

A photograph of the Chicago skyline viewed from the water. A red steel bridge spans across the river in the middle ground. In the foreground, a small motorboat with several people is moving across the water. The background is filled with various skyscrapers, including the Willis Tower. The sky is overcast.

# 2011 Annual Report

**Metropolitan Water Reclamation District of Greater Chicago  
Monitoring and Research Department**



*Protecting Our Water Environment*



*Metropolitan Water Reclamation District of Greater Chicago*

***MONITORING AND RESEARCH  
DEPARTMENT***

*REPORT NO. 12-48*

*Monitoring and Research*

*2011*

*Annual Report*

Monitoring and Research Department  
Thomas C. Granato, Director

*December 2012*

**Metropolitan Water Reclamation District of Greater Chicago**

100 EAST ERIE STREET CHICAGO, ILLINOIS 60611-3154 312.751.5600

December 2012

Acting President Barbara J. McGowan and Members of the Board of Commissioners,

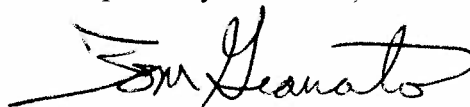
The Monitoring and Research Department makes many important contributions to the Metropolitan Water Reclamation District of Greater Chicago's (District) strategic plan. We contribute to **Ensuring Financial Stability** through efficient administration of the District's User Charge Ordinance, by providing 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 to ensure that the District **Be Environmentally Responsible**. We administer the District's Industrial Waste Pretreatment Program including the Sewage and Waste Control, the Environmental Remediation Wastewater, and the Septic Tank, Cesspool, and 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.

Respectfully submitted,



Thomas C. Granato

Director

Monitoring and Research

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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.

**MONITORING AND RESEARCH DEPARTMENT  
CONTACT PERSONNEL**

**Executive Section**

Thomas C. Granato  
Director of Monitoring and Research  
100 E. Erie St., Chicago, IL 60611  
(312) 751-5190  
thomas.granato@mwrdd.org

**Administration Section**

Michael Cohen  
Management Analyst IV  
111 E. Erie St., Chicago, IL 60611  
(312) 751-3037  
michael.cohen@mwrdd.org

**Analytical Laboratories Division**

Thomas Liston  
Assistant Director of Monitoring and Research  
Stickney Water Reclamation Plant  
6001 W. Pershing Rd., Cicero, IL 60804-4112  
(708) 588-4061  
thomas.liston@mwrdd.org

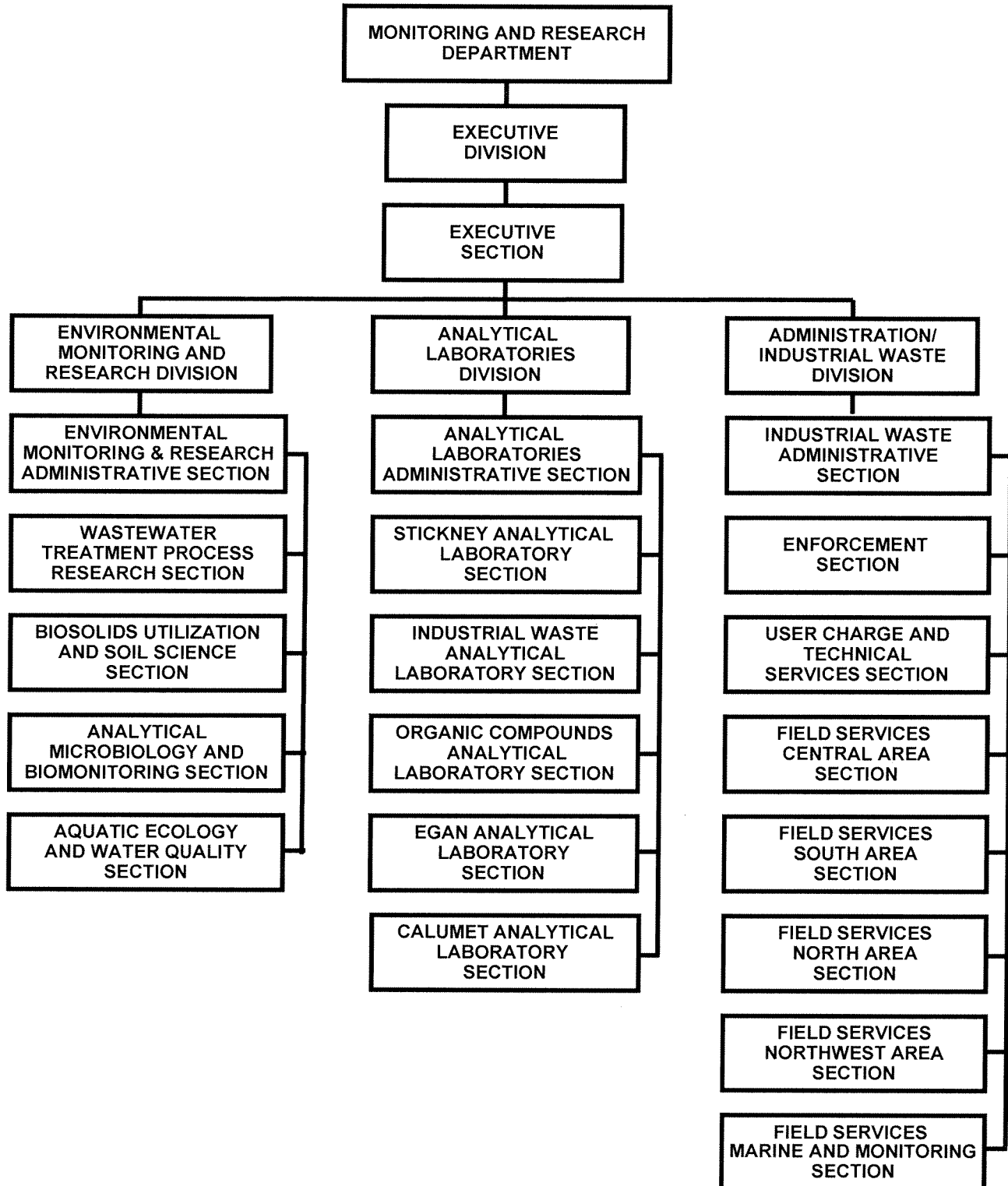
**Environmental Monitoring and Research Division**

Heng Zhang  
Assistant Director of Monitoring and Research  
Stickney Water Reclamation Plant  
6001 W. Pershing Rd., Cicero, IL 60804-4112  
(708) 588-4059  
heng.zhang@mwrdd.org

**Industrial Waste Division**

Mathew Joseph  
Assistant Director of Monitoring and Research  
111 E. Erie St., Chicago, IL 60611  
(312) 751-3040  
mathew.joseph@mwrdd.org

**MONITORING AND RESEARCH DEPARTMENT  
ORGANIZATION CHART FOR 2011**





## ENSURING FINANCIAL STABILITY

The Monitoring and Research Department (M&R) 2011 budget appropriation was \$26,404,600, a decrease of 7.5 percent from 2010. Approximately 87 percent, or \$22,963,800, was appropriated for salary and wages, and the remaining appropriation of \$3,440,800 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 11 years dropping from 355 positions in 2000 to 280 by the end of 2011.

### 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 \$48,614,202 as given in [Table 1](#).

**TABLE 1: FIVE-YEAR TREND IN USER CHARGE REVENUE INCLUDING 2011**

<b>Year</b>	<b>User Charge Receipts</b>
<b>2007</b>	<b>\$50,828,451</b>
<b>2008</b>	<b>\$54,442,493</b>
<b>2009</b>	<b>\$48,253,267</b>
<b>2010</b>	<b>\$48,666,789</b>
<b>2011</b>	<b>\$48,614,202</b>

In 2011, M&R administered 3,564 accounts. Of these accounts, 1,856 (730 Commercial-Industrial and 1,126 Tax-Exempt Users) were processed manually. M&R conducted 803 inspection and sampling events, and processed 2,462 reports and filings to reconcile User Charge liabilities for these manual accounts. The remaining 1,708 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 2011, 85 new Large Commercial-Industrial and Tax-Exempt Users and 65 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 2011, M&R also identified 682 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.

*During 2011, M&R reduced its staff by 23 full-time positions (7.6 percent decrease), and 5 part-time contract positions, while maintaining all essential technical support, analytical laboratory, and Industrial Waste Program Ordinance administration functions. This is a testament to the highly skilled, professional, dedicated staff that the department houses.*

M&R is committed to automating and streamlining its business practice. In 2011, staff from M&R and the Information Technology Department worked together to further improve the Laboratory Information Management System to increase data processing and reporting, and to enhance data acquisition from automated instruments. The Pretreatment Information Management System was also further improved in 2011 with completion of the new Industrial Waste Pretreatment Enforcement Module which automates production of the Annual Pretreatment Program Report and other Sewage and Waste Control Ordinance administrative functions.

## 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 58 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 Council, United States Environmental Protection Agency (USEPA), American Chemical Society, and others.

*In 2011, M&R staff made 31 presentations (Appendix AII) at conferences and meetings (Appendix AI), published 7 papers (Appendix AIII) in conference proceedings or peer-reviewed journals, and the department published 73 numbered reports (Appendix AV) which are available on the District's website.*

*The M&R Seminar Series (Appendix AIV) is approved by the Illinois Society of Professional Engineers for professional development credits and is available to all employees and the local community. In 2011, attendance at the Lue-Hing Research and Development Complex Auditorium and the Main Office Board Room was 1,694.*

*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, biological surveys of District properties, 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 2011, 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. Extreme odor conditions were reported to the respective plant managers. An annual summary report of monitoring results was generated.

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 2011, M&R staff worked with 60 biosolids users to ensure regulatory compliance and help them derive economic and agronomic benefits from biosolids use. M&R staff conducted field days 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.

***M&R initiated the District's Biosolids Beneficial Use Awards Program in 2011, recognizing individuals and organizations that have shown exemplary leadership and environmental stewardship in using biosolids in place of chemical fertilizers or imported topsoil.***

M&R continued its biological survey of select District properties in 2011 to determine if property holdings harbored unique or endangered species that could benefit from enhanced land stewardship. The study was conducted under a contract with Camp, Dresser, and McKee, and a technical report and a public-friendly report will be generated in 2012 to convey the findings to the scientific and local resident communities.

M&R worked with M&O in 2011 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 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 2011, the administration of the District's Industrial Waste Pretreatment Program required the issuance or renewal of Discharge Authorizations for 88 Significant Industrial Users; and the review of 719 Continued Compliance Reports; and 10 Spill Prevention, Containment, and Countermeasure Plans. During 2011, M&R conducted 2,635 inspections associated with administering the District's Sewage and Waste Control Ordinance and randomly sampled and analyzed 168 of the 849 chemical toilet disposals at the Stickney Water Reclamation Plant (WRP). In 2011, M&R issued 87 Cease and Desist Orders (Table 2) 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 29 significant violators of the program in 2011 will be published in 2012.

*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 168 investigations in response to requests from federal, state, and local agencies, municipalities and private citizens; 51 investigations were conducted in response to self-reported industrial activities; and 39 investigations were conducted in response to requests from M&O in 2011.

**TABLE 2: FIVE YEAR TREND IN ENFORCEMENT ACTIVITIES INCLUDING YEAR 2011**

Year	Cease and Desist Orders	Board Orders	Legal Actions
2007	132	1	0
2008	126	1	0
2009	88	1	0
2010	82	3	0
2011	87	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 2011, 9,357 water quality and sediment samples from the Chicago Area Waterway and Illinois River Systems (Lockport Lock to Peoria Lock) were collected and analyzed. 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 collected fish and benthic invertebrates at 28 and 25 stations, respectively, in the Chicago, Calumet, and Des Plaines River Systems. The sampled fish were identified, weighed, 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 2011, 978 samples from 125 Tunnel and Reservoir Plan (TARP) groundwater monitoring wells 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 2011, 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 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 Stickney 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.

With potential federal regulations being considered, greenhouse gas monitoring was also performed, in collaboration with the University of Illinois at Chicago, at the Stickney WRP to determine the extent of methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) emissions from the mixing channels associated with the activated sludge process. Additionally, greenhouse gas monitoring and

isotopic characterization of  $N_2O$  and nitrogen species in the wastewater was performed from the different diffuser plate configurations in the Egan WRP aeration basins to determine the locations of highest emissions as well as the mechanism of  $N_2O$  formation.

In 2011, the total number of analyses performed by M&R's National Environmental Laboratory Accreditation Program (NELAP) accredited laboratories was 1,658,816 as shown in Table 3.

**TABLE 3: TOTAL NUMBER OF ANALYSES PERFORMED BY THE MONITORING AND RESEARCH DEPARTMENT'S NELAP ACCREDITED LABORATORIES IN 2011**

Program	Nutrients	Oxygen Demands	Metals	Solids	Organic Compounds	Others	Program Total
4652 Liquid Monitoring	149,759	70,814	251,850	55,440	21,603	64,586	614,054
TARP	4,008	1,253	23,583	616	0	3,035	32,495
Treatment Facilities	145,752	69,562	228,267	54,824	21,603	61,551	581,559
4653 Solids Monitoring	12,166	447	66,471	140,962	11,958	31,838	263,842
4666 Sewage & Waste Control	2,598	80	345,426	640	35,454	8,916	393,114
∞ 4663 User Charge	49	44,512	0	14,462	0	28,646	87,669
4671 Lake Michigan	182	102	1,969	129	1,488	129	3,999
4672 Waterways	11,523	1,952	99,022	3,325	62,941	16,160	194,923
4681 Assistance to M&O	3,474	17	1,149	3,799	4,169	12,176	24,784
4682 Assistance to Others	1,083	943	1,621	464	1,602	346	6,059
4690 Operations & Research	12,909	847	47,703	2,775	5,064	1,074	70,372
Total Group	193,744	119,715	815,211	221,996	144,279	163,871	1,658,816

## 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. Whole effluent toxicity tests with fish (*Pimephales promelas*) and daphnids (*Ceriodaphnia dubia*) were conducted as required by NPDES permits.

In 2011, the wastewater quality of the side and recycle streams at the Stickney, Calumet, and Egan WRPs was examined. It was determined that the Stickney post-digester centrifuge centrate and the Calumet lagoon decant had elevated phosphorus (P) concentrations, and could be potential candidates for P recovery which could reduce P in the respective WRP effluents.

*In 2011, aeration tank energy efficiencies at all seven WRPs were evaluated through dissolved oxygen, ammonia-nitrogen, and nitrate-nitrogen profiling and it was found that complete nitrification is occurring well before the battery outlets at a number of plants which may provide an opportunity to reduce air input and institute other operational controls to reduce energy use.*

## 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 2011. Preliminary study findings indicate that lower polymer use can be achieved through adjusting and optimizing the current centrifuge operations.

As a part of M&O's polymer contract bidding process, the Environmental Monitoring and Research Division conducted bench-scale polymer testing followed by full-scale testing. The test results helped M&O to purchase the most cost-effective product for Stickney's post-digestion sludge dewatering.

**District Water Reclamation Plant and Facilities Operations.** In 2011, M&R conducted an investigation of factors leading to the inconsistency of performance of the disinfection process at the Egan WRP during wet weather conditions. The study was undertaken to prevent violations at the Egan WRP NPDES permit 001 and 004 discharge locations. Operational data during the period of inconsistent disinfection were collected and evaluated, and laboratory bench tests were conducted to investigate the impact of such factors as initial mixing, temperature,

contact time, total chlorine residual, and initial chlorine demand on disinfection. M&R will complete its recommendations for process improvement 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.

The carbon footprint for all seven District WRPs for each year from 2005 through 2010 was calculated as a measure to manage climate change risk, indicate inefficiencies in operations, and prepare the District for regulations concerning carbon emissions. The highest contributor to the annual carbon footprints was the indirect emissions from electricity use followed by the nitrous oxide emissions from the District receiving waters according to the Local Government Protocol Methodology.

**Stormwater Management.** In support of the Engineering Department, M&R continued its collaboration with the United States Geological Survey in 2011 to evaluate the effect of 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. In 2011, infiltration capacity measurements and qualified runoff calculations have indicated that all three permeable surfaces greatly reduce runoff, and infiltration rate has declined over the three years of the study.

**Process Facility Planning and Technology Evaluation.** Due to odor problems associated with the ammonia-rich centrate stream, the Egan WRP routinely conveys its ammonia-rich centrate stream to the North Side WRP for treatment. This is thought to be creating odors in the James C. Kirie (Kirie) WRP service area and is leading to corrosion of the sewers. In 2011, M&R performed an evaluation to determine the appropriate technology to remove ammonia from this side stream at the Egan WRP. The Aerobic/Anoxic Deammonification process was selected for future investigation due to its maturity, nitrogen removal efficiency, and energy efficiency relative to other technologies. M&R will initiate tests of this process in 2012.

Work was completed in conjunction with the M&O and Engineering Departments to update the North Side WRP Master Plan in order to determine current and future needs of the plant. M&R analyzed plant data; recommended current influent flows and loads for use in determining current plant needs; reviewed the most current population data in the plant service area; performed special sampling to aid development of a dynamic process model; and developed a dynamic process model using GPS-X software.



**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 2011, 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 via the sewer systems. Results from this investigation are expected in the spring of 2012.

In 2011, the District participated in the USEPA's National Municipal Contaminants of Emerging Concern Effluent Study. A 24-hour composite sample was collected from the Calumet WRP. The sample was split into several bottles and shipped to the USEPA lab in Cincinnati, Ohio, for use in a larval fathead minnow assay and chemical analysis for a number of steroids, perfluorinated chemicals, personal care products, and pharmaceuticals. The Calumet WRP was one of 50 large WRPs selected across the United States. Results from this study are expected in 2012.

**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 2011 included the following:

- Collaboration with the Law Department to respond to a legislative proposal to impose restrictions on farmland application of biosolids. A report on the Public Relations Program of the District's Farmland Application Program was also prepared in response to this legislative proposal.
- Review of 188 field information packages to evaluate suitability for land application of biosolids.
- Field inspections in response to public complaints regarding land application activities.
- Presentation at a field day organized by the land application contractor.

## **Applied Research to Achieve Operational Improvement and Cost Reductions**

**Wastewater Treatment Process.** M&R conducted a side-by-side comparison of step-feed and plug-flow operations of the conventional activated sludge aeration tanks at the Kirie WRP to document if air savings, and therefore energy savings, could be achieved by operating in step feed. Although the results did not show a decrease in air usage in the step-feed tank compared to the plug-flow tank, the study indicated that a lower dissolved oxygen set point could be

used in the step-feed tank, which may result in energy savings. The study also suggested that operating in step-feed mode rendered the WRP less susceptible to upset from shock loadings.

Through technology review and empirical study, a standard operating procedure (SOP) was developed for estimating maximum nitrification rates of mixed liquor using respirometry. This SOP will be used as part of a routine monitoring program to document the nitrification capacities of the District's activated sludge processes.

The North Side WRP has traditionally had challenges maintaining high-quality effluent during winter and high flow conditions. M&R undertook a winter monitoring study in collaboration with M&O at the North Side WRP to gain a better understanding of secondary treatment performance during winter months, particularly poor settling in the final settling tanks. The monitoring included advanced microbiological analyses of the mixed liquor from each battery; mixed liquor settling tests for estimation of settling characteristics; state point analysis using the estimated settling characteristics; and nitrification rate monitoring. The results indicate that settling problems are likely due to a combination of: (1) the microbiology of the mixed liquor, specifically the presence of filaments that decrease the settling performance; (2) the presence of inert debris and dispersed bacteria during high flow events; and (3) possible inefficiencies of the final settling tanks in Batteries A, B, and C.

**Biosolids.** M&R conducted a preliminary evaluation of an early warning biochemical oxygen demand (BOD) test kit to determine if it could be used to measure BOD concentrations of primary effluent with reasonable accuracy and reliability relative to the standard analyses performed by the District's Analytical Laboratory Division. This early warning BOD test could be useful to the District for plant monitoring, real time decision making, and model development.

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.

Many states are implementing regulations to minimize P contamination of water bodies due to runoff from the land application of biosolids. This project was started in 2003 in collaboration with the IEPA and University of Florida to address the potential for environmental impacts associated with the application of District biosolids to cropland and to minimize the impact of future biosolids P regulations on District operations. The project included greenhouse and field studies to evaluate plant availability of biosolids, and laboratory and field studies to evaluate the potential for P runoff from farm fields on which District biosolids are applied. The studies were completed in 2010. M&R has provided the results to the IEPA to inform a science-based approach to nutrient management in Illinois.

Triclosan and triclorban are the active ingredients heavily used in the antibacterial product market, and these compounds are discharged from industries and household drains to become influent to the WRPs. The WRPs are effective at removing these chemicals from wastewater, but they accumulate in biosolids. In 2008, the District began a study in collaboration with the University of Florida to assess the hazards that could potentially result from land application of District biosolids and the fate of these compounds in biosolids-amended soil. This study was completed at the end of 2011, and a final report is being prepared by the University of Florida. The results will be useful to the USEPA in their biennial pollutant reassessment for the Part 503 biosolids regulation, and will allow the District to ensure our program is protective of public health and the environment.

The air-dried, exceptional quality biosolids that the District currently produces are an imperfect product. The material 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 2011, a study was initiated at the Lawndale Avenue Solids Management Area site 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.***

Air-dried biosolids used under the District's Controlled Solids Distribution Program are available only during the drying season. Biosolids cannot be stored for use in the late fall or early spring because dried biosolids typically become odorous during extended storage. This study began in the summer of 2010 and is designed to determine the effect of various biosolids moisture contents on odor development in biosolids during storage. The study evaluates whether improvements can be made to operations to allow for long-term storage of air-dried biosolids, increasing product availability and extending the land application season.

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 2011 were submitted to the USEPA for analysis of PFCs.

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

*It is believed that some industrial sectors are promising candidates for P 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.** A collaborative study with LimnoTech Inc. and the Illinois Natural History Survey (INHS) funded by the Water Environment Research Foundation began in 2010 and concluded in 2011. The purpose of this pilot study was to assess the effect of wet weather driven depression of dissolved oxygen on fish. During the summer of 2010 and 2011, 14 acoustic hydrophone receivers were installed in Bubbly Creek, the South Branch of the Chicago River, the Chicago Sanitary and Ship Canal, and two off-channel slips. Electronic tags were surgically implanted in largemouth bass that were collected in or near Bubbly Creek to track fish movement. M&R provided dissolved oxygen data from five continuous dissolved oxygen monitoring stations in order to correlate behavior of tagged fish with dissolved oxygen concentrations in their aquatic environment. M&R assisted in the collection of largemouth bass for the lab component of this study in June 2011. In September 2011, the INHS collected nine largemouth bass and installed a transmitter tag onto each fish to record dissolved oxygen. A final report will be published on this research in 2012. The study will inform aquatic life protection strategies in the future.

The District initiated a comprehensive assessment of the potential for endocrine disrupting compounds (EDCs) to impact the reproductive potential of fish populations in the Chicago Area Waterway System in 2009. The objectives of this study were to determine: (1) the spatial and temporal occurrence of EDCs; (2) the occurrence of endocrine disruption in wild fish populations; and (3) the likely sources contributing to any occurrence of endocrine disruption. The study was completed in 2011, and the reporting of findings will be completed in 2012.

## LOOKING AHEAD

M&R will continue to support the attainment of the goals of the District's strategic plan in 2012 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 2012 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 2012 to continue to optimize the focus of its resources on mission critical work.

M&R will continue to develop all employees in 2012 by continuing to offer its monthly seminar series, maintaining its chemical hygiene plan, and increasing access to webinars and web-based training.

In 2012, 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 improve landscape management practices.

Also in 2012, 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 to develop a premium biosolids value-added product.



# **APPENDIX I**

## **APPENDIX I**

### **MEETINGS AND SEMINARS 2011**

#### **January 2011**

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

Illinois Water Environment Association, Government Affairs in Water Pollution Control Conference (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 Analysts Association, Winter Expo 2011 (and follow-up meetings throughout the year), Kenosha, Wisconsin.

Water Environment Federation, Impaired Waters Symposium 2011, Miami, Florida.

Water Environment Research Foundation, Nutrient Removal Challenge, Issue Area Team, Miami, Florida.

#### **February 2011**

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), Lombard, Illinois.

Stockholm Water Institute, Committee Meetings (and follow-up meetings throughout the year), Chicago, Illinois.

#### **March 2011**

Great Lakes Environmental Law Symposium, Chicago, Illinois.

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

Illinois Pollution Control Board, Use Attainability Analysis Hearings (and follow-up meetings and hearings throughout the year), Chicago, Illinois.

## APPENDIX I

### MEETINGS AND SEMINARS 2011 (Continued)

Illinois Section of the American Water Works Association and Illinois Water Environment Association, WaterCon 2011, Joint Conference and Expo, Springfield, Illinois.

Society of Environmental Toxicology and Chemistry Meeting, Lake Geneva, Wisconsin.

United States Environmental Protection Agency, National Beach Conference, Miami, Florida.

United States Fish and Wildlife Service, Stream Habitat Measurement Techniques, Shepherdstown, Washington.

#### April 2011

Center for Global Management and Responsible Leadership Conference, Second Annual, Chicago, Illinois.

Illinois Association of Water Pollution Control Operators, 76<sup>th</sup> Annual Conference, Springfield, Illinois.

Lake Michigan Beaches, Total Maximum Daily Load Technical Advisory Committee Meeting, Chicago, Illinois.

University of Notre Dame, Department of Civil Engineering and Geological Sciences, Weekly Seminar, Notre Dame, Indiana.

#### May 2011

DePaul University, Sustainable Cities Class, Chicago, Illinois.

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

Lower Des Plaines Ecosystem Partnership Meeting, Homer Glen, Illinois.

National Association of Clean Water Agencies, Environmental Policy Forum, Washington, D. C.

North American Benthological Society, 2011 Annual Meeting, Providence, Rhode Island.

Soil Ecology Society, 2011 Meeting, Kelowna, British Columbia, Canada.

## APPENDIX I

### MEETINGS AND SEMINARS 2011 (Continued)

University of Illinois at Chicago, e-Government Workshop, Lisle, Illinois.

#### June 2011

Chemical Industry Council of Illinois, Chicago, Illinois.

Chicagoland Chamber of Commerce, Chicago, Illinois.

Stockholm Water Institute, Stockholm Junior Water Prize National Conference, Chicago, Illinois.

United States Department of Agriculture, Cooperative Research W-2170 Committee Meeting, University Park, Pennsylvania.

United States Environmental Protection Agency, Stakeholder's Meeting, New Orleans, Louisiana.

#### July 2011

Agilent Technologies, Gas Chromatography/Mass Spectrometry Users Seminar, Schaumburg, Illinois.

Endocrine Disruption Study, Data Review and Manuscript Writing Workshop, Minneapolis, Minnesota.

National Association of Clean Water Agencies, Summer Conference, Chicago, Illinois.

Water Environment Federation, Energy and Water 2011: Efficiency, Generation, Management, and Climate Impacts Conference, Chicago, Illinois.

#### August 2011

Paul's Turf and Tree Nursery, 2011 Biosolids for Sod Production Workshop and Field Day, Marshall, Wisconsin.

Water Environment Research Foundation, Nutrient Water Quality Criteria Modeling Meeting, Alexandria, Virginia.

## APPENDIX I

### MEETINGS AND SEMINARS 2011 (Continued)

#### September 2011

American Fisheries Society, Annual Meeting, Seattle, Washington.

Enfo Tech and Consulting, iPACS User Group Meeting, North Brunswick, New Jersey.

Illinois Department of Public Health, Annual Laboratory Seminar, Workshop, Willowbrook, Illinois.

Illinois Emergency Management Agency/Local Emergency Planning Committee, Annual Conference, Springfield, Illinois.

Institute of Technology, Cyber Physical Systems Research Team, Chicago, Illinois.

International Ultraviolet Association, 2<sup>nd</sup> North American Conference, Toronto, Ontario, Canada.

Metropolitan Planning Council and Open Lands, Joint Meeting, Elgin, Illinois.

Northeast Illinois Invasive Plant Partnership, Annual Meeting, Lisle, Illinois.

Pipeline Incident Response, Northern-Central Illinois Pipeline Association Meeting, Elmhurst, Illinois.

#### October 2011

Barnes and Thornburg, Clean Water Workshop, Chicago, Illinois.

Chicago Council on Science and Technology, Chicago's Water, Luncheon Meeting, Chicago, Illinois.

North Branch Dam Removal Task Force (and follow-up meetings throughout the year), Chicago, Illinois.

Water Environment Federation, Technical Exhibition and Conference, 2011 Pre-Conference Workshop, Los Angeles, California..



## APPENDIX I

### MEETINGS AND SEMINARS 2011 (Continued)

#### November 2011

Air Quality Management Conference (Lake Michigan Section), Glen Ellyn, Illinois.

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

Lake Michigan Monitoring Coordination Council, 2011 Fall Meeting, Chicago, Illinois.

United States Army Corp of Engineers, Bubbly Creek Feasibility Study, Chicago, Illinois

United States Environmental Protection Agency, Great Lakes Restoration Initiative Workshop, Chicago Illinois.

#### December 2011

American Geophysical Union, Fall Meeting 2011, San Francisco, California.

Illinois Association of Environmental Laboratories, 11<sup>th</sup> Annual Midwest Environmental Laboratory Stakeholders Summit, Chicago Illinois.

Midwest Association of Fish and Wildlife Agency, 72<sup>nd</sup> Conference, Des Moines, Iowa.

# **APPENDIX II**

## APPENDIX II

### PRESENTATIONS 2011

#### January 2011

“Characterization of Recycle Streams at the Water Reclamation Plants of the Metropolitan Water Reclamation District of Greater Chicago and Potential for Resource Recovery.” Presented at the Midwest Water Analysts Association (MWAA), Winter Expo, Kenosha, Wisconsin, by K. Patel. PP

“Dissolved Oxygen Water Quality Standards for the Chicago Area Waterway System: Costs and Environmental Impacts of Compliance.” Presented at the Water Environment Federation (WEF), Impaired Waters Symposium 2011, Miami, Florida, by C. O’Connor, T. Granato, T. Minarik, J. Moran, J. Wasik, and H. Zhang. PP

“Evaluation of Aeration Efficiency through Profile Sampling.” Presented at the MWAA, Winter Expo, Kenosha, Wisconsin, by J. Moran. PP

#### March 2011

“A Simple Approach to Identifying and Controlling Filamentous Bacteria.” Presented at the Illinois Section of the American Water Works Association (AWWA) and Illinois Water Environment Association (IWEA), WaterCon 2011, Joint Conference and Expo, Springfield, Illinois, by T. Glymph. PP

“Algae, Habitat, and Dissolved Oxygen Monitoring in the Chicago Area Waterway System.” Presented at the Illinois Environmental Protection Agency, Nutrient Stakeholders Workgroup Meeting, Springfield, Illinois, by J. Wasik. PP

“Assessing the Potential for Endocrine Disruption in Chicago Area Waterways: Study Design and Preliminary Results.” Presented at the Illinois Chapter of the American Fisheries Society, Annual Meeting, Peoria, Illinois, by D. Gallagher and T. Minarik. PS

“Controlling Dissolved Oxygen in Aeration Tanks to Meet Dissolved Oxygen Permit Limits.” Presented at the Illinois Section of the AWWA and IWEA, WaterCon 2011, Joint Conference and Expo, Springfield, Illinois, by J. Moran. PP

“Heat Recovery at a Water Reclamation Plant in Greater Chicago (Biothermal System).” Presented at the Illinois Section of the AWWA and IWEA, WaterCon 2011, Joint Conference and Expo, Springfield, Illinois, by A. Oskouie, C. O’Connor, J. Kozak, D.T. Lordi, T. C. Granato, and L. Kollias. PP

## APPENDIX II

### PRESENTATIONS 2011 (Continued)

“Improving Soil Quality for Sustained Productivity and Human Health.” Presented at the Illinois Section of the AWWA and IWEA, WaterCon 2011, Joint Conference and Expo, Springfield, Illinois, by K. Kumar. PP

“Protecting Lake Michigan Water Quality: Addressing Reversals and Beach Use Restrictions.” Presented at the United States Environmental Protection Agency, National Beach Conference, Miami, Florida, by G. Rijal. PS

“Safety of Chicago Waterway Determined by Public Health Studies.” Presented at the Illinois Section of the AWWA and IWEA, WaterCon 2011, Joint Conference and Expo, Springfield, Illinois, by G. Rijal. PP

“The Dose Response Relationships of Chemical Additives for the Suppression of Hydrogen Sulfide Generation in Wastewater.” Presented at the Illinois Section of the AWWA and IWEA, WaterCon 2011, Joint Conference and Expo, Springfield, Illinois, by J. Kozak. PP

“Update on the Development of a Biosolids Land Application Network.” Presented at the Illinois Section of the AWWA and IWEA, WaterCon 2011, Joint Conference and Expo, Springfield, Illinois, by A. Cox, D. Collins, and O. Oladeji. PP

“Utilization of Exceptional Quality Biosolids for Turfgrass Management in the Chicago Area.” Presented at the Illinois Section of the AWWA and IWEA, WaterCon 2011, Joint Conference and Expo, Springfield, Illinois, by O. Oladeji, A. Cox, and D. Collins. PP

#### April 2011

“Current Challenges at the Metropolitan Water Reclamation District of Greater Chicago.” Presented at the University of Notre Dame, Department of Civil Engineering and Geological Sciences Weekly Seminar, Notre Dame, Indiana, by J. Kozak. PP

“Protozoa as Indicators of Activated Sludge Treatment System Conditions.” Presented at the Illinois Association of Water Pollution Control Operators, 76th Annual Conference, Springfield, Illinois, by T. Glymph. PP

“Water Quality in the Chicago Area Waterway, 1970-Present: Cost, Environmental Impact and Expected Biological Response to Further Water Quality Improvement.” Presented at the Center for Global Management and Responsible Leadership Conference, Second Annual, Chicago Illinois, by C. O’Connor. PP

## APPENDIX II

### PRESENTATIONS 2011 (Continued)

#### May 2011

“Energy and Carbon Footprint and Sustainability at the Metropolitan Water Reclamation District of Greater Chicago.” Presented at the DePaul University, Sustainable Cities Class, Chicago, Illinois, by J. Kozak. PP

“The Role of Biosolids in Replenishing Organic Matter in Cultivated Soils.” Presented at the Soil Ecology Society, 2011 Meeting, Kelowna, British Columbia, Canada, by G. Tian, A. Cox, T. C. Granato, C. Chiu and A. Franzluebbbers. PP

#### June 2011

“CSI Chicago: Tracking the Sources and Fate of Phosphorus in Chicago Area Waterways.” Presented at the Illinois Water Environment Association, Government Affairs Conference, Chicago, Illinois, by K. Kumar. PP

“Status of the Chicago Area Waterway System Use Attainability Analysis Hearings before the Illinois Pollution Control Board.” Presented at the Chemical Industry Council of Illinois, Chicago, Illinois, by C. O’Connor. PP

“Status of Chicago Area Waterway System Use Attainability Analysis Hearings before the Illinois Pollution Control Board, Plans for Disinfection and Potential Impact on Taxpayers.” Presented at the Chicagoland Chamber of Commerce, Chicago, Illinois, by C. O’Connor. PP

#### July 2011

“Changes to Recreational and Aquatic Life Use Criteria, Requirements for Disinfection, and Secondary Contact Health Studies in the Chicago Area Waterway System.” Presented at the National Association of Clean Water Agencies (NACWA), Summer Conference, Chicago, Illinois, by T. C. Granato. PP

“Greening the City of Chicago.” Presented at the NACWA, Summer Conference, Chicago, Illinois, by J. Attarian and J. Kozak. PP

“Water Utility Response to Climate Change and Engagement with the Environmental Protection Agency Climate Ready Water Utility Initiative.” Presented at the WEF, Energy and Water 2011: Efficiency, Generation, Management, and Climate Impacts Conference, Chicago, Illinois, by A. Quintanilla, J. Kozak, S. O’Connell, C. O’Connor, J. Whitler, and M. Ampleman. PP

## APPENDIX II

### PRESENTATIONS 2011 (Continued)

#### September 2011

“Assessing the Potential for Endocrine Disruption in Chicago Area Waterways: Study Design and Preliminary Results.” Presented at the American Fisheries Society, Annual Meeting, Seattle, Washington, by D. Gallagher and T. Minarik. PS

“Wastewater Treatment, Process Control at the Stickney Water Reclamation Plant.” Presented at the Institute of Technology Cyber Physical Systems Research Team, Chicago, Illinois, by C. O’Connor. PP

#### October 2011

“Activated Sludge and Biological Nutrient Removal Process Control: Hands-on in the Real World.” Co-presented at the WEF, Technical Exhibition and Conference, 2011 Pre-Conference Workshop, Los Angeles, California, by T. Glymph. PP

#### November 2011

“Regulatory Update: Metropolitan Water Reclamation District of Greater Chicago Pretreatment and User Charge Issues.” Presented at the Industrial Water, Waste, and Sewage Group Meeting, Chicago, Illinois, by T. C. Granato. PP

#### December 2011

“Evaluating the Potential for Endocrine Disruption in Urbanized Aquatic Environments.” Presented at the Midwest Association of Fish and Wildlife Agency, Annual Meeting, Des Moines, Iowa, by J. Vick and T. Minarik. PS

“Stable Isotope and Isotopomeric Constraints on N<sub>2</sub>O Production in Wastewater Treatment Plants.” Presented at the American Geophysical Union, Fall Meeting 2011, San Francisco, California, by F. Bellucci, M. Gonzalez-Meler, N.C. Sturchio, J.K. Bohlke, N.E. Ostrom, and J. Kozak. PP

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

# **APPENDIX III**

## APPENDIX III

### PAPERS PUBLISHED 2011

Hundal, L. S., K. Kumar, N. Basta, and A. Cox. "Evaluating Exposure Risk to Trace Organic Chemicals in Biosolids." *Biocycle*, 52:31-36. 2011

Kar, G., L. S. Hundal, J. J. Schoenau, and D. Peak. "Direct Chemical Speciation of P in Sequential Chemical Extraction Residues Using Phosphorus K-edge XANES Spectroscopy." *Soil Science*, 176:589-595. 2011.

Kelly, J. J., K. Policht, T. Grancharova, and L. S. Hundal. 2011. "Addition of Biosolids to an Agricultural Soil Increases Nitrification and Produces Distinct Responses in Ammonia Oxidizing Archaea and Bacteria." *Applied Environmental Microbiology*, 77:6551-6558. 2011.

Kozak, J., K. Patel, Z. Abedin, D. Lordi, C. O'Connor, T. C. Granato, and L. Kollias. 2011. "Effect of Ferric Chloride Addition and Holding Time on Gravity Belt Thickening of Waste Activated Sludge." *Water Environment Research*, 83, 2, 140-146, 2011.

Quintanilla, A., J. Kozak, S. O'Connell, C. O'Connor, J. Whitler, and M. Ampleman. "Water Utility Response to Climate Change and Engagement with the Environmental Protection Agency Climate Ready Water Utility Initiative." Proceedings of the Water Environment Federation, Energy and Water 2011 Conference, Chicago, Illinois. 2011.

Rijal, G., T. Glymph, and R. Gore. "Protecting Lake Michigan and Water Quality: Addressing Reversals and Beach Use." Proceedings of the United States Environmental Protection Agency's National Beach Conference, Miami, Florida. 2011. <http://water.epa.gov/type/oceb/beaches/2011proceedings.cfm>.

Sepulvado, J., A. Blaine, L. S. Hundal, and C. Higgins. "Occurrence and Fate of Perfluorochemicals in Soil Following the Land Application of Municipal Biosolids." *Environmental Science and Technology*, 45:8106-8112. 2011.



# **APPENDIX IV**

**METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO  
MONITORING AND RESEARCH DEPARTMENT 2011 SEMINAR SERIES**

- January 28, 2011      ***Improving Soil Quality for Sustained Productivity and Human Health***  
Dr. Kuldip Kumar, Associate Environmental Soil Scientist, Monitoring and Research Department, Metropolitan Water Reclamation District of Greater Chicago (District), Chicago, IL
- February 25, 2011      ***Need and Challenge of Alternative Water Sources for use in Electric Power Production***  
Professor David A. Dzombak, Carnegie Mellon University, Pittsburg, PA
- March 25, 2011      ***Vancouver, British Columbia's Sewage-to-Heat Neighborhood Energy Center***  
Mr. Chris Baber, Neighborhood Energy Utility Manager, City of Vancouver, Vancouver, British Columbia, CAN
- April 29, 2011      ***A Comprehensive Survey of Endocrine Active Compounds and Fish Effects In the Chicago Area Waterway System***  
Professor Heiko Schoenfuss, St. Cloud State University, St. Cloud, MN
- May 20, 2011      ***Nitrogen Removal Technology: Past, Present and Future – Including Blue Plains Advanced Wastewater Treatment Plant's Current Nutrient Regulation and Recovery Processes***  
Dr. Sudhir Murthy, Manager, Process Development and Optimization, District of Columbia Water and Sewer Authority, Washington D.C.
- June 17, 2011      ***Status of the Hearing Before the Illinois Pollution Control Board: Water Quality Standards and Effluent Limitations for the Chicago Area Waterway System***  
Dr. Thomas C. Granato, Acting Director of Monitoring and Research Department, District, Chicago, IL
- July 29, 2011      ***Wastewater Treatment and Climate Change***  
Professor Kartik Chandran, Columbia University, New York, NY
- August 26, 2011      ***Airborne Laser Scanning for Riverbank Erosion Assessment***  
Professor Satish Gupta, University of Minnesota, Minneapolis, MN
- September 30, 2011      ***East Bay Municipal Utility District's Renewable Energy Initiatives***  
Mr. David Williams, Director of Wastewater, East Bay Municipal Utility District, Oakland, CA
- October 28, 2011      ***Digester Gas Modeling and Utilization at the District's Stickney Water Reclamation Plant***  
Mr. Steve McGowan, Vice President, Malcolm Pirnie, Inc., Schaumburg, IL
- November 18, 2011      ***Computer Modeling to Support Process Design at the District***  
Mr. Edward Podczewinski, Principal Civil Engineer, Engineering Department, Cicero, IL
- December 16, 2011      ***The Maintenance and Operations of the Stickney Water Reclamation Plant***  
Mr. Stephen Carmody, Engineer of Treatment Plant Operations and Reed Dring, Engineer of Treatment Plant Operations, Maintenance and Operations Department, District, Cicero, IL

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

**CONTACT: Dr. Catherine O'Connor, Assistant Director of Monitoring and Research, EM&R Division, (708) 588-4264 or (708) 588-4059**

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

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

# APPENDIX V

**APPENDIX V: MONITORING AND RESEARCH DEPARTMENT NUMBERED REPORTS  
PUBLISHED DURING 2011**

Report No.	Report Title	Author(s)	Date	Organization or Conference
2011-1	Report of the Fulton County Environmental Protection System for 2010	M&R Department Tian, G.	January 2011	Illinois Environmental Protection Agency (IEPA)
2011-2	Monthly Controlled Solids Distribution Report, September 2010	M&R Department Oladeji, O.	January 2011	IEPA
2011-3	Monthly Controlled Solids Distribution Report, October 2010	M&R Department Oladeji, O.	February 2011	IEPA
2011-4	Monthly Controlled Solids Distribution Report, November 2010	M&R Department Oladeji, O.	February 2011	IEPA
2011-5	Monthly Controlled Solids Distribution Report, December 2010	M&R Department Oladeji, O.	February 2011	IEPA
2011-6	Annual Biosolids Management Report for 2010	M&R Department Lindo, P., Cox, A., Patel, M., and O'Connor, C.	February 2011	IEPA
2011-7	Evaluation of the Fate of Polybrominated Diphenyl Ethers in Biosolids, Biosolids-Amended Soils, and Uptake in Corn	M&R Department Cox, A., Hundal, L., and Hale, R., Virginia Institute of Marine Science	July 2011	Internal District Report
2011-8	Calumet West Solids Management Area Monitoring Report, Fourth Quarter 2010	M&R Department Lindo, P.	March 2011	IEPA
2011-9	Calumet East Solids Management Area Monitoring Report, Fourth Quarter 2010	M&R Department Lindo, P.	March 2011	IEPA
2011-10	Harlem Avenue Solids Management Area Monitoring Report, Fourth Quarter 2010	M&R Department Lindo, P.	March 2011	IEPA

**APPENDIX V (Continued): MONITORING AND RESEARCH DEPARTMENT NUMBERED  
REPORTS PUBLISHED DURING 2011**

Report No.	Report Title	Author(s)	Date	Organization or Conference
2011-11	Hanover Park Water Reclamation Plant Fischer Farm Monitoring Report, Fourth Quarter 2010	M&R Department Lindo, P.	March 2011	IEPA
2011-12	Lawndale Avenue Solids Management Area Monitoring Report, Fourth Quarter 2010	M&R Department Lindo, P.	March 2011	IEPA
2011-13	Ridgeland Avenue Solids Management Area Monitoring Report, Fourth Quarter 2010	M&R Department Lindo, P.	March 2011	IEPA
2011-14	122 <sup>nd</sup> and Stony Island Avenue Solids Management Area Monitoring Report, Fourth Quarter 2010	M&R Department Lindo, P.	March 2011	IEPA
2011-15	Ambient Water Quality Monitoring in the Chicago, Calumet, and Des Plaines River Systems: A Summary of Biological, Habitat, and Sediment Quality During 2007	M&R Department Gallagher, D., Vick, J., Minarik, T., and Wasik, J.	April 2011	IEPA
2011-16	Biosolids Farmland Application Program-Summary of Biosolids Quality Field Operations and Public Relations Procedures	M&R Department Cox, A., Hundal, L., Lindo, P., Oladeji, O., and Khalique, A.	March 2011	Internal District Report
2011-17	Biomonitoring Report 2011, Acute Whole Effluent Toxicity Test Results for the John E. Egan Water Reclamation Plant, Schaumburg, Illinois, National Pollutant Discharge Elimination System Permit Number IL0036340, February 2011	M&R Department Rijal, G.	March 2011	IEPA

**APPENDIX V (Continued): MONITORING AND RESEARCH DEPARTMENT NUMBERED  
REPORTS PUBLISHED DURING 2011**

Report No.	Report Title	Author(s)	Date	Organization or Conference
2011-18	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 2010	M&R Department Lindo, P.	March 2011	United States Environmental Protection Agency (USEPA), Region V
2011-19	Microbiological Report of Backflow Samples in 2010	M&R Department Gore, R. and Rijal, G.	August 2011	Internal District Report
2011-20	Monthly Controlled Solids Distribution Report, January 2011	M&R Department Oladeji, O.	April 2011	IEPA
2011-21	Tunnel and Reservoir Plan, Gloria Alitto Majewski Chicagoland Underflow Plan Reservoir Water Quality Monitoring Wells 2010 Annual Groundwater Monitoring Report	M&R Department MacDonald, D.	May 2011	IEPA
2011-22	Tunnel and Reservoir Plan, Des Plaines Tunnel System 2010 Annual Groundwater Monitoring Report	M&R Department MacDonald, D.	April 2011	IEPA
2011-23	Tunnel and Reservoir Plan, Upper Des Plaines Tunnel System 2010 Annual Groundwater Monitoring Report	M&R Department MacDonald, D.	April 2011	IEPA
2011-24	Monthly Controlled Solids Distribution Report, February 2011	M&R Department Oladeji, O.	April 2011	IEPA

**APPENDIX V (Continued): MONITORING AND RESEARCH DEPARTMENT NUMBERED  
REPORTS PUBLISHED DURING 2011**

Report No.	Report Title	Author(s)	Date	Organization or Conference
2011-25	Literature Search on Potential Efficacy of Ammonia Barrier to Prevent Asian Carp Movement Through the Chicago Area Waterway System	M&R Department Wasik, J.	April 2011	Internal District Report
2011-26	Tunnel and Reservoir Plan, Calumet Tunnel System 2010 Annual Groundwater Monitoring Report	M&R Department MacDonald, D.	May 2011	IEPA
2011-27	Monthly Controlled Solids Distribution Report, March 2011	M&R Department Oladeji, O.	May 2011	IEPA
2011-28	Monitoring and Research 2010 Annual Report	M&R Department	May 2011	Internal District Report
2011-29	Tunnel and Reservoir Plan, Mainstream Tunnel System 2010 Annual Groundwater Monitoring Report	M&R Department MacDonald, D.	June 2011	IEPA
2011-30	Continuous Dissolved Oxygen Monitoring in Chicago Area Wadeable Streams During 2010	M&R Department Minarik, T., Gallagher, D., Vick, J., and Wasik, J.	August 2011	IEPA
2011-31	Calumet East Solids Management Area Monitoring Report, First Quarter 2011	M&R Department Lindo, P.	June 2011	IEPA
2011-32	122 <sup>nd</sup> and Stony Island Avenue Solids Management Area Monitoring Report, First Quarter 2011	M&R Department Lindo, P.	June 2011	IEPA
2011-33	Calumet West Solids Management Area Monitoring Report, First Quarter 2011	M&R Department Lindo, P.	June 2011	IEPA

**APPENDIX V (Continued): MONITORING AND RESEARCH DEPARTMENT NUMBERED  
REPORTS PUBLISHED DURING 2011**

Report No.	Report Title	Author(s)	Date	Organization or Conference
2011-34	Hanover Park Water Reclamation Plant Fischer Farm Monitoring Report, First Quarter 2011	M&R Department Lindo, P.	June 2011	IEPA
2011-35	Harlem Avenue Solids Management Area Monitoring Report, First Quarter 2011	M&R Department Lindo, P.	June 2011	IEPA
2011-36	Lawndale Avenue Solids Management Area Monitoring Report, First Quarter 2011	M&R Department Lindo, P.	June 2011	IEPA
2011-37	Ridgeland Avenue Solids Management Area Monitoring Report, First Quarter 2011	M&R Department Lindo, P.	June 2011	IEPA
2011-38	Tunnel and Reservoir Plan, Thornton Transitional Flood Control Reservoir Water Quality Monitoring Wells 2010 Annual Groundwater Monitoring Report	M&R Department MacDonald, D.	July 2011	IEPA
2011-39	Biomonitoring Report 2010, Acute Whole Effluent Toxicity Test Results for the John E. Egan Water Reclamation Plant, Schaumburg, Illinois, National Pollutant Discharge Elimination System Permit Number IL0036340, May 2011	M&R Department Rijal, G.	June 2011	IEPA
2011-40	Monthly Controlled Solids Distribution Report, April 2011	M&R Department Oladeji, O.	June 2011	IEPA
2011-41	Continuous Dissolved Oxygen Monitoring in the Deep-Draft Chicago Waterway System During 2010	M&R Department Minarik, T., Gallagher, D., Vick, J., and Wasik, J.	August 2011	IEPA



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Report No.	Report Title	Author(s)	Date	Organization or Conference
2011-42	Water Quality Along the Illinois Waterway from the Lockport Lock to the Peoria Lock During 2010	M&R Department Wasik, J., Minarik, T., and Vick, J.	October 2011	IEPA
2011-43	The Chicago Health, Environmental Exposure, and Recreation Study (CHEERS) Final Report	M&R Department Rijal, G. and Dorevitch, S., University of Illinois at Chicago	August 2011	USEPA
2011-44	Monthly Controlled Solids Distribution Report, May 2011	M&R Department Oladeji, O.	August 2011	IEPA
2011-45	Odor Monitoring Program at the Metropolitan Water Reclamation District of Greater Chicago Facilities During 2010	M&R Department Oskouie, A.	December 2011	Internal District Report
2011-46	122 <sup>nd</sup> and Stony Island Avenue Solids Management Area Monitoring Report, Second Quarter 2011	M&R Department Lindo, P.	August 2011	IEPA
2011-47	Calumet East Solids Management Area Monitoring Report, Second Quarter 2011	M&R Department Lindo, P.	August 2011	IEPA
2011-48	Calumet West Solids Management Area Monitoring Report, Second Quarter 2011	M&R Department Lindo, P.	August 2011	IEPA
2011-49	Harlem Avenue Solids Management Area Monitoring Report, Second Quarter 2011	M&R Department Lindo, P.	August 2011	IEPA
2011-50	Lawndale Avenue Solids Management Area Monitoring Report, Second Quarter 2011	M&R Department Lindo, P.	August 2011	IEPA

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2011-51	Ridgeland Avenue Solids Management Area Monitoring Report, Second Quarter 2011	M&R Department Lindo, P.	August 2011	IEPA
2011-52	Hanover Park Water Reclamation Plant Fischer Farm Monitoring Report, Second Quarter 2011	M&R Department Lindo, P.	August 2011	IEPA
2011-53	Biomonitoring Report 2011, Acute Whole Effluent Toxicity Test Results for the Lemont Water Reclamation Plant, Lemont, Illinois, National Pollutant Discharge Elimination System Permit Number IL0028070, July 2011	M&R Department Rijal, G.	August 2011	IEPA
2011-54	Monthly Controlled Solids Distribution Report, June 2011	M&R Department Oladeji, O.	August 2011	IEPA
2011-55	Sidestream Nitrogen Removal at the John E. Egan Water Reclamation Plant	M&R Department Kozak, J. A., O'Connor, C., and Zhang, H.	March 2012	Internal District Report
2011-56	Radiological Monitoring of the Raw Sewage, Final Effluent, Sludge, and Biosolids of the Metropolitan Water Reclamation District of Greater Chicago, 2010 Annual Report	M&R Department Khalique, A.	December 2011	Internal District Report
2011-57	Biomonitoring Report 2011, Acute Whole Effluent Toxicity Test Results for the John E. Egan Water Reclamation Plant, Schaumburg, Illinois, National Pollutant Discharge Elimination System Permit Number IL0036340, August 2011	M&R Department Rijal, G.	September 2011	IEPA

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2011-58	Monthly Controlled Solids Distribution Report, July 2011 (Revised)	M&R Department Oladeji, O.	November 2011	IEPA
2011-59	2010 Annual Summary Report Water Quality Within the Waterways System of the Metropolitan Water Reclamation District of Greater Chicago	M&R Department Abedin, Z.	December 2011	Internal District Report
2011-60	Reporting Requirements for Site-Specific Equivalency to Process to Further Reduce Pathogens Designation of the Metropolitan Water Reclamation District of Greater Chicago's Biosolids Processing Trains at the Stickney and Calumet Water Reclamation Plants, January–July 2011	M&R Department Lindo, P.	September 2011	USEPA, Region V
2011-61	Monthly Controlled Solids Distribution Report, August 2011	M&R Department Oladeji, O.	November 2011	IEPA
2011-62	Biomonitoring Report 2011, Acute Whole Effluent Toxicity Test Results for the Lemont Water Reclamation Plant, Lemont, Illinois, National Pollutant Discharge Elimination System Permit Number IL0028070, October 2011	M&R Department Rijal, G.	November 2011	IEPA
2011-63	A Greenhouse Gas Accounting of the Metropolitan Water Reclamation District of Greater Chicago's Biosolids End Uses: Evaluation of Years 2001 and 2008	M&R Department Brown, S. of Washington University, Tian, G., Cox, A., and Collins, D.	February 2012	Internal District Report

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2011-64	122 <sup>nd</sup> and Stony Island Avenue Solids Management Area Monitoring Report, Third Quarter 2011	M&R Department Lindo, P.	November 2011	IEPA
2011-65	Calumet East Solids Management Area Monitoring Report, Third Quarter 2011 (Revised)	M&R Department Lindo, P.	December 2011	IEPA
2011-66	Calumet West Solids Management Area Monitoring Report, Third Quarter 2011	M&R Department Lindo, P.	November 2011	IEPA
2011-67	Harlem Avenue Solids Management Area Monitoring Report, Third Quarter 2011	M&R Department Lindo, P.	November 2011	IEPA
2011-68	Ridgeland Avenue Solids Management Area Monitoring Report, Third Quarter 2011	M&R Department Lindo, P.	November 2011	IEPA
2011-69	Lawndale Avenue Solids Management Area Monitoring Report, Third Quarter 2011	M&R Department Lindo, P.	November 2011	IEPA
2011-70	Hanover Park Water Reclamation Plant Fisher Farm Monitoring Report, Third Quarter	M&R Department Lindo, P.	November 2011	IEPA
2011-71	Monthly Controlled Solids Distribution Report, September 2011	M&R Department Cox, A.	December 2011	IEPA
2011-72	Biomonitoring Report 2011 Acute Whole Effluent Toxicity Test Results for the John E. Egan Water Reclamation Plant, Schaumburg, Illinois National Pollutant Discharge Elimination System Permit Number IL0036340, November 2011	M&R Department Wasik, J.	December 2011	IEPA

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2011-73	Environmental and Monitoring Research Division 2010 Annual Report	M&R Department	December 2011	Internal District Report

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