advisory Council for Environmental Policy and Technology, Washington, D.C., March 2001.

25. Perkin Elmer Service Training, Inductively Coupled Plasma Environmental and Wastewater, Atlanta, Georgia, March 2001.

26. Pittsburgh Conference 2001, New Orleans, Louisiana, March 2001.

27. United States Environmental Protection Agency, National Compliance Assistance Providers' Forum, Annapolis, Maryland, March 2001.

28. Water Environment Federation TMDL Science Issues Conference, St. Louis, Missouri, March 2001.

29. National Organization of Black Chemists and Chemical Engineers 2001, Baltimore, Maryland, April 2001.

30. "The Geochemical Complexity of a Man-made Aquifer and its Impacts on Monitoring, Remediation, and Biodiversity," United States Environmental Protection Agency, Chicago, Illinois, April 2001.

31. "The Illinois Waterway Ecosystem Restoration Study and the Reuse of Dredged Material from the Peoria Pool," United States Environmental Protection Agency, Chicago, Illinois, April 2001.

32. United States Environmental Protection Agency, Effluent Guidelines Workshop, Baltimore, Maryland, April 2001.

33. American Society for Civil Engineers - Environmental Water Resources Institute Conference, Orlando, Florida, May 2001.

34. American Society for Microbiology 101st General Meeting, Orlando, Florida, May 2001.

35. "Applying a Performance Based Approach to U.S. EPA SW-846/3535A, Solid Phase Extraction," Countryside, Illinois, May 2001.

36. Association of Metropolitan Sewerage Agencies 2001 National Environmental Policy Forum Meeting, Washington, D.C., May 2001.

37. Illinois Water Environment Association Public Education and Student Affairs Committee Meeting, Champaign, Illinois, May 2001.

38. Industrial Water, Waste and Sewage Group Dinner Meeting, Chicago, Illinois, May 2001.

39. Lake Michigan Water Analysts Spring Meeting, Northbrook, Illinois, May 2001.

40. Lakefront Festivals Presentation, Mayor's Office of Special Events, Chicago, Illinois, May 2001.

41. Microwave Digestion and Clean Chemistry Seminar, Chicago, Illinois, May 2001.

42. Midwest Emergency Preparedness and Response Conference, Rockford, Illinois, May 2001.

43. National Advisory Council for Environmental Policy and Technology, Compliance Assistance Advisory Committee, Arlington, Virginia, May 2001.

44. United States Environmental Protection Agency, 24th Annual Conference on Analysis of Pollutants in the Environment, Portsmouth, Virginia, May 2001.

45. United States Environmental Protection Agency, Region V, Annual National Forum on Contaminants in Fish, Chicago, Illinois, May 2001.

46. United States Environmental Protection Agency, Region V, Horizon Technology, Inc. and Mallinckrodt Baker, Inc., Implementation of Analytical Methods for RCRA Site Assessment and Monitoring Seminar, Chicago, Illinois, May 2001.

47. Illinois Department of Public Health, Response to Bioterrorism: What Clinical Laboratories Need to Know Training Course, Chicago, Illinois, June 2001.

48. Illinois Restaurant Association Presentation, Chicago, Illinois, June 2001.

49. Manhattan College, Environmental Engineering Department, Water Quality Modeling Course, Riverdale, New York, June 2001.

50. North American Benthological Society 49th Annual Meeting, LaCrosse, Wisconsin, June 2001.

51. United States Environmental Protection Agency, Region V, and Water Environment Federation, Innovative Processes to Produce Useful Materials and Energy from Biosolids and Animal Manure - A Symposium, Chicago, Illinois, June 2001.

52. United States Environmental Protection Agency, Stakeholder Meeting on Nutrient Criteria, Arlington, Virginia, June 2001.

53. National Advisory Council for Environmental Policy and Technology, Washington, D.C., July 2001.

54. Perkin Elmer Service Training, Inductively Coupled Plasma Winlap Software, Shelton, Connecticut, July 2001.

55. United States Environmental Protection Agency, Region V, Stakeholder Workshop - Great Lakes Strategy, Chicago, Illinois, July 2001.

56. Water Environment Research Foundation Project OO-ECO-2 Meeting, Lakewood, Colorado, July 2001.

57. Bioterrorism/Hazmat Seminar, Chicago, Illinois, August 2001.

58. Illinois Water Environment Association Laboratory Committee Meeting, St. Charles, Illinois, August 2001.

59. River Forest Fire Department Presentation, River Forest, Illinois, August 2001.

60. Source Sampling and CEMS Workshop, Raleigh, North Carolina, August 2001.

61. United States Environmental Protection Agency, Public Forum on the Draft National Beach Guidance and Grant Performance Criteria for Recreational Waters, Chicago, Illinois, August 2001.

62. United States Geological Survey, Inter-Agency Technical Task Force on E.coli Meeting, Gary, Indiana, August 2001.

63. University of Illinois, McCook/Thornton Aeration Pilot Plant Study Presentation, Urbana-Champaign, Illinois, August 2001.

64. American Bar Association 2001 Environmental Conference, Chicago, Illinois, September 2001.

65. Comprehensive Capillary GC Seminar, Rosemont, Illinois, September 2001.

66. Illinois Association of Wastewater Agencies Annual Meeting, St. Charles, Illinois, September 2001.

67. Industrial Water, Waste and Sewage Group Dinner Meeting, Chicago, Illinois, September 2001.

68. Midwest Water Analysts Association Steering Committee Meeting, Kenosha, Wisconsin, September 2001.

69. National Advisory Council for Environmental Policy and Technology, Emerging Trends and Issues Workgroup, Chicago, Illinois, September 2001.

70. American Society of Agronomy 2001 Annual Meeting, Charlotte, North Carolina, October 2001.

71. Dionex Ion Chromatography Seminar, Schaumburg, Illinois, October 2001.

72. Foam Fire Fighting Seminar, Forestview, Illinois, October 2001.

73. Illinois Department of Public Health Environmental Laboratory Seminar, Springfield, Illinois, October 2001.

74. Illinois Emergency Management Agency CAMEO Training, Joliet, Illinois, October 2001.

75. Illinois Water Environment Association, Ten-Day Water Environment Curriculum Committee Meeting, Villa Park, Illinois, October 2001.

76. Midwest Water Analysts Association Fall Meeting, Milwaukee, Wisconsin, October 2001.

77. National Biosolids Partnership Steering Committee, Denver, Colorado, October 2001.

78. Water Environment Federation 74th Annual Conference, Atlanta, Georgia, October, 2001.

79. Association of Metropolitan Sewerage Agencies/United States Environmental Protection Agency, Pretreatment Coordinators Workshop, Nashville, Tennessee, November 2001.

80. Environmental GC Analysis Seminar, Schaumburg, Illinois, November 2001.

81. Industrial Water, Waste and Sewage Group Dinner Meeting, Chicago, Illinois, November 2001.

82. Lake Michigan: State of the Lake 2001 Conference, Muskegon, Michigan, November 2001.

83. Society of Environmental Toxicology and Chemistry 22nd Annual Meeting, Baltimore, Maryland, November 2001.

84. Agilent Technologies 2001 HPLC Educational Seminar Series Open Forum XI, Lincolnshire, Illinois, December 2001

85. Association of Metropolitan Sewerage Agencies Fall Leadership Meeting, Washington, D.C., December 2001.

86. Water Environment Research Foundation Project Subcommittee Meeting, Cincinnati, Ohio, December 2001.

APPENDIX II

PAPERS PRESENTED 2001

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1. "Use of Biosolids to Remediate Brownfield Sites." Presented at the United States Department of Agriculture, Annual Meeting of Regional Research Committee W-170, Las Vegas, Nevada, by Thomas C. Granato, January 2001.

2. "Does Termination of Long-Term Annual Biosolids Applications to Land Cause a Time Bomb of Increased Metal Uptake by Corn?" Presented at the Water Environment Federation/ American Water Works Association/California Water Environment Association, Joint Residuals and Biosolids Management Conference, Biosolids 2001: "Building Public Support," San Diego, California, by Thomas C. Granato, Prakasam Tata, Richard I. Pietz, George Knafl, Carl R. Carlson, Jr., Richard Lanyon, and Cecil Lue-Hing, February 2001.

3. "Suitability of Biosolids for Use as a Topsoil Substitute in Urban Reclamation Projects." Presented at the Water Environment Federation/American Water Works Association/California Water Environment Association, Joint Residuals and Biosolids Management Conference, Biosolids 2001: "Building Public Support," San Diego, California, by Prakasam Tata, Thomas C. Granato, Richard I. Pietz, Cecil Lue-Hing, and Richard Lanyon, February 2001.

4. "Continuous DO Monitoring in Chicago's Deep-Draft Waterways." Presented at the Illinois Water Environment Association 2001 Annual Conference, Rockford, Illinois, by Irwin Polls, March 2001.

5. "Main Drivers for the Solids Management Practices at the Metropolitan Water Reclamation District of Greater Chicago - A Historical Perspective." Presented at the Illinois Water Environment Association 2001 Annual Conference, Rockford, Illinois, by Prakasam Tata, March 2001.

6. "Management of Solids at the Metropolitan Water Reclamation District of Greater Chicago - Past and Present Practices." Presented at the Michigan Water Environment Association Land Application of Biosolids Seminar, Lansing, Michigan, by Prakasam Tata, March 2001.

7. "Overview of Illinois Pollution Control Board Part 742 Tiered Approach to Corrective Action Objectives (TACO)

and Implications for Land Application of Biosolids in the State of Illinois." Presented at the Illinois Water Environment Association 2001 Annual Conference, Rockford, Illinois, by Thomas C. Granato, March 2001.

8. "Process Control Troubleshooting of Activated Sludge Process by SOUR Relationships." Presented at the Illinois Water Environment Association 2001 Annual Conference, Rockford, Illinois, by Kamlesh Patel, Prakasam Tata, Bernard Sawyer, and David T. Lordi, March 2001.

9. "Radiological Monitoring of the Raw Sewage, Final Effluent, Sludge, and Biosolids of the Metropolitan Water Reclamation District of Greater Chicago." Presented at the Illinois Water Environment Association 2001 Annual Conference, Rockford, Illinois, by Abdul Khalique, Richard Pietz, Prakasam Tata, and Richard Lanyon, March 2001.

10. "So You Want to Get Your Low Tech Process Certified as Equivalent to a PFRP; Stay Tuned!" Presented at the Central States Water Environment Association 2001 Education Seminar, Madison, Wisconsin, by Prakasam Tata, Richard Lanyon, and Cecil Lue-Hing, March 2001.

11. "Uptake of Heavy Metals by Vegetables Grown in Biosolids Amended Soil - Are USEPA Rules Protective?" Presented at the Illinois Water Environment Association 2001 Annual Conference, Rockford, Illinois, by Albert Cox, March 2001.

12. "Use of Reflectors to Enhance Synergism of Solar Radiation and Solar Heating to Disinfect Drinking Water." Presented at the American Society for Microbiology 101st General Meeting, Orlando, Florida, by Geeta K. Rijal and Roger S. Fujioka, May 2001.

13. "An Innovative Way to Treat Poultry Waste for Odor Control and Nitrogen Management." Presented at the United States Environmental Protection Agency, Region V, and Water Environment Federation, Innovative Processes to Produce Useful Materials and Energy from Biosolids and Animal Manure - A Symposium, Chicago, Illinois, by Prakasam Tata and Raymond Loehr, June 2001.

14. "Testing and Evaluation of Biosolids to Meet Requirements of an Urban Market." Presented at the United States Environmental Protection Agency, Region V, and Water Environment Federation, Innovative Processes to Produce Useful Materials and Energy from Biosolids and Animal Manure - A Symposium, Chicago, Illinois, by Albert Cox, Thomas C. Granato, Richard I. Pietz, and Prakasam Tata, June 2001.

15. "Water Quality Issues in Chicago Area Waterways." Presented at the American Bar Association 2001 Environmental Conference, Chicago, Illinois, by Irwin Polls, September 2001.

16. "Residual Impact of a High Metal Content Biosolids on Cd and Zn Uptake in Garden Vegetables." Presented at the American Society of Agronomy 2001 Annual Meeting, Charlotte, North Carolina, by Albert Cox, October 2001.

17. "The Effects of Age on *Pimephales promelas* Survival in Acute Whole Effluent Toxicity Tests." Presented at the Water Environment Federation 74th Annual Conference, Atlanta, Georgia, by James Zmuda, Jon Yamanaka, Zainul Abedin, Bernard Sawyer, Prakasam Tata, Cecil Lue-Hing, and George Knafl, October 2001.

APPENDIX III

PAPERS PUBLISHED 2001

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1. Granato, T.C., P. Tata, R.I. Pietz, G. Knafl, C.R. Carlson, Jr., R. Lanyon, and C. Lue-Hing. "Does Termination of Long-Term Annual Biosolids Applications to Land Cause a Time Bomb of Increased Metal Uptake by Corn?" Proceedings of the Water Environment Federation/American Water Works Association/California Water Environment Association, Joint Residuals and Biosolids Management Conference, Biosolids 2001: "Building Public Support," Water Environment Federation, Alexandria, Virginia, 2001.

2. Granato, T.C., P. Tata, R.I. Pietz, C. Lue-Hing, and R. Lanyon. "Use of Biosolids as a Soil Substitute in Urban Markets - The Metropolitan Water Reclamation District of Greater Chicago Experience." Proceedings of the Water Environment Federation Innovative Uses of Biosolids and Biosolids Management Conference, Water Environment Federation, Alexandria, Virginia, 2001.

3. Tata, P., D. Bernstein, J.S. Jain, R.I. Pietz, C. Lue-Hing, and R. Lanyon. "Advances in Conventional and Innovative Uses of Biosolids." Proceedings of the Water Environment Federation Innovative Uses of Biosolids and Biosolids Management Conference, Water Environment Federation, Alexandria, Virginia, 2001.

4. Tata, P., R.I. Pietz, and C. Lue-Hing. "Solids Management at the Metropolitan Water Reclamation District of Greater Chicago - Past and Present." Proceedings of the Virginia Water Environment Association Education Seminar, Virginia Water Environment Association, Alexandria, Virginia, 2001.

5. Tata, P., T.C. Granato, R.I. Pietz, C. Lue-Hing, and R. Lanyon. "Suitability of Biosolids for Use as a Topsoil Substitute in Urban Reclamation Projects." Proceedings of the Water Environment Federation/American Water Works Association/California Water Environment Association, Joint Residuals and Biosolids Management Conference, Biosolids 2001: "Building Public Support," Water Environment Federation, Alexandria, Virginia, 2001.

6. Zmuda, J., J. Yamanaka, Z. Abedin, B. Sawyer, P. Tata, C. Lue-Hing, and G. Knafl. "The Effects of Age on *Pimephales promelas* Survival in Acute Whole Effluent Tox-

icity Tests." Proceedings of the Water Environment Federation 74th Annual Conference, Water Environment Federation, Alexandria, Virginia, 2001.