

**NATIONAL BIOSOLIDS PARTNERSHIP
BIOSOLIDS MANAGEMENT SYSTEM
INTERIM AUDIT REPORT**

**Metropolitan Water Reclamation District
Of Greater Chicago**

Chicago, Illinois

Audit conducted by

NSF-International Strategic Registrations

**William R. Hancuff, Lead Auditor
Alan Cassel, Auditor**

References:

**National Biosolids Partnership (NBP) *EMS Elements*
NBP *Third Party Verification Auditor Guidance – November 2001*
(*Latest Revision August 2011*)
NBP *Code of Good Practice*
Metropolitan Water Reclamation District
Of Greater Chicago *EMS Manual*
(*Core Documents – Various dates*)**

Final Report – June 20, 2016

INTRODUCTION

The purpose of the Biosolids Management Program (BMP) interim audits are to verify through regular reviews the system's health and effectiveness between verification audits. The third party on-site interim audits provide independent reviews and support credibility between re-verification audits. The goal of the audit is to collect and evaluate objective evidence related to a portion of the BMP such that over the course of the four interim audits conducted between verification audits all 17 elements are addressed.

The goal of this audit is to determine whether the Metropolitan Water Reclamation District Of Greater Chicago (MWRD) BMP is functioning as intended, that practices and procedures are conducted as documented, and that the BMP as implemented conforms to the NBP's Code of Good Practice and the BMP requirements of the National Biosolids Partnership (NBP) program objectives.

RECOMMENDATION

The results of the MWRD BMP interim audit and review of corrective action notices are positive. The minor non-conformance corrective action plan has been reviewed and approved. It is therefore the recommendation of the audit team that the MWRD BMP retain its Platinum Level Recognition Certification status.

AUDIT SCOPE

The NSF-International Strategic Registrations, Ltd. (NSF-ISR) conducted a third party interim audit of the MWRD BMP from May 23, 2016 through May 27, 2016. The on-site interim audit team consisted of Dr. William R. Hancuff, Lead Auditor and Alan Cassel, Auditor.

The primary objective of the annual interim audit was to ensure the environmental management system health by reviewing:

- Progress toward goals and objectives,
- Corrective and preventive action requests and responses.
- Actions taken to correct minor non-conformances,
- Management review process, and
- BMP outcomes (environmental performance, regulatory compliance, interested party relations, and quality practices)

The first four items identified above involved reviewing procedures, activities, processes and products that have general requirements found in the NBP standard elements 5, 14, 15, 16 and 17. The fifth item, BMP outcomes, had the potential of involving other NBP standard elements, namely: 1, 2, 4, 6, 9, 10 and 13.

In addition to evaluation of the system as outlined above, the present interim audit scope included the review and verification of the maintenance and implementation of the MWRD BMP relative to standard elements 3, 8, 15, and 17.

In general terms, the scope of the Third Party interim audit encompassed the entire biosolids value chain (pretreatment, collection and treatment, through final end use) at selected MWRD facilities with special attention on those practices and management activities that directly support biosolids-related operations, processes, and activities within the biosolids value chain.

The physical biosolids facilities and land application sites included in the audit and visited during the interim audit included the following facilities: Stickney Water Reclamation Plant and Monitoring and Research Offices; Lawndale Avenue Solids Management Area (LASMA); Calumet Water Reclamation Plant and Calumet Solids Management Area (CALSMA); Harlem Avenue Solids Management Area (HASMA) composting operations, John E. Egan Water Reclamation Plant; Hanover Park Water Reclamation Plant, James C. Kirie Water Reclamation Plant, three community gardens in South Side Chicago, Lyons Township Parks and Recreation baseball and soccer fields application sites, and Stewart Spreading – farm land application site in Lisbon Township, Kendall County, IL (field code – KE KACO 3C).

The following individuals were interviewed or otherwise participated in meetings as part of the audit process:

David St. Pierre, Executive Director – Metropolitan Water Reclamation District Of Greater Chicago

John Murray, Director Maintenance and Operations (M&O) Division

Sergio Serafino, Assistant Director Maintenance and Operations (M&O) - North

Dan Collins, Managing Civil Engineer - Biosolids Manager & Biosolids EMS

Coordinator – LASMA

Ahmad Laban, Principal Engineer – LASMA

Raphael Frost, Senior Civil Engineer - CALSMA

Steve Hall, Senior Civil Engineer - CALSMA

Sharon Sopcak-Phelan, Field Operations Officer – M & R Department, Industrial Waste Div. Field Services – Stickney WRP (Industrial Waste Division)

Brett Garelli, Deputy Director of Maintenance and Operations (M&O) – Plant Manager – Stickney WRP

Reed Dring, Engineer of Treatment Plant Operations 1 – Operations Manager – Stickney WRP

Henry Marks, Chief Operating Engineer – Stickney WRP

Steve Carmody, Maintenance Manager – Stickney WRP

Mark Kwan, Operating Engineer II – Stickney WRP

Mike Doyle, Operating Engineer I – Stickney WRP

Tom Conway, Assistant Director Maintenance and Operations (M&O) Division – Calumet WRP

Brian Perkovich, Managing Engineer – Calumet WRP

Neil Dorigan, Managing Engineer – Calumet WRP\

Patrick Connolly, Principal Engineer – Calumet WRP
Aruch Poonsapaya, Principal Engineer – Terrence J. O’Brien WRP
Jim Cloonan, Assistant Chief Operating Engineer – Kirie WRP
Jim Kaminski, Treatment Plant Operator III – Kirie WRP
Albert Cox, Manager EM&R – Stickney WRP
Lakhwinder Hundal, Ph.D, Supervising Environmental Soil Scientist, M&R Department,
Stickney WRP
Guanglong Tian, Senior Environmental Soil Scientist, M&R Department, Stickney WRP
Katarzyna (Kathy) A. Lai, Principal Engineer, Operations Manager – Egan WRP
Hitesh Shah, Plant Manager – Egan WRP
Sanjay Patel, Egan WRP
John Lazicki, Plant Manager – Hanover Park WRP
Rob Pogorney, Engineering Technician V. Hanover Park WRP
Dan Mikso, Chief Operator, Hanover Park WRP
Al Eswani, Senior Civil Engineer, Hanover Park WRP
Greg Firrantello, Agronomy Manager – Steward Spreading
Michelle Stewart, Field Coordinator – Stewart Spreading
Gregg Bratton, Executive Director ChicaGRO Intergenerational Growing Project
(Community gardens South Side Chicago)
Ed Staudacher, Managing Engineer - Storm water
Ruth Joplin, Risk Manager, Risk Management Section, General Administration Division
Allison Fore, Officer Public and Intergovernmental Affairs – Public Affairs Office
Dan Wendt, Assistant Public and Intergovernmental Affairs Specialist – Public Affairs
Office
Pat Thomas, Public Affairs Specialist – Graphic Artist – Public Affairs Office

INTERIM AUDIT FINDINGS

The interim audit included document of the latest versions of the MWRD BMP element procedures, Standard Operating Procedures, reports and records. During the on-site audit these documents were reviewed to verify conformance with the National Biosolids Partnership (NBP) BMP Elements using the most current NBP Third Party Verification Auditor Guidance dated August 2011. Additionally interviews were conducted with various personnel to obtain supplemental objective evidence on the effectiveness of the implementation of the BMP. The interim audit found 4 positive observations, no major non-conformances, 1 minor non-conformance and 14 opportunities for improvement. Attachment 1 summarizes the documents and other objective evidence associated with each element that was evaluated during the interim audit.

The following is a review of the observations made during the interim audit. The positive observations are presented first, followed by the minor non-conformance and opportunities for improvement. The latter two categories are listed by item number, which correspond to the element minimum conformance requirements found in the NBP Third Party Verification Auditor Guidance and are presented in the sequence of the NBP standard elements.

Commendation

The continued efforts and dedication of the EMS Team must be acknowledged. Maintaining the BMP Platinum Certification goal is obviously a team effort, but the guidance and direction provided by the biosolids coordinator, Dan Collins to ensure continuous improvement must be recognized. Additionally, the support, encouragement and active participation of the Executive Director, David St. Pierre, in the BMP process have guaranteed the continual improvement of the program. The following are the positive observations identified for recognition since the last interim audit.

Positive Observations

- The Executive Director, David St. Pierre, has established an aggressive goal of having 100 percent of the District's biosolids processed into a Class A Exceptional Quality product that can be used for any beneficial purpose without restriction. Additionally, the goal includes ensuring that 100 percent of this resource will be used exclusively to benefit Chicagoland (i.e. within Cook County and the District Service areas).
- The District has responded to the request from a Chicago urban gardening organization for help in providing assistance with community gardens in South Side Chicago by forming a partnership with ChicaGRO. The District will provide a composted biosolids blend to 72 gardens as soil amendment to promote the growth of healthy garden vegetables for consumption by the neighborhood residents. This is a major breakthrough in public acceptance of biosolids, which is of national significance.
- The Executive Director has taken an active role in ensuring the Biosolids Management Program is effective and results in continual improvement. He revised the Policy Statement to ensure advancements in beneficial use of biosolids through including Commercial Use of this resource. He has also personally established several District goals and objectives to put Chicago in the forefront of recovering resources.
- MWRD has developed a comprehensive online GIS-enabled Citizen Incident Reporting System to improve communication between the public and MWRD through submittal of complaints. The incidents are sorted into three categories: odor, flood, and general. This program represents a significant accomplishment in open two-way communication. It is especially relevant to the biosolids management program since odor is the most frequently cited concern with biosolids production and utilization. The complaint form indicates that the MWRD staff will investigate the reported issue within 24 hours and if the origin of the odor is within their system MWRD will work to find a resolution to the issue.

Minor Nonconformance

Requirement 16.3 and 8.1 – The standard requires that the organization maintains at a minimum documents and records that identifies the lead auditor(s) and their qualifications. Interviews indicated that field auditors have not received any formal training in EMS auditing. (Note: the Quality Assurance Coordinator (QAC), who is identified as the lead EMS auditor in the procedure has not received Environmental Management System lead auditor training.) Additionally requirement 8.1 of the standard requires that a training program be established and maintained to ensure that employees responsible for implementation of various EMS functions are competent in performing their assigned tasks and duties. There was no evidence available to demonstrate the auditing competence of various individuals (EMS Field Representatives) assigned auditing tasks.

Opportunities for Improvement

Requirement 1.1 – The standard requires the organization to have an EMS manual that describes policy, programs, plans, procedures and management practices. Consider developing a master schedule for all required actions of the Biosolids environmental management system. (Note: as a separate consideration some organizations identify within each procedure all the actions associated with the words shall, will, must, is/are required, etc. and placing them on a timeline chart with the dates of completion. Then use “Outlook” or a similar program to distribute reminders to individuals who have responsibilities for accomplishing the tasks.)

Requirement 2.1 – The standard requires the establishment of a Biosolids Management Policy that commits the organization to following the principles set forth in the “Code of Good Practice.” One of the principles of conduct of the Code is “Preventive Maintenance” which requires the preparation and implementation of a plan for preventive maintenance for equipment used to manage biosolids and wastewater solids. While MWRD has a robust preventive and corrective maintenance program using a MMS program there was no reference in the biosolids management procedures to its existence or how it functions. Consider including a complete description of this program (i.e. a PM/CM SOP) as a reference in either the Operational Controls Procedure or the Nonconformance: Preventive and Corrective Action procedure, or another appropriate procedure of the EMS.

Requirement 2.1 – The standard requires the establishment of a Biosolids Management Policy that commits the organization to following the principles set forth in the “Code of Good Practice.” One of the principles of conduct of the Code is “Continual Improvement” in all aspects of biosolids management. It was observed that there were delays in progress on several of the goals and objectives that resulted in significant impacts on continual improvement. Consider having the status of the Biosolids Management Program Goals and Objectives reviewed by the Executive Director at the same time as the Executive Director goals are reviewed. Note that many of the Biosolids Goals and Objectives include or support the ED’s District-wide Goals.

Requirement 4.1 – Review the regulatory requirements for the development of an SDS (formerly known as an MSDS) for each of the District’s biosolids products, including those to be sold in the future. (See Louisville Green Biosolids MSDS as an example.)

Element 5 – Consider preparing a simple single page summary list of all current goals and objectives along with the outcome areas they impact, responsible individuals, SMART criteria, and any other information considered critical.

Element 5 – Consider having the Executive Director review and approve each of the biosolids management system goals and objectives.

Element 5 – Continue to observe the progress on the odor mitigation investigations involving Odowatch and at the appropriate time consider establishing a goal and objective for odor control.

Requirement 5.7 – One of the goals at Hanover WRP is to “Prevent nutrient overloads” in the soil at Fischer Farm. Groundwater samples are collected and monitored quarterly. However, soil samples are collected and analyzed only once every four years. Consider increasing the frequency of soil sampling to once annually, which would allow staff to track changes and correct any overload situations in a timely manner.

Requirement 8.1 –The Element 8 – Training procedures does not currently address the on-line method used for awareness training, and Document 08-2, which lists the employees required to attend EMS awareness training, is not current.

Requirement 8.2 – Consider documenting all of the job training performed relative to EMS job functions for new, transferred and promoted employees.

Requirement 10.1 – The gravity thickener improvements at Stickney made to date include modifying the operation of the primary sludge withdrawal system, and reducing the number of thickeners in service from 8 to 3. Consider if the dilution water, which is presently being added to the thickeners is of sufficient quantity. Also, samples are taken once daily from the thickener underflow. Consider increasing the sampling frequency to once per shift until the thickeners are stabilized. Also, consider sampling the overflow from each thickener every shift and analyzing for total suspended solids (TSS). (Note: a well-operated thickener is normally 90% capture of solids in the underflow.)

Requirement 14.4 – The standard requires the development of corrective action plans to address nonconformities identified during routine monitoring and measurement. During the last interim audit conducted in 2015, it was observed at the Hanover Park facility that the current boilers in the digester area create an unsafe condition, as they are open-flame in an area where open flames are prohibited. None of the electrical gear in that zone is rated for use in an explosion-proof area. There is potential for a methane explosion or fire. An elementary school is located across the street from the plant. Engineering is

evaluating the most cost effective solution to this issue, but a corrective action plan has not yet been finalized.

Requirement 16.1 – The standard requires that the organization establish and maintain an internal audit program to periodically analyze the EMS for biosolids and determine whether it is effectively meeting its biosolids management policy. In the “key areas of interpretation” of this requirement it indicates the internal audit should review its commitment and implementation of the Code of Good Practice as part of the internal audit program. Consider including in the internal audit procedure a review of how the BMP is being implemented to meet the intent of the Policy and Code of Good Practice.

Requirement 16.1 – Ensure that the scope of the internal audit includes checking and evaluating the implementation of each element procedure and document listed in the EMS Manual for each element of the standard being audited. The audit needs to assure that practices and procedures are conducted as documented.

Requirement 16.1 – The District prepared and conducted an internal audit that meets the intent of assessing its biosolids program goals and objectives as well as performance evaluation. However, the current Internal Audit procedures (Element 16 – Biosolids EMS Internal Audit procedure and Document 16.1 – Biosolids Internal EMS Audit Guidance) do not reflect the scope, frequency, and methodology of the audits, assignment of responsibility for conducting the audits and communicating the findings, which were used to conduct the audit.

Requirement 17.1 – Consider having an additional Management Review of the Biosolids Management System Performance shortly after the third party interim audit. Consider including in this review having the Biosolids Coordinator presents to the Executive Team the results of the third party audit and the proposed corrective actions along with the schedules to address each finding.

Summary and Closure

The NBP Third Party Verification Auditor Guidance indicates that when the auditor identifies minor nonconformances during the on-site audit, the organization must resolve the nonconformances and provide documentation to the auditor within 30 days of the audit. NBP acknowledges that biosolids organizations may not be able to fully correct some minor nonconformances within 30 days, in which case NBP requires that the audited organization develop an action plan with time frames. This plan and schedule for correcting minor nonconformances must be approved by the lead auditor.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO COMMENT

The District’s Environmental Management System (EMS) continual improvement in 2015 revolved around the Internal Audit process, and tracking of non-conformances to daily operations and opportunities for improvement (OFI’s). The tracking of non-

conformances and OFI's was not a part of the program previously. The result of this tracking has resulted in improved information sharing in all levels of reporting and with outside contractors.

The Third Party Audits provide an insight for continual improvement of the District's Biosolids management program at various plants. As a result of the 2015 Interim Audit operations staff began to communicate their ideas for continual improvement. One of the ideas, market the direct pickup of biosolids and biosolids related products, resulted in a savings of over \$30K in truck hauling in 2015. In addition, a goal has been established for 2016 and beyond to increase the quantity of products picked up by the end user each year. The EMS provides an opportunity for direct communication among the Executive Director, the Director of M&O and EMS Coordinator, through Element 17 - Management Review, which ensures continual improvement begins with upper management direction.

An example of continual improvement in the program is the legislative change related to the removal of restrictive use of EQ Biosolids. The passing of the bill in July of 2015 supports the District's efforts of creating Class A biosolids through composting and, as a result, the District procured equipment to formally begin a composting program in 2016. The District's Biosolids program is strong due to the support of the Executive Director and the dedication of all members of the EMS team working together. The District strives for excellence in all areas of resource recovery and the EMS employed by the District supports that effort.

OUTCOMES MATTER

The MWRD Biosolids Environmental Management System established goals and objectives through requests to the Division Heads and Field EMS representative inputs. Subsequent to the development and approval the EMS coordinator distributes the goals and objectives to a list of interested parties and requests input on future goals. The MWRD Biosolids goals for its EMS were established cognizant of each of the four outcome focal points of the NBP program as identified below:

1. Environmental Performance,
2. Regulatory Compliance,
3. Relations with Interested Parties, and
4. Quality Biosolids Management Practices.

While it is not a requirement to attain all the objectives established, it is a critical component of the system to make progress towards accomplishing the overall goals. Initially in June 2013 the MWRD established eighteen (18) goals and objectives for 2013, which carried through until the third party interim audit conducted in May 2014. Many of the goals were long term and carried over from year to year. The goals for the most part were established using Specific, Measurable, Achievable, Relevant, and Time Bound (SMART) criteria, although some did not completely capture the measurable criteria (including costs). The District worked to improve the specific measurability of goals and objectives and tracking of progress using these measurements. Some of the goals and

objectives were accomplished and dropped, others were modified and new ones were identified. Progress has been made on the goals and objectives and, where performed, measurable accomplishments were tracked quarterly through 2015.

In his management role the Executive Director initially established three long term goals in 2013, namely 1) becoming energy neutral, 2) beneficially using 100% of MWRD biosolids within Cook County (and the District's service areas), and 3) Odor mitigation throughout the District. All of these top-level goals impact the outcome areas of Environmental Performance, Relations with Interested Parties, Regulatory Compliance and Quality Biosolids Management Practices. In mid-2014 the Executive Director added another goal of creating a composted biosolids program, which will support his second long-term goal mentioned above. And in 2015 the Executive Director added another goal of establishing a tree farm and native prairie landscape nursery at Hanover Park's Fisher Farms, which again will support the ED's long-term goal of beneficially using 100% of MWRD biosolids within Cook County (and the District's service areas).

Individual goals and objectives were established for each of the water reclamation plants that produce biosolids. In addition, the General Division, Monitoring and Research and Public Affairs established goals. Many of these goals and objectives were initially developed in support of the Executive Directors goals and may in the future be continued as targets or part of action plans needed to attain the ED's goals. The District's performance relative to the above outcome areas are addressed below and identified immediately after the discussion of each goal.

Executive Director Goal 1 – Become Energy Neutral

While this goal is involves many operations throughout the District, the activity with the highest potential not attributable to energy conservation is related to energy generation through biosolids processing; that is, the conversion of organic materials to methane gas during the anaerobic digestion solids stabilization process.

Since this goal is District-wide and is not completely controlled within the Biosolids Management Program's Environmental Management System the progress is not currently tracked through the BMP; however several of the EMS goals and objectives contribute to moving towards this goal. These BMP goals include the Stickney goal of improving solids concentration to the digesters, which should increase the production of methane gas in the digesters for potential recovery; the utilization of all biogas at Calumet; the usage of the central facility boiler facility for heating digester gas at Calumet; to utilize as much digester gas as possible at Hanover Park; and the General Divisions goal of increasing customer direct pickup of Class A biosolids products, which will not only reduce the energy associated with transportation of biosolids but eliminate the energy consumed by the field equipment used to spread the solids.

Outcome areas impacted: Environmental Performance, Regulatory Compliance, Relations with Interested Parties, and Quality Biosolids Management Practices.

Executive Director Goal 2 – Beneficially use 100% of MWRD biosolids within Cook County and the 125 Service Areas of the District

The achievement of this goal is the General Division's responsibility with the support of Public Affairs and Monitoring and Research. The ultimate disposition of biosolids produced by the district is through the Controlled Solids Distribution Program and the Beneficial Use on Farmland Application Program. Application as a landfill cover is the last option when all other options for biosolids use have been exhausted.

The objective is to increase the utilization of Class A biosolids in the local community and decrease the use of Class B biosolids utilization on Farmland. The near term EMS Goal for 2015 was to beneficially use 100% of solids production, and to use 15% of the overall utilization in Cook County. The General Division received a total of 87,362 dry tons of biosolids from various plants and the total utilization was 71,021 dry tons. This represents 81% of the total production. However, the controlled solids distribution within Cook County was 16,350 dry tons, which represents 18.3 % of the total solids production and 23 % of the total beneficial utilization; both of which exceed the 15% goal of use in the District's service area.

Several other efforts support this initiative including the Public Affairs Section's goal to identify potential customers; the General Division's goals of creating EQ composted biosolids and increasing customer direct pickup of Class A biosolids products; and the executive director's goal of establishing a tree nursery and farm at Hanover Park's Fisher Farm.

It is anticipated that the intermediate targets for this goal will increase significantly from 15% in 2015, to 40% in 2016, to 70% in 2017 and to 100% in 2018. To aid in this increase the Executive Director has changed the BMP Policy to reflect commercial utilization of biosolids products.

Outcome areas impacted: Environmental Performance, Regulatory Compliance, Relations with Interested Parties, and Quality Biosolids Management Practices.

Executive Director Goal 3 – Odor Mitigation Throughout the District

The single most effective change, which will mitigate odors throughout the District, associated with biosolids, is the creation and implantation of an EQ compost biosolids program. The creation of this program in 2015 was highly successful and immediate implementation is schedule for 2016 and beyond. An aggressive program has been established with production targets of 10,000 tons in 2016, 50,000 tons in 2017 and 100,000 tons in 2018. Other programs that do not yet have measureable targets include odor control at the WRPs currently being researched; and use of the online incident reporting system (public site, which can be used for reporting odor complaints) as a method for quick response to concerns.

Outcome areas impacted: Environmental Performance, Regulatory Compliance, Relations with Interested Parties, and Quality Biosolids Management Practices.

Stickney Water Reclamation Plant (WRP) Goal 1 - Improve West Side Solids Feed to Digesters:

This goal is to improve the solids concentration to the digesters and is an extension of a long-term project, which began in 2009 and was carried forward to 2010 and 2011 and expanded to include improvement of the West Side solids feed to the digesters. The near-term objective is to improve solids feed to the digesters by constructing eight circular gravity concentration tanks (GCT) followed by installation of new pre-digestion centrifuges. This contract, 09-176-3P, was awarded in March 2010, and after extensive change orders regarding power feed, the GCTs were put into service on January 27, 2015 via the O'Brien solids line. Currently O'Brien and Stickney WAS/Primary solids are being fed into the GCTs. It is anticipated that the solids streams will be separated and only WAS will be centrifuged and primary solids will be pumped to the GCTs. The installation of pre-digestion centrifuges has been extended and is scheduled for completion in the fall of 2016.

The described benefits include increasing the feed concentration to the digesters (through new primary thickeners and new WAS centrifuges), which thereby increases the digester detention time and ensures better stabilization of the solids. Some measureable parameters for environmental performance improvement would include feed concentration (percent solids), detention time increase, and increased stabilization, e.g. percent reduction in volatile solids and increase in digester gas generated (cubic feet or therms) and cost savings associated with increased energy self sufficiency.

The current status is that three Imhoff tanks have been removed and replacement with 9 new primary clarifiers is currently under construction and progressing to a completion date of August 2018. When operational, the new primary tanks will have an additional benefit of improving volatile solids feed to the digesters.

The measureable objective of this goal is: 1) to increase the West Side plant primary volatile solids from approximately 40% to 60%; 2) to increase digester gas production from 3,500 Mcf/day to 6,700 Mcf/day, and 3) to increase the volatile solids reduction from the historic level of 31% to a range of 40% to 50%.

The percent solids feed to the digesters is planned for improvement, and new gravity concentration tanks (GCT) are in operation for primary solids. These have the goal of increasing percent solids to approximately 5%. However, further work as noted below is required to optimize this process. Currently the percent solids ranges between 2.5 to 4.5%, while the waste activated sludge (WAS) is thickened to about 5.5% solids in centrifuge thickeners.

This goal and objective supports the MWRD Executive Director's EMS goal of becoming energy neutral.

Outcome Areas Impacted: Environmental Performance and Quality Biosolids Management Practices.

Stickney Water Reclamation Plant (WRP) Goal 2 – Minimize Polymer and Electrical Use at Post-Centrifuge Building:

This goal and objective is to increase low solids pumping from Stickney WRP to Lawndale Avenue Solids Management Area (LASMA) to 45,000 tons. This shift eliminates the need for centrifugation of those solids at the Stickney WRP and reduces the quantity of polymer and electricity used resulting in considerable cost savings. As a side note it was observed that transferring the low solids to LASMA reduces the operating cost for the Stickney plant but increases the cost of processing those solids at the LASMA facilities. To demonstrate the true cost saving to the Districts the reduced costs for Stickney combined with the increased cost for LASMA should provide the net savings to MWRD. The cost savings calculated for electricity is \$4.22 per dry ton; for polymer is \$51 per dry ton and for CO₂ is 4.94 per dry ton; resulting in a total cost savings of \$60.16 per dry ton.

These were the historic costs, which were expected to be lower in 2014 and 2015. Nevertheless Stickney increased its low solids pumping to an all time record high of 75,987 dry tons. The plant did an excellent job of tracking the details of all of the cost components on a monthly basis, including polymer, CO₂, and power along with the quantity of low solids in dry tons sent to the LASMA lagoons. The total savings for 2014 was approximately \$4.5 million. No costs were immediately available to compare the additional costs of solids handling at LASMA.

While the goal of transferring 45,000 tons of dry solids from Stickney to LASMA was maintained for 2015, it was not achieved because by mid-2015 the M&O staff realized that unseasonably wet conditions would result in exceeding the lagoons' capacity. As a result it was decided to centrifuge more solids at Stickney and retain lagoon capacity for the winter season, when it is most needed. In spite of these adjustments a total of 29,600 dry tons were transferred to the lagoons in 2015.

This goal was adjusted for 2016 to reflect new operating conditions. Additionally, the new phosphorus removal system, Ostera, began operations in late May 2016, which will require more centrifugation and perhaps development of new goals.

Outcome Areas Impacted: Environmental Performance and Quality Biosolids Management Practices.

Calumet Water Reclamation Plant (WRP) Goal 1 – Utilize all biogas:

This goal is to utilize 100% of the biogas produced. This objective includes measuring digester gas production and utilization to establish a baseline for comparison in addition to establishing a baseline cost to be able to evaluate reduction in operation and maintenance costs. Measurable quantities of methane gas production have been quantified in millions of cubic feet and therms, and operation and maintenance costs have been quantified in dollars. The method of tracking identified in the goals and objectives template indicates monthly tracking of digester gas utilization will be performed from 2013 to 2016 to create a baseline. The tracking of digester gas production and utilization for 2015 showed 100% of the digester gas produced being used in January, February, March, November and December. The remaining months showed an average based on totals of approximately 80%. Other data tracked included digester temperature variation, total natural gas usage, maintenance cost of CBF and maintenance cost of digester boilers.

The improvement in environmental performance with this goal and objective was not specifically established, i.e. defining the theoretical amount of gas to be produced in millions of cubic feet or therms was not presented in the quarterly progress reports. Also no cost savings were found in the progress reports. Additional environmental benefits to be quantified (estimated) include greenhouse gas impacts avoided.

Funding for this project is available in the Engineering Department, although the Engineering Department rejected the proposals for 100% utilization of digester gas, and they will be reissuing a Request for Proposal in early 2016 to achieve 100% utilization.

This goal and objective supports the MWRD Executive Director's EMS goal of becoming energy neutral.

Outcome Areas Impacted: Environmental Performance and Quality Biosolids Management Practices.

Calumet Water Reclamation Plant (WRP) Goal 2 – Employ the Central Boiler Facility for Digester Heating:

This was a completely new goal and objective established mid-year for 2014. The purpose of this goal is to use steam produced at the Central Boiler Facility to heat the biosolids in the anaerobic digester. Currently the digester temperatures vary over a wide range causing an inefficient use of energy, sometimes overheating the digesters sometime not heating the digesters enough. As discussed this improvement will require replacing the boilers with new efficient heat exchanger and temperature controls. The defined improvement will be realize in the more efficient use of digester gas thus reducing the amount of natural gas needed for supplemental digester heating. In order to measure more precisely the benefits of this goal it was identified that tracking the biosolids temperatures to show fluctuations is critical to demonstrate improved performance. Additionally it was indicated there would be a reduction in operation and maintenance costs. Once again no baseline temperature measurements, such as temperature variations, quantity of natural

gas supplemented, and cost of heating operations (including maintenance) were presented in quarterly progress reports.

A project has been designed to use steam from recently constructed Central Boiler Facility to heat the solids with better fuel economy and replace the aging hot water to solids heat exchangers. The vetting panel approved project 06-213-3M on May 21st 2015, but the project was withdrawn from presentation to the Executive Team at the request of the Engineering Department sponsor. No progress has been made since that time.

Outcome Areas Impacted: Environmental Performance and Quality Biosolids Management Practices.

Hanover Park Water Reclamation Plant (WRP) Goal 1 – Prevent Nutrient Overload in Soil at Fischer Farm:

The objective of this goal is to improve the distribution system used to apply lagoon supernatant to the Fischer Farm fields. This originally was a short-term objective that has been on the books since 2007 and has been carried forward each year through 2012 with no progress until 2013. The estimated amount of supernatant produced at Hanover Park is seven million gallons per year. The specific objective is to apply one million gallons of supernatant per year to each of seven farm fields. Until last year the supernatant was applied to only three of the seven fields due to damaged piping and valves. This distribution has the effect of overloading those fields that receive the supernatant and could impair groundwater quality in the long term. Funding has been allocated to this objective for several years running and then reallocated to other projects resulting in no progress. However, in 2013 the funding was approved and construction was completed replacing valves and risers on the supernatant piping system in the fourth quarter of 2014. Replacement of damaged equipment allows a more even distribution among all seven fields and improves environmental performance.

Operations applied supernatant and biosolids evenly across seven fields in 2015. In early August 2015 a crop of oats was planted and successfully produced 50 bushels/acre, which were harvested in November. In December 7 million gallons of Biosolids were injected into the soil with no odors or complaints received.

The contractor planted corn on all seven fields in early May 2016. Sampling of the soil for nutrients and metals content was scheduled to take place in Spring 2016 and was completed for nutrients in April 2016 at 4 to 6 locations. Results will be compared with 2012 samples.

(Note: To meet the Executive Director's new goal of establishing a tree nursery, one of the 7 fields at the farm is being set aside for this purpose. Eight acres will be converted to a design, build, operate contract for trees and native plants. The contract has been bid and is scheduled for opening early June 2016. This will have minimal impact on the normal farm operations.)

Outcome Areas Impacted: Environmental Performance, Relations with Interested Parties, Regulatory Compliance and Quality Biosolids Management Practices.

Hanover Park Water Reclamation Plant (WRP) Goal 2 – To Utilize as Much Digester Gas as Possible (2015 – 2016):

The second goal for Hanover Park WRP was originally established in 2009. It was expanded through combining it with another past objective and carrying it forward through 2014. The goal and objective currently includes digester facility improvements to capture the digester gas, which is wasted through flaring, and to use it as a substitute for natural gas that currently heats the plant. The project was planned for two stages; first to improve the digester facilities piping and second to construct digester gas storage facilities. Contract # 08-530-3P for digester facility improvements began in the fall of 2012 and was completed in 2014. A work order #C20535 was created to replace the existing gas burner piping with stainless steel.

All gas piping was replaced with stainless steel resulting in a significant improvement by reducing gas lost to the atmosphere and reduction in odors. Digester gas utilization is now ranges from 70+% use in winter, and 40% to 50% in summer. There was a 40% decrease in natural gas purchased in 2015 from 2014, even though the total gas utilization rate increased by 2.41%.

This goal and objective supports the MWRD Executive Director’s EMS goal of becoming energy neutral, and odor mitigation throughout the district.

Outcome Areas Impacted: Environmental Performance Relations with Interested Parties and Quality Biosolids Management Practices.

John E. Egan Water Reclamation Plant (WRP) Goal 1 – Maximize Digester Gas Usage

The objective of this goal is to improve the digester gas use for building and digester heat in order to reduce costs associated with purchasing natural gas for the same purposes. Additionally, as a side benefit improvements will reduce flaring and releases to the atmosphere. To accomplish this the digesters must be cleaned and mixing of primary digesters must be restored to full capacity.

A baseline was established in 2014, which indicated that 394,276 therms of natural gas were purchased; 741,308 therms of gas were produced by the digesters and 610,054 therms of digester gas were used. Historically, digester gas utilization has been between 82% and 92% for digester heating, to heat the buildings in the winter and to operate chillers in summer.

Engineering Contract 11-403-2P is in process and improvements in digester gas generation and use will follow. If the cleaning contract can be expedited then all digesters can be available in early 2017.

Outcome Areas Impacted: Environmental Performance Relations with Interested Parties and Quality Biosolids Management Practices.

John E. Egan Water Reclamation Plant (WRP) Goal 2 – Improve Dewatering Facility at the Egan WRP:

The objective of this goal is to replace the existing conveyor system with a new system that will allow an increase in efficiency by reducing the number of outages (reduce the number of outages from the 2012 – 2014 average of 10 total and 6 unscheduled) and lower the maintenance costs (2009 – 2012 average conveyor cost of \$76,000). It was also an objective to increase the dewatered biosolids storage capacity to allow for longer uninterrupted period of centrifuge operation (from 19 hours five days per week to 24 hours six days per week).

This system will also reduce odors by being an enclosed system and reduce cleanup cost from historic 4 hours per day to approximately 1 hour daily allowing the staff to be assigned to other tasks at Egan. The 2010 IIT odor study and also the eight-week study by the Districts M&R staff in December 2013/January 2014 recorded reading of H₂S and ED50. These will be used as a baseline to determine the reduction of the odors in the dewatering facility upon completion of the improvement project.

Construction has been completed on the dewatering/conveying/truck loading system, however, there have been many problems with the equipment that have delayed the completion of this project.

Evaluation of progress as measured by the impacts on performance as discussed in the paragraphs above are ongoing and will be summarized and discussed in each quarterly report on goals and objectives.

Outcome Areas Impacted: Environmental Performance, Relations with Interested Parties, and Quality Biosolids Management Practices.

Kirie Water Reclamation Plant (WRP) Goal 1 – Upgrade Instrumentation (Magnetic Meter Installation) for Flow Measurement of Waste Activated Sludge (WAS) Transmission to the Egan WRP

This goal and objective was created mid-year 2013 as a 2014 goal. It is anticipated that improved accuracy may result along with redundancy in flow measurement. Also, it is anticipated that maintenance cost and reliability of flow measurement will result. It is projected that maintenance cost will be reduced by 66% and solids transmissions interruptions will be lowered by 70%. Progress has been made and completion of the operation was originally anticipated to be June 2015. The meter has been delivered and will be installed by plant forces in June or July 2016. Work is being coordinated with the Toll way rerouting of the WAS line. Maintenance costs associated with flow measurement and solids transmission interruptions (hours) continue to be tracked.

Outcome Areas Impacted: Environmental Performance and Quality Biosolids Management Practices.

Kirie Water Reclamation Plant (WRP) Goal 2 – Improve Cathodic Protection of the Waste Activated Solids Transmission to the Egan WRP

This goal and objective was created mid-year 2013 as a 2014 goal. The objective is to reduce corrosion, which will extend the life expectancy of the pipeline and reduce the loss of solids dewatering production at the Egan WRP due to pipeline failure. A contract has been awarded and work is expected to be complete by July 2016.

Outcome Area Impacted: Environmental Performance.

General Division Goal 1 – Increase Use of Biosolids within Cook County:

This goal represents the combination of three separate goals developed in the past, namely Beneficial Use of Solids Production at Calumet Solids Management Area (CALSMA), Beneficial Use of Solids Production at Lawndale Avenue Solids Management Area (LASMA), and Beneficially use 100% of MWRD biosolids within Cook County and the 125 Service Areas of the District, and is primarily to implement the action plan required to accomplish the Executive Directors overarching goal to beneficially utilize 100% of the Districts biosolids within Cook County and the District service areas.

The original 2013 objective of this goal was to increase the percentage of the 125 Community Service Areas of the District where biosolids could be beneficially used and to increase the number of significant users in the District by 10 each year over the next 5 years. Also an earlier objective was to increase the quantity of biosolids beneficially used by 1,500 tons each year over the next five years. This goal and objective went through a mid-year clarification and redefinition in 2014 and the objective was to increase the utilization of Class A biosolids in the local community and decrease Class B utilization on farmland. The measureable goal for 2014 was to have at least 10% of the total 2014 biosolids utilization applied locally with Class A biosolids. This goal was exceeded with 15% of the total production being applied locally and 85% applied to farmland.

The 2015 status of this goal is discussed in greater detail within the Executive Director Goal 2.

Outcome Areas Impacted: Environmental Performance, Relations with Interested Parties, and Quality Biosolids Management Practices

General Division Goal 2 – Increase Customer Direct Pickup of Class A Biosolids Products

The purpose of this goal is to establish a direct pickup program for Class A biosolids products by end users. This goal has the benefit of eliminating the cost of transporting biosolids and in most cases reducing the cost of land applying those solids at the delivery site. It also has the benefit of increasing the use of biosolids locally in Cook County because all current customer pickups are used exclusively within the county.

The action plan involves contacting landscapers, golf courses, and current customers to inform them of the advantage of pickup at anytime without awaiting scheduling for District transportation. Measurements to be made include: tonnage picked up; ton-miles eliminated with costs saved, application equipment use avoided (hours and costs) and total cost savings.

The objective of the first year of this goal was to establish a baseline upon which expansion of distribution could be based. The measureable goal is to increase the direct pickup by 25% each year over the baseline year of 2015. In 2015, end users picked up 1,860 tons of product, which sets the goal for 2016 of 2,325 tons. A preliminary estimate of cost savings associated with the direct pickup of 2449 wet tons (1616 dry tons) of biosolids from May 14, 2015 to December 15, 2015 showed a savings of \$26,940.

Outcome Areas Impacted: Environmental Performance, Relations with Interested Parties, and Quality Biosolids Management Practices

General Division Goal 3 – Create and Produce Exceptional Quality (EQ) Composted Biosolids:

This is a new goal that resulted from the M & R goal of increasing biosolids compost production by 1000 dry tons each year. The initial action plans involved determining the optimal ratio of combining woodchips and biosolids for composting, using Gore cover technology for reducing odors and evaluating green waste for improving heat generation and reducing costs. The total 2015 EQ composted biosolids delivered was 2,052 dry tons.

This goal has been greatly influenced by the Executive Director’s (ED) overarching goal of beneficially using 100% of MWRD biosolids within Cook County and the 125 service areas of the district. The ED has established an aggressive set of targets as follows:

- 2016 - 10,000 tons of product
- 2017 – 50,000 tons of product
- 2018 – 100,000 tons of product

Outcome Areas Impacted: Environmental Performance, Regulatory Compliance, Relations with Interested Parties and Quality Biosolids Management Practices

General Division Goal 4 – GIS Mapping for Biosolids:

This objective is associated with a long-term goal that was originally established in 2011 and continued through 2015. This objective involved providing GIS mapping for all biosolids beneficial uses, including land application, controlled distribution and final utilization of biosolids from LASMA, CALSMA and Egan WRP dating back to 1998. Federal and state regulations require long term (sometimes lifetime) tracking of land application of certain classifications of biosolids. While the District has maintained hard copies of all records they are susceptible to damage or loss. The GIS mapping provides easy access to all historic records for any land application site, controlled distribution points, and landfill applications. The farmland application data entered includes mapping showing the property and application areas and application data, such as delivery dates, biosolids quantities, application areas, and metal loading history. This system facilitates the preparation of regulatory reports such as the Monthly EPA Controlled Solids Distribution Reports. The project is making progress and the mapping of all farm fields and controlled solids distribution from 1998 – 2010 have been mapped on the GIS program. In 2014 emphasis was on keeping up to date with the current year and completing the mapping and linking of 2011 Controlled Solids Distribution (CSD) sites. The following was accomplished in 2014; closing out 2011 (mapping and linking CSD sites) and closing out 2013 (mapping farms& linking all sites). This goal is basically complete with continuing efforts in 2016 to map and link any remaining CSD sites.

Outcome Areas Impacted: Environmental Performance, Regulatory Compliance and Relations with Interested Parties.

Public Affairs Goal – Identify Potential Customers:

This goal is carried forward from 2013 and 2014. It is fully complementary to the executive director’s goal of beneficially using 100% of MWRD biosolids within Cook County and the 125 service areas of the district. The measurability has changed over the past three years and now does not quantify the results of the outreach methods, such as: community outreach, Student/teacher/administrator educational visits, tours, marketing materials, website, letters, press releases/social media coverage, and event planning; as it used to do. This goal appears to be evolving to a quantifiable action plan that supports the Executive Directors goal.

The Public Affairs Section promoted biosolids through interactions at 165 public meetings, events and schools though Cook County with t total attendance of over 32,400. In addition, 100 tours were organized for the public and attended by 1,636 attendees, which included biosolids conveyance systems at various plant ant the lab and greenhouse where biosolids are used to grow plants for research and demonstration purposes.

Marketing materials continued to be revised. Several press releases were distributed though the year regarding biosolids. Social media was utilized to reach potential customers. And Public Affairs held the third annual Sustainability Summit on November 10, 2015. The event attracted local community leaders, elected officials and municipal staff from throughout Cook County and offered information and testimonials pertaining to biosolids.

Outcome Areas Impacted: Relations with Interested Parties.

Monitoring and Research Goal 1 – Increase Biosolids Compost Production by 1000 dry tons each year:

The 2015 goal was carried over from 2014 and was to produce a biologically stable and odor-free biosolids compost using woodchips having a consistent nutrient content to be made available to users throughout the year. (Note: the quantity of compost production was incidental to the goal.) The advantage is that biosolids compost can be stored for extended periods of time at solids drying areas and utilization sites without the potential for odors.

In 2015 the environmental performance benefits were identified as specifically quantifiable by R&D using the following measurable criteria: biologically stable may be measured by vector attraction reduction and pathogen elimination; odor free may be measured using an odor panel and the ED50 method of evaluation. Results of odor testing are quantified by a numerical value of 0 to 10. Measurability of the compost nutrient content consistency was determined to be defined by concentration of nitrogen, phosphorus, and potassium. The targeted levels and results of test conducted in December 2015 were as follows: CO₂ production – less than 2.0 mg CO₂-C/g/d as a measure of biological stability (results 0.24); total Kjeldahl N – 1.5 – 2.0 percent (results 1.64%); total phosphorus – 1.5 to 2.0 percent (results 1.24%); total potassium – 0.05 – 0.3 percent (results 0.55%), odor scoring units – less than 5 (results 2.1) and fecal coliform as a measure of pathogen elimination – less than 1000 MPN/g (results 433).

This goal and objective supports the MWRD Executive Director's EMS goal of using 100% of the biosolids in Cook County and odor mitigation throughout the district.

This goal has been accomplished and the results demonstrated that full-scale composting of biosolids is feasible and safe. This resulted in a follow-on goal of creation and implantation of an EQ composted biosolids program. The creation of this program was initiated in mid-2014, equipment was purchased and composted biosolids production began in 2015. The program is highly successful and expansion of the program is scheduled for 2016 and beyond. An aggressive program has been established with production targets of 10,000 tons in 2016, 50,000 tons in 2017 and 100,000 tons in 2018.

Outcome Areas Impacted: Environmental Performance, Relations with Interested Parties, Regulatory Compliance and Quality Biosolids Management Practices.

Monitoring and Research Goal 2 – Locate three (3) new Significant Industrial Users (SIUs) and/or Large Commercial Industrial Users that discharge to MWRD system:

This goal and objective was carried over from 2014, specifically to further the control of contaminants that may have a potentially adverse impact on biosolids quality. The Field Services Section of M&R located over 10 new SIUs.

Outcome Areas Impacted: Environmental Performance, Regulatory Compliance and Relations with Interested Parties.

CONCLUSIONS AND RECOMMENDATIONS

The results of the third party interim audit show MWRD has a strong mature Biosolids Management Program (BMP). There have been considerable improvements in the District BMP since the last external third party audit and this continuous improvement is expected in the future, especially in the goals, objectives and programs area, internal audits, and the facilities corrective and preventive action programs.

For the minor non-conformance District personnel prepared a Corrective Action Notice (CAN) and Corrective Action Work Plan, and will implement corrective actions according to their BMP procedures to provide continual improvements to their biosolids program. All proposed corrective action work plans were reviewed by the lead auditor and found to be acceptable and final closure will be verified during the next external third party interim audit. As a further measure to demonstrate continuous improvement the opportunities for improvement will be addressed to the maximum extent possible.

It is the recommendation of the audit team that MWRD's Biosolids Environmental Management Program (BMP), Chicago, Illinois retain its certification and "Platinum Level Recognition."

As was mentioned, a BMP is a continuously improving process, and retention of the platinum level recognition is not the end. The results of this and future audits will provide value added to the system and should be viewed as an overall opportunity to improve. Every audit is a snapshot in time, and does not, or cannot, identify each and every area for improvement. And yet, while no single audit identifies all of the areas for improvement the results of each audit provide an additional incremental step in the overall system's improvement.

Based on discussions between the facility's BMP Coordinator and the third party auditor the interim audit schedule listed below was proposed for the four years of interim audits and next re-verification audit.

The scope of each interim audit will include a review of the organization's progress toward goals and objectives; BMP outcomes (environmental performance, regulatory compliance, interested party relations, and quality practices); actions taken to correct minor non-conformances; the management review process; and corrective and preventive action requests and responses. This review generally includes requirements found in elements 1, 2, 5, 6, 9, 14, 15, 16 and 17.

In order to address each element of the NBP standard over the four years of interim audits the following elements are tentatively scheduled over the period between verification audits:

Year 6 (completed) – Elements 5, 6, 9, 14, 16

Year 7 (completed) – Elements 1, 10, 12, 13

Year 8 (completed) – Elements 3, 8, 15, 17

Year 9 (third party) – Elements 2, 4, 7, 11

Year 10 (third party) – Re-verification – All elements

Attachment 1

Documents and Other Objective Evidence Reviewed During Interim Audit

Element 1. BMP Manual

- Document 00.1 – EMS Manual Document Control Summary – 5/3/15
- Document 00.5 – District Organizational Chart (Revised 7/1/13) – Version 3, 10/13/11
- EMS Manual Element 01 – Biosolids EMS Manual – Version 3, 10/13/11
- Interview with Dan Collins, Managing Civil Engineer - Biosolids Manager & Biosolids EMS Coordinator and Ahmad Laban, Principal Engineer – LASMA
- Interview with Greg Firrantello, Agronomy Manager – Steward Spreading (contractor)

Element 2. Biosolids Management Policy

- EMS Manual Element 02 – Biosolids Management Policy – Version 7, 3/16/15
- Document 02.1 – MWRD Biosolids Policy (containing Code of Good Practice) – Version 2, 10/13/11
- Interview with David St. Pierre, Executive Director
- Interview with John Murray, Director Maintenance and Operations (M&O) Division
- Interview with Dan Collins, Managing Civil Engineer - Biosolids Manager & Biosolids EMS Coordinator and Ahmad Laban, Principal Engineer – LASMA
- Interviews with various personnel with biosolids value chain responsibilities (see list presented in the Audit Scope section of this report)

Element 3. Critical Control Points

- EMS Manual Element 03 – Critical Control Points – Version 5, 10/17/11
- Hanover Park WRP CCP Table – Version 12, 2/16/16
- John E. Egan WRP CCP Table – Version 15, 3/24/16
- James C. Kirie WRP CCP Table – Version 12, 1/22/16
- Terrence J. O'Brien WRP CCP Table – Version 11, 5/19/14
- Stickney WRP CCP Table – Version 12, 2/19/14
- Calumet WRP CCP Table – Version 12, 2/20/14
- Interviews with:
 - Dan Collins, Managing Civil Engineer - Biosolids Manager & Biosolids EMS Coordinator – LASMA
 - Ahmad Laban, Principal Engineer – LASMA
 - Steve Hall, Senior Civil Engineer - CALSMA

Sharon Sopcak-Phelan, Field Operations Officer – M & R Department, Industrial Waste Div. Field Services – Stickney WRP (Industrial Waste Division)
 Brett Garelli, Deputy Director of Maintenance and Operations (M&O) – Plant Manager – Stickney WRP
 Reed Dring, Engineer of Treatment Plant Operations 1 – Operations Manager – Stickney WRP
 Henry Marks, Chief Operating Engineer – Stickney WRP
 Steve Carmody, Maintenance Manager – Stickney WRP
 Mark Kwan, Operating Engineer II – Stickney WRP
 Mike Doyle, Operating Engineer I – Stickney WRP
 Tom Conway, Assistant Director Maintenance and Operations (M&O) Division – Calumet WRP
 Brian Perkovich, Managing Engineer – Calumet WRP
 Neil Dorigan, Managing Engineer – Calumet WRP
 Patrick Connolly, Principal Engineer – Calumet WRP
 Aruch Poonsapaya, Principal Engineer – Terrence J. O’Brien WRP
 Jim Cloonan, Assistant Chief Operating Engineer – Kirie WRP
 Jim Kaminski, Treatment Plant Operator III – Kirie WRP
 Lakhwinder Hundal, Ph.D, Supervising Environmental Soil Scientist, M&R Department, Stickney WRP
 Guanglong Tian, Senior Environmental Soil Scientist, M&R Department, Stickney WRP
 Katarzyna (Kathy) A. Lai, Principal Engineer, Operations Manager – Egan WRP
 Hitesh Shah, Plant Manager – Egan WRP
 John Lazicki, Plant Manager – Hanover Park WRP
 Rob Pogorney, Engineering Technician V. Hanover Park WRP
 Dan Mikso, Chief Operator, Hanover Park WRP
 Al Eswani, Senior Civil Engineer, Hanover Park WRP
 Greg Firrantello, Agronomy Manager – Steward Spreading

Element 4. Legal and Other Requirements

- EMS Manual Element 04 – Legal and Other Requirements – Version 3, 10/17/11.
- Interview with Dan Collins, Supervising Civil Engineer - Biosolids Manager & Biosolids EMS Coordinator
- Interview with Ahmad Laban, Principal Engineer – LASMA and CALSMA
- Interview with Sharon Sopcak-Phelan, Field Operations Officer – M & R Department, Industrial Waste Div. Field Services – Stickney WRP
- Interview with Ruth Joplin, Risk Manager, Risk Management Section, General Administration Division
- Interview with Allison Fore, Officer Public and Intergovernmental Affairs – Public Affairs Office
- Interview with Dan Wendt, Assistant Public and Intergovernmental Affairs Specialist – Public Affairs Office
- Interview with Pat Thomas, Public Affairs Specialist – Graphic Artist – Public Affairs Office

- Interview with Lakhwinder Hundal, Ph.D, Supervising Environmental Soil Scientist, M&R Department, Stickney WRP
- Interview with Guanglong Tian, Senior Environmental Soil Scientist, M&R Department, Stickney WRP

Element 5. Goals and Objectives

- EMS Manual Element 05 – Goals and Objectives – Version 8, 3/16/15
- Document 05.1 – Goals and Objectives Guidance – Version 1, 10/13/11
- Monitoring and Research Goals and Objectives for 2015
- General Division’s Goals and Objectives for 2015
- Calumet WRP’s Goals and Objectives for 2015
- Egan WRP’s Goals and Objectives for 2015
- Kirie WRP - Goals and Objectives for 2015
- Hanover Park WRP’s Goals and Objectives for 2015
- Division 900’s Goals and Objectives for 2015
- Public Affairs Biosolids EMS Goals and Objectives for 2015
- 2015 Biosolids Program and Environmental Management System (EMS) Performance Report – Final – May 2, 2016
- First Quarterly Status Report on Biosolids Goals and Objectives – 2016 (May 2016).
- Summary of MWRD’s Biosolids EMS Goals and Objectives for 2015
- Summary of Activities for the Office of Public Affairs for 2015
- Summary of Activities of the Districts Land Application Program for 20154
- Interviews with:
 - David St. Pierre, Executive Director – Metropolitan Water Reclamation District of Greater Chicago
 - Dan Collins, Managing Supervising Civil Engineer - Biosolids Manager & Biosolids EMS Coordinator
 - Ahmad Laban, Principal Engineer – LASMA and CALSMA
 - Brett Garelli, Deputy Director of Maintenance and Operations (M&O), Plant Manager – Stickney WRP
 - Reed Dring, Engineer of Treatment Plant Operations 1, Operations Manager – Stickney WRP
 - Tom Conway, Assistant Director Maintenance and Operations (M&O) Division – Calumet WRP
 - Brian Perkovich, Managing Engineer – Calumet WRP
 - Aruch Poonsapaya, Principal Engineer – Terrence J. O’Brien WRP (by phone)
 - Jim Cloonan, Assistant Chief Operating Engineer – Kirie WRP
 - Hitesh Shah, Plant Manager – Egan WRP
 - Katarzyna (Kathy) A. Lai, Principal Engineer, Operations Manager – Egan WRP
 - John Lazicki, Plant Manager – Hanover Park WRP
 - Dan Mikso, Chief Operator – Hanover Park WRP

- Sharon Sopcak-Phelan, Field Operations Officer – M & R Department, Industrial Waste Division Field Services – Stickney WRP
- Lakhwinder Hundal, Ph.D, Supervising Environmental Soil Scientist, M&R Department, Stickney WRP
- Allison Fore, Officer – Public and Intergovernmental Affairs Office
- Dan Wendt, Assistant Public and Intergovernmental Affairs Specialist

Element 6. Public Participation in Planning

- EMS Manual Element 06 – Public Participation in Planning – Version 6, 3/16/15
- Document 06.1 – Public Input Opportunities, including table of marketing and education activities – Version 6, 3/14/14
- Document 06.2 – Public Relations Program for Farmland Application – Version 2, 10/13/11
- Interview with Allison Fore, Officer Public and Intergovernmental Affairs – Public Affairs Office
- Interview with Dan Wendt, Assistant Public and Intergovernmental Affairs Specialist – Public Affairs Office
- Interview with Pat Thomas, Public Affairs Specialist – Graphic Artist – Public Affairs Office
- Interview with Dr. Lakhwinder Hundal – Supervising Environmental Soil Scientist – Monitoring and Research Department – Stickney WRP
- Interview with Gregg Bratton, Executive Director, ChicaGRO Intergenerational Growing Project (Community gardens South Side Chicago)
- Visited three composted biosolids community gardens in South Side Chicago
- MWRD website - <https://www.mwrd.org/irj/portal/anonymous/Home>
- Biosolids Program and EMS Performance Report – May 2, 2016
- MWRD Recovering Resources, Transforming Water Brochure – May 2016
- MWRD Online Incident Reporting System (public site for reporting odor complaints)
- Notification Mailing List – City Managers and Mayors
- Press Release – “MWRD is working with communities to replenish our green canopy.” April 15, 2016.
- Press Release – “MWRD soil enriches South Side community garden projects” May 19, 2016
- Biosolids – A Sustainable Soil Amendment and Fertilizer Pamphlet
- Multiple YouTube Community Garden uses for biosolids (2011 – 2015)
- Sustainability Summit – 2016 (April 13 – 14, 2016)
- Free Tree program – distribution of 100,000 oak trees potted in composted biosolids
- Rain barrel project – distribution of free rain barrels throughout the community

Element 7. Roles and Responsibilities

- EMS Manual Element 07 – Roles and Responsibilities, Version 8, 3/16/15

- Document 7.1 – EMS Coordinator Responsibilities, Version 4, 10/13/11
- Document 7.2 – Field Division EMS Responsibilities, Version 3, 10/13/11
- Interviews with:
 - David St. Pierre, Executive Director – Metropolitan Water Reclamation District of Greater Chicago
 - John Murray, Director Maintenance and Operations (M&O) Division
 - Dan Collins, Managing Civil Engineer - Biosolids Manager & Biosolids EMS Coordinator – LASMA
 - Ahmad Laban, Principal Engineer – LASMA
 - Sharon Sopcak-Phelan, Field Operations Officer – M & R Department, Industrial Waste Div. Field Services – Stickney WRP (Industrial Waste Division)
 - Brett Garelli, Deputy Director of Maintenance and Operations (M&O) – Plant Manager – Stickney WRP
 - Reed Dring, Engineer of Treatment Plant Operations 1 – Operations Manager – Stickney WRP
 - Tom Conway, Assistant Director Maintenance and Operations (M&O) Division – Calumet WRP
 - Brian Perkovich, Managing Engineer – Calumet WRP
 - Neil Dorigan, Managing Engineer – Calumet WRP\
 - Jim Cloonan, Assistant Chief Operating Engineer – Kirie WRP
 - Lakhwinder Hundal, Ph.D, Supervising Environmental Soil Scientist, M&R Department, Stickney WRP
 - Hitesh Shah, Plant Manager – Egan WRP
 - John Lazicki, Plant Manager – Hanover Park WRP
 - Greg Firrantello, Agronomy Manager – Steward Spreading
 - Ruth Joplin, Risk Manager, Risk Management Section, General Administration Division
 - Allison Fore, Officer Public and Intergovernmental Affairs – Public Affairs Office

Element 8. Training

- Element 08 – Training, Version 8, 3/16/15
- Document 08.1 – Types of Training, Version 3, 10/13/11
- Document 08.2 – Employees Required to Attend EMS Awareness Training, Version 7, 3/23/15
- Interviews with various personnel with biosolids value chain responsibilities (see list presented in the Audit Scope section of this report)
- Reviewed Sign-In Sheets for “EMS for Biosolids Awareness Training” at all WRPs and M&R for 2016.
- EMS Awareness on-line slide deck for training

Element 9. Communications

- EMS Manual Element 09 – EMS Communications, Version 10, 3/23/15

- Interview with Allison Fore, Officer Public and Intergovernmental Affairs – Public Affairs Office
- Interview with Dan Wendt, Assistant Public and Intergovernmental Affairs Specialist – Public Affairs Office
- Interview with Pat Thomas, Public Affairs Specialist – Graphic Artist – Public Affairs Office
- Interview with Dr. Lakhwinder Hundal – Supervising Environmental Soil Scientist – Monitoring and Research Department – Stickney WRP
- Interview with Gregg Bratton, Executive Director, ChicaGRO Intergenerational Growing Project (Community gardens South Side Chicago)
- Visited three composted biosolids community gardens in South Side Chicago
- MWRD website - <https://www.mwrld.org/irj/portal/anonymous/Home>
- Biosolids Program and EMS Performance Report – May 2, 2016
- MWRD Recovering Resources, Transforming Water Brochure – May 2016
- MWRD Online Incident Reporting System (public site for reporting odor complaints)
- Notification Mailing List – City Managers and Mayors
- Press Release – “MWRD is working with communities to replenish our green canopy.” April 15, 2016.
- Press Release – “MWRD soil enriches South Side community garden projects” May 19, 2016
- Biosolids – A Sustainable Soil Amendment and Fertilizer Pamphlet
- Multiple YouTube Community Garden uses for biosolids (2011 – 2015)
- Sustainability Summit – 2016 (April 13 – 14, 2016)
- Free Tree program – distribution of 100,000 oak trees potted in composted biosolids
- Rain barrel project – distribution of free rain barrels throughout the community

Element 10. Operational Control of Critical Control Points

- EMS Manual Element 10 – Operational Control of Critical Control Points, Version 6, 10/27/11
- Document 10.1 – Operational Control Guidance, Version 1, 10/13/11
- Spot checked various Standard Operating Procedures at different Wastewater Reclamation Plants
- Interviews with:
 - Dan Collins, Managing Civil Engineer - Biosolids Manager & Biosolids EMS Coordinator – LASMA
 - Ahmad Laban, Principal Engineer – LASMA
 - Steve Hall, Senior Civil Engineer - CALSMA
 - Brett Garelli, Deputy Director of Maintenance and Operations (M&O) – Plant Manager – Stickney WRP
 - Reed Dring, Engineer of Treatment Plant Operations 1 – Operations Manager – Stickney WRP
 - Henry Marks, Chief Operating Engineer – Stickney WRP

- Steve Carmody, Maintenance Manager – Stickney WRP
- Mark Kwan, Operating Engineer II – Stickney WRP
- Mike Doyle, Operating Engineer I – Stickney WRP
- Tom Conway, Assistant Director Maintenance and Operations (M&O) Division – Calumet WRP
- Brian Perkovich, Managing Engineer – Calumet WRP
- Neil Dorigan, Managing Engineer – Calumet WRP\
- Patrick Connolly, Principal Engineer – Calumet WRP
- Jim Cloonan, Assistant Chief Operating Engineer – Kirie WRP
- Jim Kaminski, Treatment Plant Operator III – Kirie WRP
- Katarzyna (Kathy) A. Lai, Principal Engineer, Operations Manager – Egan WRP
- Hitesh Shah, Plant Manager – Egan WRP
- Sanjay Patel, Egan WRP
- John Lazicki, Plant Manager – Hanover Park WRP
- Rob Pogorney, Engineering Technician V. Hanover Park WRP
- Dan Mikso, Chief Operator, Hanover Park WRP
- Al Eswani, Senior Civil Engineer, Hanover Park WRP

Element 12. BMP Documentation and Document Control

- EMS Manual Element 12 - Documentation, Document Control and Recordkeeping, Version 8, 3/16/15
- Document 12.1 - Types of Documents – Version 2, 10/13/11
- Interview with Dan Collins, Managing Civil Engineer - Biosolids Manager & Biosolids EMS Coordinator – LASMA
- Interview with Ahmad Laban, Principal Engineer – LASMA

Element 13. Monitoring and Measurement

- EMS Manual Element 13 – Monitoring and Measurement, Version 6, 3/16/15
- Reviewed quarterly reports on Goals and Objectives progress 2015 through first quarter 2016
- Reviewed Biosolids Program and EMS Performance Report for 2015 – May 2, 2016
- Monitoring and Research Department “Composted Demonstration Project Report - 2 October 2015
- Biological stability, nutrient concentration, odor evaluation and pathogen test of composted biosolids produced by co-composting with woodchips in 2015 – Dec 2015
- Interviews with the following:
 - See Element 10 for all staff interviewed

Element 14. Nonconformances: Preventive and Corrective Action

- EMS Manual Element 14 – Non-conformances: Preventive and Corrective Action, Version 9, 3/16/15
- Document 14.1 – Corrective Action Plan Guidance, Version 2, 10/13/11
- Reviewed Biosolids Program and EMS Performance Report for 2015 – May 2, 2016 (summary of nonconformances and corrective actions)
- Corrective Action Plans (CAPs) from interim audit and internal audit conducted 2015.
- Corrective Action tracking spreadsheet for 2015 Interim Audit Nonconformances

Element 15. Biosolids Management Program Report

- EMS Manual Element 15 – Biosolids Program Report, Version 7, 3/16/15
- Document 15.1 – Biosolids EMS Annual Report Guidance, Version 4, 10/13/11
- Reviewed Biosolids Program and EMS Performance Report for 2015 – May 2, 2016

Element 16. Internal BMP Audit

- EMS Manual Element 16 – Biosolids EMS Internal Audit, Version 6, 3/16/15
- Document 16.1 – Biosolids EMS Internal Audit Guidance, Version 5, 10/13/11
- Document 16.2 – Biosolids EMS Audit Schedule, Version 3, 4/19/12
- Internal audit first quarter 2016 (January 4, 2016 – March 4, 2016)
- Internal Audit Draft Report – March 10, 2016

Element 17. Management Review

- EMS Manual Element 17 – Management Review, Version 6, 3/16/15
- Document 17.1 – Management Review Guidance, Version 1, 10/13/11
- 2014 Biosolids
- Reviewed Biosolids Program and EMS Performance Report for 2015 – May 2, 2016
- Interview with David St. Pierre, Executive Director – Metropolitan Water Reclamation District of Greater Chicago
- Interview with John Murray, Director Maintenance and Operations (M&O) Division
- Interview with Dan Collins, Managing Civil Engineer - Biosolids Manager & Biosolids EMS Coordinator – LASMA
- Interview with Ahmad Laban, Principal Engineer – LASMA