

Protecting Our Water Environment



Metropolitan Water Reclamation District of Greater Chicago

***MONITORING AND RESEARCH
DEPARTMENT***

REPORT NO. 13-39

Monitoring and Research

2012

Annual Report

Monitoring and Research Department
Thomas C. Granato, Director

October 2013

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MONITORING AND RESEARCH

2012

ANNUAL REPORT

Monitoring and Research Department
Thomas C. Granato, Director

October 2013

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President Kathleen Therese Meany and Members of the Board of Commissioners,

The Monitoring and Research Department makes many important contributions to the Metropolitan Water Reclamation District of Greater Chicago's (District) strategic plan. We contribute to **Ensuring Financial Stability** through efficient administration of the District's User Charge Ordinance, by providing process monitoring and technical support to operations, and by conducting applied research to support process optimization, energy efficiency, and resource recovery. We are also committed to streamlining our business practices to reduce costs.

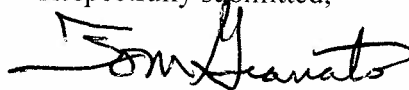
We are **Developing All Employees** by offering in-house training on chemical hygiene, hazardous material emergency response, standard analytical operating procedures, and participation at local, regional, and national professional conferences and workshops. We provide access to informational and training webinars, and organize and operate a monthly environmental issues and research seminar series that is accessible in real time and in archived streaming video to all District employees.

The Monitoring and Research Department contributes to **Improving Public Image** for the District by working with local municipalities, school districts, and park districts to enable them to beneficially utilize our biosolids to reduce fertilizer and topsoil costs for land management at recreational facilities. We also provide informative technical presentations on environmental issues that are important to the Chicago metropolitan area, respond to citizen complaints about odors, fish kills, or incidents of illegal dumping, and provide leadership and support at HAZMAT spills.

We provide monitoring, research, and technical support that contribute to the District's efforts to **Be Environmentally Responsible**. We administer the District's Industrial Waste Pretreatment Program including the Sewage and Waste Control, the Environmental Remediation Wastewater, and the Chemical Toilet Wastes Disposal Ordinances. We execute the District's responsibility as a primary response agency for hazardous materials emergency management in Cook County. We monitor the aquatic, terrestrial, and atmospheric environment to ensure that our operations are beneficial and protective of public health, and we provide technical support to improve operations and adaptation of new technologies to improve the quality of our treatment processes.

I am proud to present to you herewith, a summary report of our accomplishments for 2012.

Respectfully submitted,



Thomas C. Granato

Director

Monitoring and Research

TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES	iii
DISCLAIMER	iii
MONITORING AND RESEARCH DEPARTMENT CONTACT PERSONNEL	iv
MONITORING AND RESEARCH DEPARTMENT ORGANIZATION CHART FOR 2011	v
ENSURING FINANCIAL STABILITY	1
User Charge Program	1
Optimizing Business Practice	2
DEVELOPING ALL EMPLOYEES	3
IMPROVING PUBLIC IMAGE	4
BE ENVIRONMENTALLY RESPONSIBLE	6
Industrial Waste Pretreatment Program	6
Environmental Monitoring Program	7
Surface and Groundwater	7
Air	7
Analytical Laboratories	8
Treatment Process Control and Optimization	10
Provide Technical Assistance to Other Departments and Agencies	11
Polymer Studies	11
District Water Reclamation Plant and Facilities Operations	11
Stormwater Management	11

Process Facility Planning and Technology Evaluation	12
TABLE OF CONTENTS (Continued)	

	<u>Page</u>
Assistance to Outside Agencies	13
Technical Support for Biosolids Program	13
Applied Research to Achieve Operational Improvement and Cost Reductions	14
Biosolids	14
Resource Recovery	15
Aquatic Environment	15
LOOKING AHEAD	17
APPENDICES	
Meetings and Seminars 2012	AI-1
Presentations 2012	AII-1
Papers Published 2012	AIII-1
Monitoring and Research Department 2012 Seminars	AIV-1
Monitoring and Research Department Numbered Reports Published During 2012	AV-1

LIST OF TABLES

<u>Table No.</u>		<u>Page</u>
1	Five-Year Trend in User Charge Revenue Including 2011	1
2	Marketing Efforts are Increasing Local Biosolids Use Under the Controlled Solids Distribution Program	4
3	Five-Year Trend in Enforcement Activities Including Year 2012	6
4	Total Number of Analyses Performed by the Monitoring and Research Department's NELAP Accredited Laboratories 2012	9
5	Total Number of Analyses Performed by the Monitoring and Research Department's Analytical Microbiology Laboratory in 2012	10

DISCLAIMER

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

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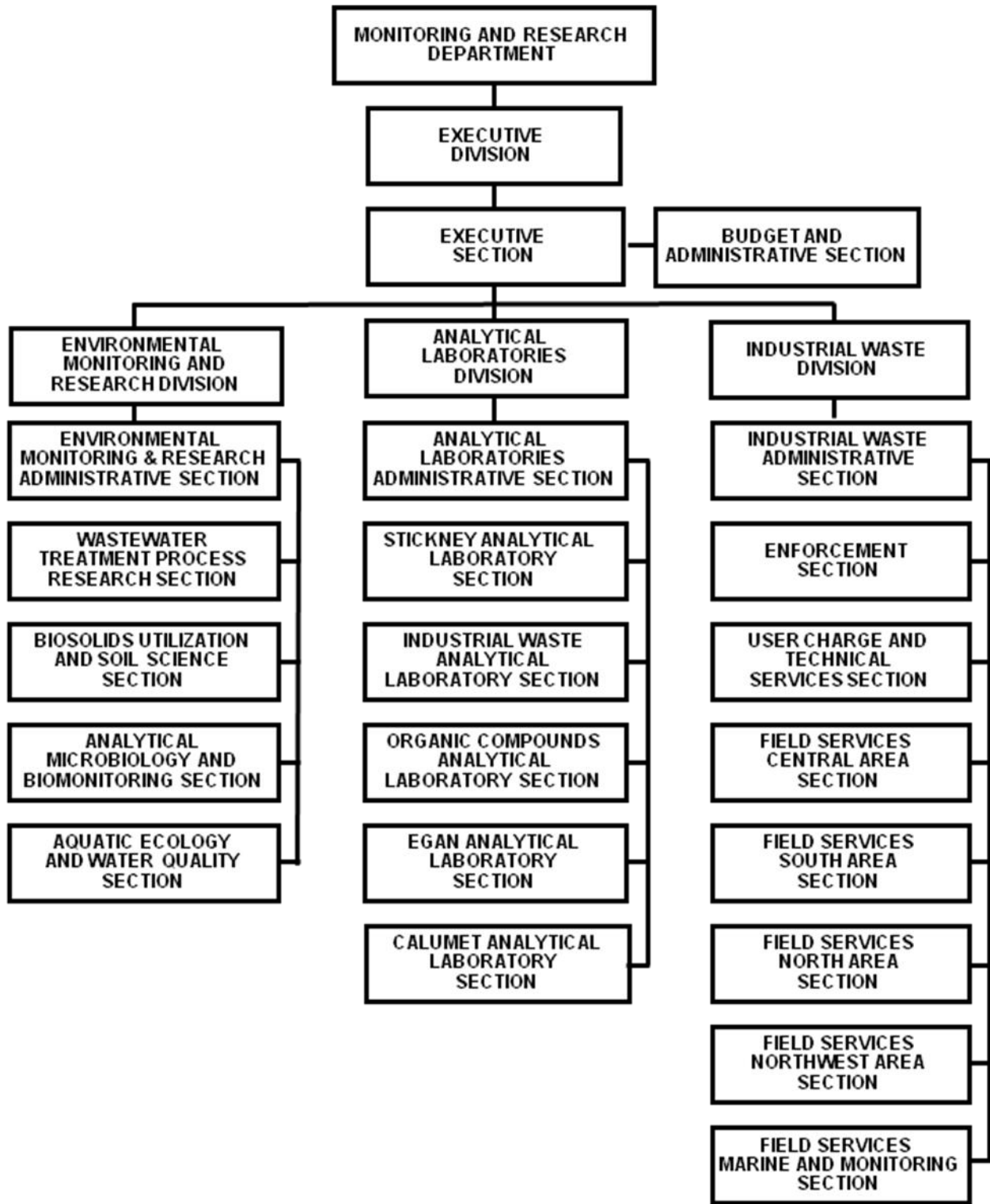
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MONITORING AND RESEARCH DEPARTMENT ORGANIZATION CHART FOR 2012



ENSURING FINANCIAL STABILITY

The Monitoring and Research Department (M&R) 2012 budget appropriation was \$25,677,500, a decrease of \$727,100, or 2.8 percent from 2011. Approximately 86 percent, or \$22,179,400, was appropriated for salary and wages, and the remaining appropriation of \$3,498,100 was used to fund acquisition of equipment, supplies, and services to operate M&R's laboratories, technical support projects, and environmental and industrial monitoring programs. M&R has continuously sought to make improvements to its business practice and to maintain a clear focus on its mission. As a result, M&R has decreased the number of budgeted positions it houses in 10 of the past 12 years dropping from 355 positions in 2000 to 280 by the end of 2012.

User Charge Program

M&R generates an important revenue stream through recovery of operations, maintenance, and replacement costs incurred from providing treatment to discharges from Commercial, Industrial, and Tax-Exempt Users of the sewerage system, and the costs of administering the Metropolitan Water Reclamation District of Greater Chicago's (District) Pretreatment and User Charge Programs. The User Charge Program assesses charges to recover costs that are beyond those recovered through payment of ad valorem property taxes based on the volume of water discharged and the concentration of waste it contains. The 2011 User Charge revenue was \$77,743,336.

TABLE 1: FIVE-YEAR TREND IN USER CHARGE REVENUE INCLUDING 2012

Year	User Charge Receipts
2008	\$54,442,493
2009	\$48,253,267
2010	\$48,666,789
2011	\$48,614,202
2012	\$77,743,336

In 2012, M&R administered 3,550 accounts. Of these accounts, 1,533 (776 Commercial-Industrial and 757 Tax-Exempt Users) were processed manually. M&R conducted 1,767 inspection and sampling events, and processed 2,691 reports and filings to reconcile User Charge liabilities for these manual accounts. The remaining 2,017 accounts, which are all Tax-Exempt Users, were approved by M&R for automated processing. M&R remains vigilant in identifying and classifying new users, and in 2012, 49 new Large Commercial-Industrial and Tax-Exempt Users and 79 Small Nonresidential Commercial-Industrial User accounts were created.

Section 7f of the District's User Charge Ordinance makes provision for automated filing and clearing of User Charge accounts. This reduces costs for the District and the Users. M&R will continue to encourage Users to migrate to automated processing. In 2012, M&R also identified 571 Users who were eligible for reduced reporting and self-monitoring requirements under Sections 7g, 7h, and 7i of the Ordinance. Granting these reduced requirements reduces the User's cost for determining their User Charges and reduces the District's oversight costs.

Optimizing Business Practice

M&R provides quality control data to the Maintenance and Operations Department (M&O) for various materials purchased by the District, which allows verification that contract requirements are met. These materials, such as lubricants, sodium hypochlorite, bisulfites, bioxides, polymers, and ferric chloride, are used for such purposes as operating plant machinery, disinfection, odor control, and biosolids processing.

M&R is committed to automating and streamlining its business practice. In 2012, staff from M&R and the Information Technology Department continued working together to further improve the Laboratory Information Management System (LIMS) to increase data processing and reporting, and to enhance data acquisition from automated instruments. Bids were received for consulting services to upgrade LIMS in 2013.

Implementation of the complete new pretreatment information management system (PIMS) is expected to be completed by 2014. This updated and enhanced PIMS will enable M&R to maintain its industrial waste program data in a single database and increase staff efficiency. An integrated User Charge/Finance Department module, expected to be in operation by the end of 2013, will streamline the assessment, invoicing, and collection of User Charges, penalties and noncompliance enforcement charges, as well as simplify calculation methods where feasible. M&R will streamline its programs through implementation of electronic industrial user reporting and electronic management of District and industrial user records and correspondence.

DEVELOPING ALL EMPLOYEES

M&R is committed to providing continuing education and professional development to all of its employees. M&R conducts a monthly environmental issues and research seminar series at the Lue-Hing Research and Development Complex which is video-conferenced to three other facilities and is archived in streaming on-line video format through the web portal.

M&R employees benefited from attendance at 49 local, regional, and national professional society meetings and workshops (Appendix AI), and often participated on the meeting programs as speakers, session chairs and moderators, or committee chairs or members. M&R also economizes where possible by providing its employees access to webinars which are presented by the Water Environment Federation, Water Environment Research Foundation, United States Environmental Protection Agency (USEPA), American Chemical Society, and others.

In 2012, M&R staff made 34 presentations at conferences and meetings, published 7 papers in conference proceedings or peer-reviewed journals, and the department published 59 numbered reports which are available on the District's website.

The M&R Seminar Series is approved by the Illinois Society of Professional Engineers for professional development credits and is available to all employees and the local community. In 2012, attendance at the Lue-Hing Research and Development Complex Auditorium and the Main Office Board Room was 1,622, and video conferencing was expanded to the Calumet and O'Brien WRPs.

M&R administers the District's Radiation Safety Program, including maintaining a Radioactive Material License issued to the District by the Illinois Emergency Management Agency, Division of Nuclear Safety, assuring that activities are conducted according to the license conditions and regulations. M&R also maintains a Chemical Hygiene Plan for its laboratories and conducts bacteriological monitoring of drinking water sampled from various District facilities to ensure the safety of drinking water to District employees.

IMPROVING PUBLIC IMAGE

M&R engages in activities to benefit the public and in the process strives to improve the District's image. The major activities include odor monitoring, the Biosolids Controlled Solids Distribution Program, and maintaining native prairie landscapes.

The District conducts an Odor Monitoring Program to minimize or eliminate odor nuisance to the communities surrounding its facilities. During 2012, M&R in collaboration with M&O, monitored unit processes at the District's wastewater treatment facilities as well as biosolids drying areas for odors. Odor conditions were reported to the respective plant managers. An annual summary report of monitoring results was generated.

The District is committed to reducing the odors generated in its collection systems. M&R undertook a full-scale field study during 2012 to identify the hydrogen sulfide (H₂S) hot spots along interceptors Upper Des Plaines 14A and 20B in the James C. Kirie (Kirie) Water Reclamation Plant (WRP) service area to evaluate the effect of interceptor lining and jet flushing in alleviating odors in these interceptors. This work will continue into 2013 to assess the implementation of multiple chemical dosing stations to effectively reduce the H₂S levels.

The District conducts a biosolids Controlled Solids Distribution Program under a permit issued by the Illinois Environmental Protection Agency (IEPA). Under this program, exceptional quality air-dried biosolids are used as a soil amendment and fertilizer in the Chicago metropolitan area. During 2012, M&R staff worked with 45 biosolids users to ensure regulatory compliance and help them derive economic and agronomic benefits from biosolids use. M&R staff conducted a field day and distributed promotional materials to park districts, school districts, golf courses, and other land managers to expand the program and make the public aware of the benefits of utilizing biosolids.

TABLE 2: MARKETING EFFORTS ARE INCREASING LOCAL BIOSOLIDS USE UNDER THE CONTROLLED SOLIDS DISTRIBUTION PROGRAM

	2005	2006	2007	2008	2009	2010	2011	2012
No. of Users*								
Total	8	12	37	35	39	43	60	48
New (1 st Time)	-	10	35	16	11	10	20	11
Repeat Users	-	2	2	19	28	33	40	37
Biosolids Qty. -- (dry tons)								
Total	2,300	1,900	4,800	4,000	6,274	6,863	7,279	11,050
Large Users -- (>1,000 DT)				16,000**				

* Not all customers use biosolids every year.

** Construction at Highlands GC (10,000 DT), and reclamation at Miller Meadows (4,000 DT) and USX (2,000 DT).

M&R conducted marketing activities and technical support on projects in the Chicago metropolitan area where 11,000 dry tons of biosolids were used as a soil conditioner or fertilizer topdressing on various sites, including 15 schools/athletic fields, 66 parks, 5 golf courses, 2 landscaping companies, and 1 cemetery.

In 2012, M&R developed a white paper and report to the Members of the Board of Commissioners on guidelines for managing of vegetation on District land to minimize impacts on the environment. M&R worked with M&O in 2012 to continue to maintain the native prairie landscape conversions that have been established on District property throughout the service area.

BE ENVIRONMENTALLY RESPONSIBLE

M&R works in partnership with the M&O and Engineering Departments to ensure regulatory compliance of its operations and to seek to continually increase the efficiency of the District's treatment processes to bring about progressive and sustainable improvement of the aquatic, terrestrial, and atmospheric environment in the District's service area and beyond.

Industrial Waste Pretreatment Program

M&R is committed to stopping pollution at its source by operating an effective Industrial Waste Pretreatment and Source Control Program in full compliance with all federal and state statutes. During 2012, the administration of the District's Industrial Waste Pretreatment Program required the issuance or renewal of Discharge Authorizations for 101 Significant Industrial Users; the review of 718 Continued Compliance Reports; and 6 Spill Prevention, Containment, and Countermeasure Plans. During 2012, M&R conducted 3,229 inspections associated with administering the District's Sewage and Waste Control Ordinance and randomly sampled and analyzed 666 of the 1,289 chemical toilet disposals at the Stickney WRP. In 2012, M&R issued 118 Cease and Desist Orders to Industrial Users who were found to be in significant noncompliance with the District's Industrial Waste Pretreatment Program requirements. In accordance with the public participation requirements of the Pretreatment Program, the identity of 44 significant violators of the program in 2012 will be published in 2013.

As a result of the District's Industrial Pretreatment Program, all of the biosolids produced by the District met the highest quality criteria in USEPA's Part 503 Regulation and the WRP effluents met all NPDES permit limits for regulated industrial pollutants.

M&R provided first response services for hazardous materials emergencies and complaints of pollution by conducting 159 investigations in response to requests from federal, state, and local agencies, municipalities and private citizens; 64 investigations were conducted in response to self-reported industrial activities; and 28 investigations were conducted in response to requests from M&O in 2012.

TABLE 3: FIVE-YEAR TREND IN ENFORCEMENT ACTIVITIES INCLUDING YEAR 2012

Year	Cease and Desist Orders	Board Orders	Legal Actions
2008	126	1	0
2009	88	1	0
2010	82	3	0
2011	87	0	0
2012	118	0	0

Environmental Monitoring Program

Surface and Groundwater. M&R monitors the effectiveness of District operations in improving the environment, and documents compliance with state and federal regulations and operating permits. In 2012, M&R collected and analyzed approximately 600 water quality samples from the District area waterways. M&R also successfully met the District's National Pollutant Discharge Elimination System (NPDES) permit requirements for continuous dissolved oxygen monitoring and completed a chlorophyll survey of the Chicago, Calumet, and Des Plaines River Systems.

M&R's Environmental Monitoring and Research Division (EM&RD) collected fish at 32 stations in the Chicago, Calumet, and Des Plaines River Systems. The sampled fish were identified, weighed and measured for length, and examined for parasites and disease. The fish data is provided to the IEPA for their use in preparing the Illinois 305(b) assessment report.

All of the Ambient Water Quality Data, Continuous Dissolved Oxygen Monitoring Data and Biological Survey Data for the local waterways is reported annually and is available to the public on the District website.

In 2012, 517 samples from 102 Tunnel and Reservoir Plan (TARP) groundwater monitoring wells for the deep tunnels and two reservoirs were collected and analyzed. Based on the monitoring results, M&R compiled six annual monitoring reports for the four TARP tunnel systems including Mainstream, Calumet, Des Plaines and Upper Des Plaines, and two reservoirs including the Gloria Alitto Majewski Chicagoland Underflow Plan Reservoir and the Thornton Transitional Reservoir to meet operating permit requirements of these facilities.

M&R also conducts groundwater monitoring at seven biosolids management facilities, including the Hanover Park Fischer Farm in accordance with permits issued by the IEPA. In 2012, a total of 28 monitoring reports were submitted to the IEPA.

Air. M&R provides compliance monitoring and reporting support to M&O for the District's Clean Air Act Permits. At the John E. Egan (Egan) WRP, M&R performed monthly monitoring of hydrogen sulfide levels at the facility's compressor room in compliance with its Federally Enforceable State Operating Permit. M&R also calculated the Hazardous Air Pollutant emissions from the liquid stream of the all the District's WRPs, except the Egan WRP, as required by its Title V Air Quality Permit. Annual hazardous air pollutant emissions were calculated using a computer model and submitted to M&O for reporting to the IEPA. Additionally, as part of the IEPA's Environmental Emissions Reduction Market System, an Annual Hazardous Air Pollutants Report was filed. During 2012, M&R also conducted odor monitoring at the District's biosolids drying areas in compliance with the IEPA permits for operation of the drying areas.

Analytical Laboratories

The Analytical Laboratories Division (ALD) has five National Environmental Laboratory Accreditation Program (NELAP) accredited laboratories, generating accurate, reliable, and defensible data for samples from various District functional programs. The laboratories are audited internally by the M&R Quality Assurance Officer annually and by the IEPA biennially. The laboratories are also audited annually by the Chemical Hygiene Officer for compliance with fire and safety requirements. In 2012, the total number of analyses performed by the laboratories was 1,564,687.

The Analytical Microbiology and Biomonitoring Section has five state-of-the-art laboratories: Analytical Bacteriology Laboratory; Molecular Microbiology Laboratory; Parasitology Laboratory; Virology Laboratory; and Wastewater Microbiology Laboratory that provide high quality microbiological monitoring and research support services for various District functional programs. These specialized laboratories conducted a total of 6,580 microbial analyses in 2012. The Analytical Bacteriology Laboratory is certified by the Illinois Department of Public Health.

The ALD of M&R maintained its NELAP accreditation by adhering to the strict standards established by The NELAP Institute. The Bacteriology Laboratory of the EM&RD maintained its certification by the Illinois Department of Public Health. The accreditation and certification ensure that all results generated by the M&R laboratories are accurate, reliable and defensible.

TABLE 4: TOTAL NUMBER OF ANALYSES PERFORMED BY THE MONITORING AND RESEARCH DEPARTMENT'S NELAP ACCREDITED LABORATORIES IN 2012

Program	Nutrients	Oxygen Demands	Metals	Solids	Organic Compounds	Others	Program Total
4652 Liquid Monitoring*	145,556	67,026	152,725	65,327	17,814	78,098	526,546
TARP	2,027	467	10,677	302	0	975	14,448
Treatment Facilities	143,529	66,559	142,048	65,025	17,814	77,123	512,098
4653 Solids Monitoring	11,403	478	37,863	150,445	4,695	20,195	225,078
4666 Sewage & Waste Control	711	77	299,828	1,390	37,009	10,184	349,199
4663 User Charge	0	36,215	0	10,419	0	20,714	67,349
4671 Lake Michigan	0	0	0	0	0	0	0
4672 Waterways	7,805	1,339	64,743	2,726	59,314	11,229	147,156
4674 Groundwater	1,983	637	10,991	366	0	1,220	15,197
4681 Assistance to M&O	3,512	82	963	2,829	5,333	10,392	23,111
4682 Assistance to Others	600	405	442	143	0	422	2,012
4684 Engineering	31,218	4,223	44,119	5,356	2,208	1,379	88,503
4685 Regulatory Monitoring	0	0	0	0	0	0	0
4690 Operations & Research	3,555	18,732	49,486	883	2,780	45,099	120,535
Total Group	206,342	129,214	661,161	239,884	129,153	198,932	1,564,687

* 4652 Liquid Monitoring is the sum of TARP and Treatment Facilities.

TABLE 5: TOTAL NUMBER OF ANALYSES PERFORMED BY THE MONITORING AND RESEARCH DEPARTMENT'S ANALYTICAL MICROBIOLOGY LABORATORY IN 2012

Program	Total Coliform	Fecal Coliform/ <i>E. Coli</i>	Pathogens ¹	Other ²
4652 Liquid Monitoring	27	735	--	--
4653 Solids Monitoring	--	120	115	--
4666 Sewage & Waste Control	--	4	--	5
4672 Waterways	--	561	--	--
4674 Groundwater	--	472	--	--
4681 Assistance to M&O	--	157	157	3,393
4682 Assistance to Others	50	12	--	--
4690 Operations & Research	--	618	36	118
Total	77	2,679	308	3,516

¹ Includes *Salmonella*, *enteric virus*, and *Ascaris ova*.

² Includes coliphages, filament and phosphorus accumulating organisms.

Treatment Process Control and Optimization

M&R monitors the liquid and solids process trains daily at multiple critical control points for each of the seven WRPs to inform process control and to improve operations and the quality of effluents and biosolids. This includes chemical and microbiological monitoring including characterization of changes in microbial communities associated with operations performance metrics to assess process stability and provide early warning of process upset such as appearance of excess filamentous bacteria in mixed liquor. A total of 370 activated sludge samples were analyzed for microbial characterization. Whole effluent toxicity tests with fish (*Pimephales promelas*) and daphnids (*Ceriodaphnia dubia*) were conducted as required by NPDES permits.

In 2012, M&R continued an investigation of the disinfection process at the Egan WRP during wet weather conditions. The study was undertaken to prevent violations of the Egan WRP NPDES permit. Operational data during the period of inconsistent disinfection was collected and evaluated, and a full-scale process evaluation was initiated to determine the impact of sudden changes in flow and suspended solids concentrations on disinfection. M&R will continue with the evaluation in 2013 and provide recommendations for process control improvements.

Provide Technical Assistance to Other Departments and Agencies

Polymer Studies. The District's dewatering polymer chemical costs are in excess of \$5,000,000. M&R is working with M&O to optimize post-digestion centrifuge operations at the Stickney WRP with respect to reducing polymer consumption. Full-scale baseline centrifuge operation, polymer use evaluation, and laboratory tests were conducted in 2012. Preliminary study findings indicate that lower polymer use can be achieved through adjusting and optimizing the current centrifuge operations. M&R prepared centrifuge operational procedures for use by M&O based on this concept and plans to conduct a full-scale implementation study in 2013. Additionally, M&R facilitated automatic data logging of key centrifuge operational parameters from the machines to support and increase efficiency of the dewatering operations. This computerized data feedback is a first step towards automated rather than manual centrifuge operation which will be explored in 2013.

As a part of M&O's polymer contract procurement process, M&R conducted bench-scale polymer testing followed by full-scale testing. The test results helped M&O to purchase the most cost-effective product for Hanover Park's sludge thickening operations.

District Water Reclamation Plant and Facilities Operations. In 2012, in response to M&O's requests, M&R conducted microbiological analysis on the biofilm collected from the gates at the Lockport Flow Control Structure to investigate the potential causes of corrosion occurring on the gates.

M&R provided support in response to a sludge line break in the north service area and to formulate strategies to correct upset conditions at the Egan WRP.

Stormwater Management. In support of the Engineering Department Stormwater Management Program, M&R continued its collaboration with the United States Geological Survey in 2012 to evaluate the effect of green infrastructure Best Management Practices such as permeable pavements, bioswales, planters on stormwater flow, and pollutant load reduction in the Sustainable Streetscape Project located on West Cermak Road between South Halsted Street and South Ashland Avenue, and South Blue Island Avenue between South Ashland Avenue and South Western Avenue. Collection of baseline and partial construction data of precipitation, combined sewer flow, groundwater levels, wastewater quality, and groundwater quality has now been completed.

M&R is continuing to investigate the effect of stormwater flow and pollutant load reduction on three different permeable pavements relative to a control lot at the Stickney WRP. A final project report will be prepared in 2013.

Process Facility Planning and Technology Evaluation. M&R, in conjunction with the Engineering and M&O Departments, formed a Disinfection Task Force, which evaluated

available disinfection technologies, reviewed operating data for the Calumet and Terrence J. O'Brien (O'Brien) WRPs, and performed a triple bottom line analysis in order to provide recommendations on the best disinfection alternatives for installation at the Calumet and O'Brien WRPs. The recommendations of the Task Force included chlorination and dechlorination disinfection for the Calumet WRP and ultraviolet (UV) radiation disinfection for the O'Brien WRP.

M&R continued to participate on the Disinfection Task Force and conducted testing to determine minimum effective disinfectant doses for the Calumet and O'Brien WRPs that generated criteria for design of efficiently sized facilities.

In addition to participating in the Disinfection Task Force, M&R also performed a UV dose response study for the O'Brien WRP. For this study, regular collimated beam tests were conducted using un-disinfected final effluent from the O'Brien WRP to obtain a UV dose response curve for fecal coliform. These response curves were developed over a range of operating conditions and have been used to select an appropriate UV design dose for the future UV disinfection facility at the O'Brien WRP.

For the Calumet WRP, laboratory scale tests were conducted on secondary effluent at elevated ammonia-nitrogen concentrations to determine the required dosing rates for sodium hypochlorite disinfection and sodium bisulfite dechlorination for process design.

M&R contributed to the review of project design documents. In 2012, M&R reviewed the preliminary design reports and 60 percent design documents for the Lemont WRP Wet Weather Treatment Facility and Reservoir Project, the Lemont WRP Pump Station Project, the Calumet WRP Disinfection Project, and the O'Brien WRP Disinfection Project.

Due to odor problems associated with the ammonia-rich centrate stream, the Egan WRP routinely conveys its ammonia-rich centrate stream to the O'Brien WRP for treatment. It appears that this is creating odors in the Kirie WRP service area and is leading to corrosion of the sewers. M&R evaluated a Deammonification (Demon[®]) sequencing batch reactor suspended growth process pilot study for three months at the Egan WRP to evaluate its ability to remove ammonia from the ammonia-rich centrate for odor control. Stress testing of this process will continue in 2013.

M&R coordinated the Leaders Innovation Forum for Technology - Technology Evaluation Program Collaborative Workshop on Deammonification cosponsored by the Water Environment Research Foundation, in Chicago, Illinois and the Egan WRP in December 2012. Representatives from several large wastewater utilities and innovative technology vendors shared experiences that will accelerate development and deployment of this energy saving approach to ammonia reduction.

M&R, in conjunction with the Engineering and M&O Departments, formed a Phosphorus Task Force in order to assess and implement biological phosphorus removal and recovery at four District WRPs. M&R performed a demonstration of enhanced biological phosphorus removal in one battery at the Stickney WRP using current plant infrastructure. The process was implemented by creating anoxic, anaerobic, and aerobic zones in the battery which would favor the growth of phosphorus accumulating organisms and luxury uptake of phosphate. Process optimization included adjusting the air input to the different zones and maintaining higher mixed liquor suspended solids. Process optimization and evaluation of infrastructure needs will continue in 2013. In addition, a battery at the Calumet WRP was converted to the enhanced biological phosphorus removal process. Process optimization and evaluation of infrastructure needs will continue in 2013.

As part of the Phosphorus Task Force, M&R helped provide data and reviewed Requests for Proposals regarding technologies to recover phosphorus from the Stickney WRP post digester centrifuge centrate stream. Final technology and vendor selection will occur in 2013.

M&R led the study phase of the Phosphorus Task Force in 2012. Secondary treatment batteries at the Calumet and Stickney WRPs were configured and operated to support Enhanced Biological phosphorus removal. This study phase will determine operational strategies and process modifications that will be necessary to optimize phosphorus removal.

Assistance to Outside Agencies. M&R has been providing assistance to oversight agencies studying and controlling the migration of invasive aquatic species for decades. In 2012, M&R assisted the United States Fish and Wildlife Service with electro-fishing and netting to investigate the presence of Asian Carp in the Des Plaines River near Lemont and Willow Springs. No Asian Carp were found. M&R also assisted the United States Army Corp of Engineers investigate the potential for Asian Carp DNA to enter the Chicago Area Waterway System (CAWS) via the sewer systems and through water reclamation plant effluents. An interim report was published in July of 2012 that confirmed the theory that Asian Carp DNA can potentially make its way into the CAWS via the sewer system. A report with information on the potential for Asian Carp DNA to get into the CAWS via WRP effluents is expected in 2013.

M&R provided in-kind support to an Illinois Institute of Technology (IIT) project, which is funded by the National Science Foundation. The project involves cyber physical systems in which intelligent sensor networks and software are applied to achieve more efficient and effective operations by providing real-time response for wastewater treatment. The IIT project is using the Calumet WRP as a basis for this study. M&R provided plant data for the creation of a process model, technical support, and aided in the collection of monitoring data.

Technical Support for Biosolids Program. M&R provides technical support to the District's Biosolids Farmland Application Program in which biosolids are applied by a contractor as a fertilizer for production of row crops in nearby counties. Technical support includes

implementing a Public Relations Program and review and approval of fields for biosolids application. The activities conducted during 2012 included the following:

- Review of 301 field information packages to evaluate suitability for land application of biosolids.
- Field inspections in response to public complaints regarding land application activities.
- Presentations at a field day organized by the land application contractor.
- Presentation at Soil and Water Conservation District's Board meetings to foster their support and collaboration on the Biosolids Farmland Application Program.

Applied Research to Achieve Operational Improvement and Cost Reductions

Biosolids. Since 1973, the District has been conducting a corn fertility experiment on calcareous mine spoil at the Fulton County site. The purpose of this experiment is to evaluate the effect of long-term applications of anaerobically digested biosolids on crop yields, crop chemical composition, and mine spoil chemical composition. The experiment was designed to simulate biosolids application to fields at the site at agronomic and reclamation rates, and to provide information that can be used for management of biosolids and crops. In 2011, new plots were established at the Fulton County site as replacements for the old plots because of the declining quality of the data obtained from those plots. During 2012, soil and plant tissue samples were collected from the plots for analysis.

The air-dried, exceptional quality biosolids that the District currently produces has the potential to become odorous if it is not managed carefully prior to being land applied. This attribute of the product is a major factor controlling the cost of managing biosolids, public acceptance, and the economic value of the product. In 2012, the pilot-scale testing of biosolids compost production at the Lawndale Avenue Solids Management Area site was continued to investigate blending ratios of biosolids and yard wastes and to develop a protocol for producing compost with minimal modification of current District biosolids drying operations.

M&R is exploring processes to produce compost from biosolids and landscape waste. This value-added product will expand current local markets and potentially can result in a new revenue stream for the District.

As part of its efforts to promote the use of biosolids in the city of Chicago, the District initiated a project in 2009 to address issues raised by the United States Fish and Wildlife Service and other stakeholders regarding the potential for using biosolids for ecological restoration in

Chicago's Calumet Region. The project is conducted in collaboration with The Ohio State University. The study consists of field plots in which biosolids and other recyclable materials are used as a soil amendment, and the impact of these treatments on soil biology and the concentration of potential contaminants in runoff water are evaluated. This study was completed at the end of 2011, and a final report conveying the ecotoxicological risk assessment that was conducted is being prepared by The Ohio State University.

The occurrence of perfluorinated compounds (PFCs) in biosolids and the potential risk of transport of these compounds through the food chain is an emerging issue to the sustainability of the practice of biosolids application to farmlands. The District is collaborating with the USEPA to collect data on the uptake of PFCs in crops for an evaluation of exposure risks to humans. As part of this collaboration, in 2011 a three-year field study was established on the grounds of the Mainstream Pumping Station. This study consists of plots of biosolids-amended soil on which various vegetable crops are grown. The soil and edible plant tissue samples collected in 2012 were submitted to the USEPA for analysis of PFCs.

Resource Recovery. The District is evaluating various approaches, such as source control, enhanced biological phosphorus removal, and sidestream recovery, to reduce phosphorus in WRP effluent and receiving waters to meet pending regulatory standards. During 2011, a study on the sources of phosphorus in influent wastewater was conducted. This study included a review of literature and operations data from the Stickney, Calumet, and O'Brien WRPs and sampling and analysis of discharge from 45 industries in the service area. A report on the findings of this study was prepared in 2012.

It is believed that some industrial sectors are promising candidates for phosphorus source control and resource recovery and that this will provide a benefit to the industries, the District, and the water environment. M&R is currently evaluating this through an industrial survey and surveillance study.

Aquatic Environment. M&R continued to investigate the potential for endocrine active compounds to enter the area waterways and qualify the impact to the aquatic biota. In 2012, the District collaborated with St. Cloud State University to conduct on-site exposure experiments at the O'Brien and Calumet WRPs. The experiments involved the use of a mobile trailer that was set up with a flow through design to expose fathead minnows to various concentrations of the final effluent. After 12 days of continuous exposure the fathead minnows were analyzed at various biological endpoints to look for biological effects from exposure to WRP effluents. A research paper on the results of these experiments and others performed in 2010 and 2011 is planned for 2013.

The District was awarded the 2012 Grand Prize for University Research from the American Academy of Environmental Engineers for its epidemiological study of the CAWS "Chicago Health, Environmental Exposure, and Recreation Study."

M&R is initiating a seven-year Microbiome Project in collaboration with Argonne National Laboratory to develop information on the microbial sources in the CAWS that can be used to guide decisions on water quality management with respect to recreational users in the CAWS.

LOOKING AHEAD

M&R will continue to support the attainment of the goals of the District's strategic plan in 2013 and beyond.

To continue to ensure financial stability, M&R is planning to undertake a reassessment of the User Charge Ordinance and program administration in 2013 to reduce administrative overhead and increase customer service, thereby ensuring the viability of the District's cost recovery system. M&R will also undertake an organizational functional analysis and redesign in 2013 to continue to optimize the focus of its resources on mission critical work.

M&R will continue to develop all employees in 2013 by continuing to offer its monthly seminar series, maintaining its chemical hygiene plan, and increasing access to webinars and web-based training. During 2013, M&R will be also proactive in taking advantage of any relevant training opportunities to meet the twenty-four hours professional development training for employees.

In 2013, a new Planning Section will be added to EM&RD. This section will lead the capital project evaluation for the Capital Improvement Program before engineering design, perform WRP Master Plan updates, develop an Odor Master Plan for all District facilities, and develop and maintain a 20-year capital plan.

In 2013, M&R will contribute to improving the District's public image by continuing outreach to the public to promote the Biosolids Program by participating in public meetings, and by developing informational materials and presentations on the District's mission, operational achievements, and water quality improvements. M&R will also partner with M&O to begin production of a biosolids value-added compost for distribution under the Controlled Solids Distribution Program.

Also in 2013, M&R will contribute to being environmentally responsible by continuing to lead the phosphorus removal and recovery task force; will undertake research to address odor issues at District facilities; and will partner with M&O and the city of Chicago to compost vegetative waste generated in Chicago and biosolids to produce a value-added product that can be used by the city and other communities.

APPENDIX I

APPENDIX I

MEETINGS AND SEMINARS 2012

January 2012

Air and Waste Management Association, Lake Michigan States Section and Union League Club, Environment and Public Affairs Committees, Joint Luncheon Meeting, Chicago, Illinois.

Asian Carp Regional Coordinating Committee, Technical and Policy Workgroup Meeting (and follow-up meetings throughout the year), Chicago, Illinois.

DuPage River Salt Creek Workgroup, Annual Meeting (and follow-up meetings throughout the year), Downers Grove, Illinois.

Illinois Water Environment Association and the Illinois Section of the Central States Water Environment Association, 2012 Government Affairs (and follow-up meetings throughout the year), Willowbrook, Illinois.

Industrial Water, Waste, and Sewage Group Meeting (and follow-up meetings throughout the year), Chicago Illinois.

Midwest Water Analyst Association, Winter Expo 2012 (and follow-up meetings throughout the year), Kenosha, Wisconsin.

February 2012

Chicago Area Waterway System, Use Attainability Analysis, Physical Habitat Projects Workgroup (and follow-up meetings throughout the year), Chicago, Illinois.

Illinois Chapter of the American Fisheries Society, Annual Meeting, Utica, Illinois.

Northwestern University, Environmental Engineering Class, Evanston, Illinois.

Water Environment Research Foundation, Research Council Annual Meeting, Alexandria, Virginia.

March 2012

American Water Works Association, Financial Management Seminar, Portland, Oregon.

Illinois Association of Wastewater Agencies, Technical Committee Meeting (and follow-up meetings throughout the year), Utica, Illinois.

APPENDIX I

MEETINGS AND SEMINARS 2012 (Continued)

Illinois Chapter of the American Fisheries Society, Age and Growth of Fishes: Modern Techniques and Applications Workshop, Monticello, Illinois.

Illinois Lake Michigan Implementation Plan, Workgroup Meeting (and follow-up meetings throughout the year), Chicago, Illinois.

Illinois Section of the American Water Works Association and Illinois Water Environment Association, WaterCon 2012, Joint Conference and Expo, Springfield, Illinois.

University of Illinois at Chicago, College of Urban Planning and Public Affairs, College of Medicine, School of Public Health and College of Engineering, Water Area of Excellence Seminar Series, Chicago, Illinois.

April 2012

American Academy of Environmental Engineers Conference, Washington, D.C.

Central States Water Environment Association, Leadership Academy and Education Seminar, Madison, Wisconsin.

Northwestern University, Engineering Design Class, Evanston, Illinois.

The Conservation Foundation Workshop: Physical and Biological Goals of the Clean Water Act; What Stormwater Professionals Need to Know, Wheaton, Illinois.

Trojan UV Facility Tour, London, Ontario Canada.

Water Environment Federation, Air and Waste Management Association, and Kentucky-Tennessee Water Environment Association, Odors and Air Pollutant 2012 Conference, Louisville, Kentucky.

May 2012

Calumet Area Industrial Commission, Lunch and Learn Series, Calumet, Illinois.

Friends of the Chicago River, 8th Annual Chicago River Summit, Chicago, Illinois.

APPENDIX I

MEETINGS AND SEMINARS 2012 (Continued)

Illinois Environmental Protection Agency, Nutrient Stakeholders Workgroup Meetings (and follow-up meetings throughout the year), Springfield, Illinois.

Society for Freshwater Science, Annual Meeting, Louisville, Kentucky.

June 2012

American Society of Microbiology, General Meeting, San Francisco, California.

Institute of Transportation Engineers, Midwestern District and Urban Street Symposium, Chicago, Illinois.

Peregrine Lake Homeowners Association Meeting (and follow-up meetings throughout the year), Palatine, Illinois.

T-CON: Midwest Water and Wastewater Technology Conference, Crystal Lake, Illinois.

United States Department of Agriculture, W-2170 Committee Meeting, Tacoma, Washington.

July 2012

United States Army Corp of Engineers, Great Lakes Mississippi River Interbasin Study Meeting (and follow-up meetings throughout the year), Chicago, Illinois.

August 2012

Addison Underbridge Coordination Meeting, Chicago, Illinois.

September 2012

Illinois Water 2012, Champaign-Urbana, Illinois.

Water Environment Federation, Technical Exhibition and Conference 2012, New Orleans, Louisiana.

APPENDIX I

MEETINGS AND SEMINARS 2012 (Continued)

October 2012

Agilent Technologies, Agilent QQQ LC/MS User Workshop, Schaumburg Illinois.

American Society of Agronomy, Annual Meeting, Cincinnati, Ohio.

Facility Tour of West Lafayette, Indiana Waste Treatment Plant, Lafayette, Indiana.

Great Lakes Beach Association Conference, Mackinac Island, Michigan.

iPACS (internet POTW Administrative and Compliance System), User Group Conference, North Brunswick, New Jersey.

November 2012

Air and Waste Management Association, Lake Michigan States Section, 2012 Air Quality Management Conference, Oak Brook, Illinois.

Illinois Emergency Management Agency Conference, Lisle, Illinois.

North Central Extension-Industry Soil Fertility Conference, Des Moines, Iowa.

Perkin Elmer, Implementation of ICP-MS, Schaumburg, Illinois.

University of Illinois at Chicago, Environmental and Occupational Health Course, Chicago, Illinois.

December 2012

Comprehensive Environmental Toxicity Information System Training, Trinidad, California.

Midwest Association of Fish and Wildlife Agency, 73rd Conference, Wichita, Kansas.

Water Environment Federation and Water Environment Research Foundation, Leaders Innovation Forum for Technology-Deammonification Workshop, Schaumburg, Illinois.

Water Environment Research Foundation and United States Environmental Protection Agency, Experts Meeting on Trace Organics in Biosolids, Washington, D.C.

APPENDIX II

APPENDIX II PRESENTATIONS 2012

January 2012

“Effects of Mechanical Mixing on Full-Scale Digester Performance at Calumet WRP.” Presented at the Midwest Water Analyst Association, Winter Expo 2012, Kenosha, Wisconsin, by K. Patel. PP

“Environmental Issues Facing the Metropolitan Water Reclamation District of Greater Chicago.” Presented at the Air and Waste Management Association, Lake Michigan States Section and Union League Club, Environment and Public Affairs Committees, Joint Luncheon Meeting, Chicago, Illinois, by T. C. Granato. PP

“The Energy of the Urban Water Cycle in Greater Chicago.” Presented at the Illinois Water Environment Association and the Illinois Section of the Central States Water Environment Association, 2012 Government Affairs Conference, Willowbrook, Illinois by J.A. Kozak. PP

February 2012

“Current Challenges at the Metropolitan Water Reclamation District of Greater Chicago.” Presented at the Northwestern University, Environmental Engineering Class, Evanston, Illinois, by J. A. Kozak. PP

March 2012

“Effects of Solids Content on Stability of Air-Dried Biosolids Stored in Stockpiles.” Presented at the Illinois Section of the American Water Works Association and Illinois Water Environment Association, WaterCon 2012, Joint Conference and Expo, Springfield, Illinois, by O. Oladeji, G. Tian, and A. Cox. PP

“Evaluation of Biosolids Composting Using Low Rates of Bulking Materials.” Presented at the Illinois Section of the American Water Works Association and Illinois Water Environment Association, WaterCon 2012, Joint Conference and Expo, Springfield, Illinois, by G. Tian, O. Oladeji, L. Hundal, P. Lindo, A. Cox, J. Gawrys and D. Collins. PP

“Overview of Biosolids Composting – The Science, Production and Use in Illinois.” Presented at the Illinois Section of the American Water Works Association and Illinois Water Environment Association, WaterCon 2012, Joint Conference and Expo, Springfield, Illinois, by A. Cox, K. Kumar, and J. Hutton. PP

APPENDIX II

PRESENTATIONS 2012 (Continued)

“Research Needs of the Municipal Wastewater Sector to Advance Public Health Protection and Formulation of Sound Public Policy,” Presented at the University of Illinois at Chicago, College of Urban Planning and Public Affairs, College of Medicine, School of Public Health and College of Engineering, Water Area of Excellence Seminar Series, Chicago, Illinois, by T.C. Granato. PP

“The Carbon Footprint of the Metropolitan Water Reclamation District of Greater Chicago.” Presented at the Illinois Section of the American Water Works Association and Illinois Water Environment Association, WaterCon 2012, Joint Conference and Expo, Springfield, Illinois, by J. A. Kozak. PP

April 2012

“Chicago Health, Environmental Exposure, and Recreation Study (CHEERS).” Presented at the American Academy of Environmental Engineers Conference, Washington, D.C., by G. Rijal. PS and PP

“Green Infrastructure Research at the Metropolitan Water Reclamation District of Greater Chicago.” Presented at the Northwestern University, Engineering Design Class, Evanston, Illinois, by J. A. Kozak. PP

“Various Stages of Leadership Throughout Your Career: A Panel Discussion.” Presented at the Central States Water Environment Association: Leadership Academy and Education Seminar, Madison, Wisconsin, by J. Moran-Andrews. PP

May 2012

“Environmental Issues Facing the Metropolitan Water Reclamation District of Greater Chicago.” Presented at the Calumet Area Industrial Commission, Lunch and Learn Series, Calumet, Illinois, by T. C. Granato. PP

June 2012

“Monitoring and Modeling the Chicago Department of Transportation Streetscape Project.” Presented at the Institute of Transportation Engineers, Midwestern District and Urban Street Symposium, Chicago, Illinois, by J. A. Kozak. PP

APPENDIX II

PRESENTATIONS 2012 (Continued)

“Sources and Distribution of Fecal Indicator Bacteria Impacting Chicago’s North Shore Channel Water Quality.” Presented at the American Society of Microbiology, General Meeting, San Francisco, California, by G. Rijal. PS

July 2012

“Biosolids – The Key Ingredient for Sustainable Farming.” Presented at the Natural Resource Conservation Service, Kendall County Soil and Water Conservation District Board Meeting, Yorkville, Illinois, by L. S. Hundal. PP

“Land Application to Ensure Sustainable Farming.” Presented at the Natural Resource Conservation Service, Grundy County Soil and Water Conservation District Board Meeting, Morris, Illinois, by L. S. Hundal. PP

August 2012

“Fertilizing with Biosolids to Ensure Long-Term Productivity and Soil Health.” Presented at the Stewart Environmental Inc. Field Day, Sheridan, Illinois, by L. S. Hundal. PP

September 2012

“A Case Study of Bacteria Source Tracking in the North Shore Channel.” Presented at the Illinois Water 2012, Champaign-Urbana, Illinois, by R. Gore. PP

“Activated Sludge and BNR Process Control: Hands-on in the Real World.” Presented at the Water Environment Federation, Technical Exhibition and Conference 2012, New Orleans, Louisiana, by T. Glymph-Martin. PS

“Chicago Area Waterway System: An Overview of the New Recreational Use Standards and Attainability Challenges.” Presented at the Illinois Water 2012, Champaign-Urbana, Illinois, by T. C. Granato. PP

“Costs, Operational and Environmental Impacts of Chemical Phosphorus Removal at the Egan Water Reclamation Plant and Projected Impacts on Metropolitan Chicago Water Reclamation Plants.” Presented at the Illinois Water 2012, Champaign-Urbana, Illinois, by H. Zhang. PP

APPENDIX II

PRESENTATIONS 2012 (Continued)

“Healthy Soils: The Key Ingredient in Agricultural Sustainability Pie.” Presented at the 2nd Annual Urban Resolutions for Bridging African Americans to Natural Environments Conference, Chicago State University, Chicago, Illinois, by L. S. Hundal. PP

“Phosphorus Sources and Loading from Chicago Area Water Reclamation Plants and the Impact of the Loading on the Concentration of Phosphorus in Chicago Area Streams and the Illinois River.” Presented at the Illinois Water 2012, Champaign-Urbana, Illinois, by K. Kumar. PP

“Pilot Testing Enhanced Biological Phosphorus Removal at Chicago Water Reclamation Plants Using Existing Infrastructure.” Presented at the Illinois Water 2012, Champaign-Urbana, Illinois, by J.A. Kozak. PP

“Unintended Consequences of Phosphorus Removal.” Presented at the Illinois Water Environment Association, Nutrient Removal and Recovery Workshop, Sandwich, Illinois by, J. A. Kozak. PP

October 2012

“Groundwater Quality during Thirty-Five Years of Monitoring Mined Land Reclaimed with Biosolids.” Presented at the American Society of Agronomy, Annual Meeting, Cincinnati, Ohio, by O. Oladeji, G. Tian, and A. Cox. PP

“The Effect of Long-Term Application of Biosolids on Nitrate Downward Movement in a Midwest Corn Belt Soil.” Presented at the American Society of Agronomy, Annual Meeting, Cincinnati, Ohio, by G. Tian, O. Oladeji, A. Cox, T. C. Granato, and C. O’Connor. PP

“Wastewater Microbiology and Process Control.” Presented at the Illinois Water Environment Association, Microbiology Laboratory Seminar, Schaumburg, Illinois, by T. Glymph-Martin. PS

November 2012

“Biosolids Composting with the Low Rate of Bulking Materials.” Presented at the Illinois Water Environment Association, Biosolids Seminar, Schaumburg, Illinois, by G. Tian. PP

“Effect of Biosolids Application on Plant Available Nutrients.” Presented at the North Central Extension-Industry Soil Fertility Conference, Des Moines, Iowa, by L. S. Hundal. PP

APPENDIX II

PRESENTATIONS 2012 (Continued)

“Metropolitan Water Reclamation District of Greater Chicago Update on Pretreatment and User Charge Programs and Environmental Issues.” Presented at the Industrial Water, Waste and Sewage Group, Dinner Meeting, Chicago, Illinois, by T. C. Granato, M. Joseph, G. Yarnik, and P. Kalinowski. PP

“Wastewater Microbiology and Treatment.” Presented at the University of Illinois at Chicago, Environmental and Occupational Health Course, Chicago Illinois, by G. Rijal. PP.

December 2012

“Sidestream Nitrogen Removal at the John E. Egan Water Reclamation Plant.” Presented at the Water Environment Federation and Water Environment Research Foundation, Leaders Innovation Forum for Technology-Deammonification Workshop, Schaumburg, Illinois, by J. A. Kozak. PP

* PP=Available as PowerPoint Presentation

PS=Poster Presentation

APPENDIX III

APPENDIX III

PAPERS PUBLISHED 2012

Cox, A., T. C. Granato, and L. Kollias. "Land Application of Biosolids by the Metropolitan Water Reclamation District of Greater Chicago." In chapter Jakobsson (ed) Sustainable Agriculture – Ecosystem Health and Sustainable Agriculture. Baltic University Programme, Uppsala Univ. Uppsala, Sweden. pp. 159-167, 2012.

Hale, R., M. La Guardia, E. Harvey, D. Chen, and L. S. Hundal. "PBDEs in U.S. Biosolids: Temporal/Geographical Trends and Uptake by Corn Following Land Application." *Environmental Science and Technology*, 46(4):2055-2063, 2012.

Hundal, L. S., A. Cox, K. Kumar, G. Tian, and T. C. Granato. "Effect of Biosolids Application on Plant Available Nutrients." Proceeding of 42nd North Central Extension-Industry Soil Fertility Conference. Des Moines, Iowa. pp. 37-44, 2012.

Kumar, K., L. S. Hundal, S. Brown, and A. Cox. "Biosolids, Compost, and Manure are Important Components of Agricultural Sustainability." *BioCycle*. 53(4):57-58, 2012.

Lukicheva I, G. Tian, A. Cox, T. C. Granato, and K. Pagilla. 2012. "Anaerobic and aerobic transformations affecting stability of dewatered sludge during long-term storage in a lagoon." *Water Environment Research*, 84: 17-24.

Oladeji O., G. Tian, A. E. Cox, T. C. Granato, R. I. Pietz, C. R. Carlson and Z. Abedin. "Effect of Long Term Application of Biosolids for Mine Land Reclamation on Groundwater Chemistry: Trace Metals." *Journal of Environmental Quality*, 41: 1445-1451, 2012.

Peak, D., G. Kar, L. S. Hundal, and J. J. Schoenau. "Kinetics and Mechanisms of Phosphorus Release in a Soil Amended with Biosolids or Inorganic Fertilizer." *Soil Science*, 177(3): 183-187, 2012.

APPENDIX IV

**APPENDIX IV
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO
MONITORING AND RESEARCH DEPARTMENT 2012 SEMINAR SERIES**

- January 27, 2012** ***Asian Carp and the Separation of the Great Lakes and Mississippi River Watersheds in the Chicago Area***
Mr. Richard Lanyon, Retired Executive Director of the Metropolitan Water Reclamation District of Greater Chicago (District), Chicago, Illinois
- February 24, 2012** ***Tracking Sources of Phosphorus and the District's Action Plan for Sustainable Phosphorus Management***
Mr. Brett Garelli, Deputy Director of Maintenance and Operations, Maintenance and Operations Department and Dr. Kuldip Kumar, Associate Environmental Soil Scientist, Monitoring and Research Department, District, Chicago, Illinois
- March 30, 2012** ***Heritage Park Flood Control Facility: Compensatory Floodplain Storage for Levee 37***
Mr. Joe Kratzer, Senior Civil Engineer, Engineering Department, District, Chicago, Illinois
- April 27, 2012** ***Coal-Tar-Based Pavement Sealcoat, Polycyclic Aromatic Hydrocarbon, Source Tracking and Impacts on Urban Watersheds***
Mr. Peter Van Metre, Research Hydrologist, United States Geological Survey, Austin, Texas
- May 18, 2012** ***Water Scarcity: A Global Perspective***
Dr. Cecil Lue-Hing, Cecil Lue-Hing & Associates, Burr Ridge, Illinois
- June 29, 2012** ***Removal and Recovery of Phosphorus at the Hampton Roads Sanitary District***
Dr. Charles B. Bott, Research and Development Manager, Hampton Roads Sanitation District, Virginian Beach, Virginia
- July 27, 2012** ***The Use of Water Quality Modeling to Inform Decision Making Under Uncertainty***
Professor Ken Reckhow, Duke University, Raleigh-Durham, North Carolina
- August 24, 2012** ***Oxygen Transfer in Wastewater Treatment Processes: Research Perspectives in the 21st Century***
Professor Diego Rosso, Assistant Professor, University of California, Irvine, California
- September 28, 2012** ***Mechanisms of Corrosion and the Impact of Corrosion on the Underground Infrastructure***
Mr. Mark Joyce, Senior Mechanical Engineer, Maintenance and Operations Department and Dr. Ali Oskouie, Senior Environmental Research Scientist, Monitoring and Research Department, District, Chicago, Illinois
- October 26, 2012** ***Fish Response to Varying Dissolved Oxygen Concentrations in Urban Streams***
Mr. Doug Bradley, Senior Project Scientist, LimnoTech, Ann Arbor, Michigan
- November 30, 2012** ***Implications of Pathogen-Biofilm Interactions for Surface Water Quality***
Professor Aaron Packman, Department of Civil and Environmental Engineering, Northwestern University, Evanston, Illinois
- December 14, 2012** ***Complying with National Pollutant Discharge Elimination System Permit Requirements***
Mr. Adam Gronski, Principal Civil Engineer, Maintenance and Operations Department, and Ms. Jennifer Wasik, Supervising Aquatic Biologist, Monitoring and Research Department, District, Chicago, Illinois

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

CONTACT: Dr. Heng Zhang, Assistant Director of Monitoring and Research, EM&R Division, (708) 588-4264 or (708) 588-4059

LOCATION: Stickney Water Reclamation Plant, Lue-Hing R&D Complex, 6001 West Pershing Road, Cicero, IL 60804; TIME: 10:00 A.M.

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

APPENDIX V

APPENDIX V

**MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS
PUBLISHED DURING 2012**

Report No.	Report Title	Author(s)	Date	Organization or Conference
2012-1	Report of the Fulton County Environmental Protection System for 2011	M&R Department Tian, G.	January 2012	Illinois Environmental Protection Agency (IEPA)
2012-2	Monthly Controlled Solids Distribution Report, October 2011	M&R Department Oladeji, O.	January 2012	IEPA
2012-3	Monthly Controlled Solids Distribution Report, November 2011	M&R Department Oladeji, O.	January 2012	IEPA
2012-4	Monthly Controlled Solids Distribution Report, December 2011	M&R Department Oladeji, O.	February 2012	IEPA
2012-5	Annual Biosolids Management Report for 2011	M&R Department Lindo, P. Cox, A. Patel, M. and O'Connor, C.	February 2012	United States Environmental Protection Agency (USEPA) Region 5
2012-6	Acute Whole Effluent Toxicity Test Results for the Lemont Water Reclamation Plant, Lemont, Illinois, National Pollutant Discharge Elimination System Permit Number IL0028070, January 2012	M&R Department Kollias, N., J. Vick and J. Wasik	February 2012	IEPA
2012-7	Calumet East Solids Management Area Monitoring Report, Fourth Quarter 2011	M&R Department Lindo, P.	February 2012	IEPA
2012-8	Calumet West Solids Management Area Monitoring Report, Fourth Quarter 2011	M&R Department Lindo, P.	February 2012	IEPA
2012-9	Harlem Avenue Solids Management Area Monitoring Report, Fourth Quarter 2011	M&R Department Lindo, P.	February 2012	IEPA

APPENDIX V

**MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS
PUBLISHED DURING 2012 (Continued)**

Report No.	Report Title	Author(s)	Date	Organization or Conference
2012-10	Lawndale Avenue Solids Management Area Monitoring Report, Fourth Quarter 2011	M&R Department Lindo, P.	February 2012	IEPA
2012-11	Ridgeland Avenue Solids Management Area Monitoring Report, Fourth Quarter 2011	M&R Department Lindo, P.	February 2012	IEPA
2012-12	Hanover Park Water Reclamation Plant Fischer Farm Monitoring Report, Fourth Quarter 2011	M&R Department Lindo, P.	February 2012	IEPA
2012-13	122 nd and Stony Island Avenue Solids Management Area Monitoring Report, Fourth Quarter 2011	M&R Department Lindo, P.	February 2012	IEPA
2012-14	Reporting Requirements for Site-Specific Equivalency to Process to Further Reduce Pathogens Designation of the Metropolitan Water Reclamation District of Greater Chicago's Biosolids Processing Trains at the Stickney and Calumet Water Reclamation Plants August-December 2011	M&R Department Lindo, P.	March 2012	USEPA
2012-15	Acute Whole Effluent Toxicity Test Results for the Lemont Water Reclamation Plant, Lemont, Illinois, National Pollutant Discharge Elimination System Permit Number IL0028070, April 2012	M&R Department Kollias, N., J. Vick and J. Wasik	May 2012	IEPA
2012-16	Controlled Solids Distribution Report, First Quarter 2012	M&R Department Oladeji, O.	May 2012	IEPA
2012-17	Stickney Water Reclamation Plant Permeable Pavement Demonstration Interim Report 2010 and 2011	M&R Department Kozak, J.	June 2012	Internal District Report

APPENDIX V

**MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS
PUBLISHED DURING 2012 (Continued)**

Report No.	Report Title	Author(s)	Date	Organization or Conference
2012-18	122 nd and Stony Island Avenue Solids Management Area Monitoring Report, First Quarter 2012	M&R Department Lindo, P.	June 2012	IEPA
2012-19	Calumet East Solids Management Area Monitoring Report, First Quarter 2012	M&R Department Lindo, P.	June 2012	IEPA
2012-20	Calumet West Solids Management Area Monitoring Report, First Quarter 2012	M&R Department Lindo, P.	June 2012	IEPA
2012-21	Hanover Park Water Reclamation Plant Fischer Farm Monitoring Report, First Quarter 2012	M&R Department Lindo, P.	June 2012	IEPA
2012-22	Harlem Avenue Solids Management Area Monitoring Report, First Quarter 2012	M&R Department Lindo, P.	June 2012	IEPA
2012-23	Lawndale Avenue Solids Management Area Monitoring Report, First Quarter 2012	M&R Department Lindo, P.	June 2012	IEPA
2012-24	Ridgeland Avenue Solids Management Area Monitoring Report, First Quarter 2012	M&R Department Lindo, P.	June 2012	IEPA
2012-25	Tunnel and Reservoir Plan Des Plaines Tunnel System 2011 Annual Groundwater Monitoring Report	M&R Department MacDonald, D.	July 2012	IEPA
2012-26	Tunnel and Reservoir Plan Gloria Alitto Majewski Chicagoland Underflow Plan Reservoir Water Quality Monitoring Wells 2011 Annual Groundwater Monitoring Report	M&R Department MacDonald, D.	July 2012	IEPA

APPENDIX V

**MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS
PUBLISHED DURING 2012 (Continued)**

Report No.	Report Title	Author(s)	Date	Organization or Conference
2012-27	Tunnel and Reservoir Plan Thornton Transitional Flood Control Reservoir 2011 Annual Groundwater Monitoring Report	M&R Department MacDonald, D.	July 2012	IEPA
2012-28	Tunnel and Reservoir Plan Upper Des Plaines Tunnel System 2011 Annual Groundwater Monitoring Report	M&R Department MacDonald, D.	July 2012	IEPA
2012-29	Tunnel and Reservoir Plan Mainstream Tunnel System 2011 Annual Groundwater Monitoring Report	M&R Department MacDonald, D.	July 2012	IEPA
2012-30	Tunnel and Reservoir Plan Calumet Tunnel System 2011 Annual Groundwater Monitoring Report	M&R Department MacDonald, D.	July 2012	IEPA
2012-31	Continuous Dissolved Oxygen Monitoring in Chicago Area Wadeable Streams During 2011	M&R Department Minarik, T., D. Gallagher, J. Vick, and J. Wasik	July 2012	IEPA
2012-32	Bacteriological Monitoring Report of River Backflow in 2011	M&R Department Gore, R.	June 2012	IEPA
2012-33	Continuous Dissolved Oxygen Monitoring in the Deep-Draft Chicago Waterway System During 2011	M&R Department Minarik, T., D. Gallagher, J. Vick, and J. Wasik	August 2012	IEPA
2012-34	Biological Survey of the Metropolitan Water Reclamation District of Greater Chicago Properties	M&R Department CDM Smith	August 2012	Outside Agencies

APPENDIX V

**MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS
PUBLISHED DURING 2012 (Continued)**

Report No.	Report Title	Author(s)	Date	Organization or Conference
2012-35	Water and Sediment Quality Along the Illinois Waterway from the Lockport Lock to the Peoria Lock During 2011	M&R Department Wasik, J., T. Minarik, and J. Vick.	August 2012	IEPA
2012-36	Calumet East Solids Management Area Monitoring Report, Second Quarter 2012	M&R Department Lindo, P.	September 2012	IEPA
2012-37	Calumet West Solids Management Area Monitoring Report, Second Quarter 2012	M&R Department Lindo, P.	September 2012	IEPA
2012-38	Hanover Park Water Reclamation Plant Fischer Farm Monitoring Report, Second Quarter 2012	M&R Department Lindo, P.	September 2012	IEPA
2012-39	Harlem Avenue Solids Management Area Monitoring Report, Second Quarter 2012	M&R Department Lindo, P.	September 2012	IEPA
2012-40	Lawndale Avenue Solids Management Area Monitoring Report, Second Quarter 2012	M&R Department Lindo, P.	September 2012	IEPA
2012-41	Ridgeland Avenue Solids Management Area Monitoring Report, Second Quarter 2012	M&R Department Lindo, P.	September 2012	IEPA
2012-42	122 nd and Stony Island Avenue Solids Management Area Monitoring Report, Second Quarter 2012	M&R Department Lindo, P.	September 2012	IEPA
2012-43	Controlled Solids Distribution Report, Second Quarter 2012 (Revised)	M&R Department Oladeji, O.	January 2012	IEPA

APPENDIX V

**MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS
PUBLISHED DURING 2012 (Continued)**

Report No.	Report Title	Author(s)	Date	Organization or Conference
2012-44	Phosphorus in Service Areas of the Stickney, Calumet and North Side Water Reclamation Plants – Tracking Sources and Feasibility of Recovery to Meet Future Effluent Limits	M&R Department Kumar, K., A. Cox, and H. Zhang	October 2012	Internal District Report
2012-45	Odor Monitoring Program at the Metropolitan Water Reclamation District of Greater Chicago Facilities During 2011	M&R Department Oskouie, A.	September 2012	Internal District Report
2012-46	2011 Annual Summary Report Water Quality Within the Waterways System of the Metropolitan Water Reclamation District of Greater Chicago	M&R Department Abedin, Z.	November 2012	IEPA
2012-47	Controlled Solids Distribution Report, Third Quarter 2012	M&R Department Oladeji, O.	December 2012	IEPA
2012-48	Monitoring and Research 2011 Annual Report	M&R Department	December 2012	Internal District Report
2012-49	Calumet East Solids Management Area Monitoring Report, Third Quarter 2012	M&R Department Lindo, P.	December 2012	IEPA
2012-50	Calumet West Solids Management Area Monitoring Report, Third Quarter 2012	M&R Department Lindo, P.	December 2012	IEPA
2012-51	Hanover Park Water Reclamation Plant Fischer Farm Monitoring Report, Third Quarter 2012	M&R Department Lindo, P.	December 2012	IEPA
2012-52	Harlem Avenue Solids Management Area Monitoring Report, Third Quarter 2012	M&R Department Lindo, P.	December 2012	IEPA

APPENDIX V

**MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS
PUBLISHED DURING 2012 (Continued)**

Report No.	Report Title	Author(s)	Date	Organization or Conference
2012-53	Lawndale Avenue Solids Management Area Monitoring Report, Third Quarter 2012	M&R Department Lindo, P.	December 2012	IEPA
2012-54	Ridgeland Avenue Solids Management Area Monitoring Report, Third Quarter 2012	M&R Department Lindo, P.	December 2012	IEPA
2012-55	122 nd and Stony Island Avenue Solids Management Area Monitoring Report, Third Quarter 2012	M&R Department Lindo, P.	December 2012	IEPA
2012-56	Report of the Fulton County Environmental Protection System for 2012	M&R Department Tian, G.	December 2012	IEPA
2012-57	Radiological Monitoring of the Raw Sewage, Final Effluent, Sludges, and Biosolids of the Metropolitan Water Reclamation District of Greater Chicago, 2011 Annual Report	M&R Department Khalique, A.	December 2012	Internal District Report
2012-58	Ambient Water Quality Monitoring in the Chicago, Calumet, and Des Plaines River Systems: A Summary of Biological, Habitat, and Sediment Quality During 2008	M&R Department Gallagher, D., N. Kollias, J. Vick, T. Minarik, and J. Wasik	December 2012	IEPA
2012-59	Environmental, Monitoring and Research Division 2011 Annual Report	M&R Department	December 2012	Internal District Report