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 – August 6, 2015

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 (MWRDGC) 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 MWRDGC BMP interim audit and review of corrective action notices are positive. All major nonconformances have been corrected. It is therefore the recommendation of the audit team that the MWRDGC biosolids BMS retain its Platinum Level Certification status.

AUDIT SCOPE

The NSF-International Strategic Registrations, Ltd. (NSF-ISR) conducted a third party interim audit of the MWRDGC BMP from May 18, 2015 through May 22, 2015. 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 LGMS relative to standard elements 1, 10, 12, and 13.

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 MWRDGC 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); John E. Egan Water Reclamation Plant; Hanover Park Water Reclamation Plant, Terrence J. O'Brien Water Reclamation Plant James C. Kirie Water Reclamation Plant, Maggie Daly Park – downtown Chicago, Mid Iron Golf Club, Lemont, Cook County, IL; Gleneagles Country Club – Lemont, Cook County, IL; and Stewart Spreading – W.L. Donahue 8, Will County, Illinois – farm land application site.

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
Manju Prakash Sharma – Director Maintenance and Operations (M&O) Division
Anthony Quintanilla – Assistant Director Maintenance and Operations (M&O) General Division
Dan Collins – Managing Civil Engineer - Biosolids Manager & Biosolids EMS Coordinator – LASMA
Ahmad Laban – Principal Engineer – LASMA
Rich Kuzminski – Associate Civil Engineer - LASMA
Raphael Frost – Senior Civil Engineer - CALSMA
Gahana Patel – Associate 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
Joe Costello, Operating Engineer, (Control Room) – Stickney WRP
Tom Conway – Assistant Director Maintenance and Operations (M&O) Division – Calumet WRP

Neil Dorigan – Managing Engineer – Calumet WRP Pat Connolly – Principal Engineer – Calumet WRP
Pat Connolly – Principal Engineer – Calumet WRP
John Kargbo – TPO III – Calumet WRP
Sherry Kamenjarin – TPO III – Calumet WRP
Al Nicols – Chief Operating Engineer – Calumet WRP
Charles Jones – Operations Engineer – Calumet WRP
Shane Edwards – Landscaping Manager – Twin Oaks Landscaping – Maggie Daly Park
Aruch Poonsapaya – Principal Engineer – Terrence J. O'Brien WRP
Sandra Matual – Operations Manager – Terrence J. O'Brien WRP
Yipling Zhou – Managing Engineer – Kirie WRP
John Smoody – Operations Manager (by phone) – Kirie WRP
Jim Cloonan – Assistant Chief Operating Engineer – Kirie WRP
Sean Kelly, TPO II (Control Room) – Kirie WRP
Lakhwinder Hundal, Ph.D – Supervising Environmental Soil Scientist, M&R Department, Stickney WRP
Katarzyna (Kathy) A. Lai – Principal Engineer, Operations Manager – John E. Egan WRP
Hitesh Shah, Plant Manager – Egan WRP
Kent Anderson, Assistant Chief Operating Engineer – Egan WRP
Mark D'Ambrosia, Construction Technician – Egan WRP
Sanjay Goel, Resident Engineer for construction – Egan WRP
John Lazicki, Plant Manager – Hanover Park WRP
Dan Mikso – Chief Operator – Hanover Park WRP
Greg Firrantello – Agronomy Manager – Steward Spreading
Ed Thompson – Operations Manager Spreading Crew – Stewart Spreading
Chris Mhachrzak Field Coordinator – Stewart Spreading
Allison Fore - Public and Intergovernmental Affairs Officer
Dan Wendt – Assistant Public and Intergovernmental Affairs Specialist
Justin Brown – Public Affairs Specialist – Graphic Artist
Jeff Hutton – Illinois EPA – Environmental Protection Specialist III – Land Application Permits Section

INTERIM AUDIT FINDINGS

The interim audit included document review, which included review of the latest versions of the MWRDGC 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 6 positive observations, 3 major non-conformances, 2 minor non-conformances and 10 opportunities for improvement. Attachment 1 summarizes the documents and other objective evidence associated with each element that was considered during the interim audit.

The NBP Third Party Verification Auditor Guidance indicates that when an audit identifies a major nonconformance the organization must resolve the nonconformance and have the auditor verify that the nonconformance has been corrected before recommendation for continued certification can be made. The NBP recommends that the organization correct any major nonconformance within 90 days (although a shorter time is preferable).

The NBP Third Party Verification Auditor Guidance also indicates that when the auditor has identified 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. Corrective action plans were prepared and submitted to the lead auditor and the approach and time frame for implementation were approved. Field verification of the closure of all minor findings will be finalized during the next scheduled third party interim audit.

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

Commendation

The hard work 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 has guaranteed the continued success of the program.

Positive Observations

- The Executive Director, David St. Pierre led the campaign in Illinois to introduce legislative change which opens the door for extensive beneficial use of biosolids throughout the state. This effort resulted in an overwhelming passage of the proposed regulatory changes by the House and Senate and awaits the Governor's signature. Mr. St. Pierre's leadership was solidly supported by the MWRDGC staff including the Law Department, M&O, M&R and Public Relations, all working together to support this much needed amendment.

- Chicago has made significant progress in increasing the available alternative biosolids processes that advance resource recovery simultaneously with

improving product quality and customer acceptance. The Intergovernmental Agreement with the City of Chicago allows for reclaiming woodchips for use in biosolids composting, which ultimately results in significantly reduced odors and a natural appearance of the final product.

- Based on the accomplishments of the biosolids management program goals and objectives additional financial support is being provided for windrow turners and a screener to accelerate high quality biosolids production and facilitate mass production of biosolids compost.

- Chicago has taken a high profile approach to its use of compost and biosolids. This is exemplified by the use of its products at the newly constructed downtown centerpiece Maggie Daley Park. Thousands of tons of biosolids materials were used during the creation of this park in both the recreation and plant areas. Additionally in 2015, the District expanded its use of Class A biosolids on Golf Courses such as Gleneagles and the MidIron Club.

- Public Relations established a benchmark program in communications and public participation in the biosolids and other District programs. This approach should be used by other agencies as the model for a proactive program.

- Stewart Spreading, a contractor, developed an innovative process for preventing biosolids from sticking to the truck beds used for hauling. They designed and manufactured a spray device similar to a power washer, which sprays biodegradable glycerin (soap) onto the truck bed to ensure complete clearing of biosolids from trucks when unloading at land application sites. They also constructed an elevated application station at the truck-loading site so that the drivers can easily apply the glycerin before each load.

Major Nonconformances

Requirement 14 and Requirement 5.3 – Corrective Action Plans must be developed and implemented, and Program goals must be developed using measureable criterion. During the interim audit performed in June 2014 a minor nonconformance was identified associated with the requirements for goals and objectives at Calumet being developed without fully defining their measurability. (Note that the measurability criteria presented in the original minor nonconformance was identified by personnel at Calumet Facility and given to the auditor as representative of what should be measured as performance criteria, aside from the thickening goal of 5.0 percent solids.) The following is a summary of the original information contained in the 2014 minor nonconformance:

Requirement 5.3 – Program goals must be developed using measureable criterion.

a) *The first goal is to create a more efficient solids handling system. The identified measurable objective was to increase the pre-digestion thickening from 0.7 percent to 5.0%. The environmental performance benefits identified include*

improving anaerobic digester performance and reducing operation and maintenance costs. However, neither of these benefits was quantified. The measureable performance improvements of the digester considered but not included in the objectives was to increase the volatile solids reduction to an average of 37% and thereby increase the amount of digester gas available for energy use. The additional gas produced (measurable in cubic feet or therms) was not quantified as part of the objective. Additionally the cost savings associated with increased use of digester gas was not quantified. An additional operational cost savings (dollars) would be attributable to reducing the heating requirement for the digesters (measurable in therms) due to a smaller quantity of WAS required to be heated. The estimated therm (and potential cost) savings was suggested to be approximately 10% but was not measured or identified as a measureable environmental performance objective. An additional measureable benefit was the increase in digester capacity (gallons) to handle a greater quantity of digestible solids and therefore increase the potential for the digesters to produce more useable methane gas as an energy source (quantifiable but not estimated). This goal and objective supported the MWRDGC Executive Director's EMS goal of becoming energy neutral.

b) *The second goal was 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 could be identified as millions of cubic feet and/or therms, and operation and maintenance costs could be measured in dollars. A new objective within this goal was the production of pipeline quality gas using digester gas as the feedstock. The improvement in environmental performance with this goal and objective was not specifically established, i.e. defining the amount of gas to be produced in millions of cubic feet or therms. Also for the initial stage or phase of implementation the cost and revenue projected to be generated was not estimated as a measureable objective. Additional environmental benefits to be quantified (estimated) include greenhouse gas impacts avoided. This goal and objective supports the MWRDGC Executive Director's EMS goal of becoming energy neutral.*

In the August 5, 2014 management approved corrective action plan to be implemented to correct this nonconformance it stated "Re-establish 2015 Goals and Objectives identifying measurable criterion as stated in the Interim Audit report for each plant and/or division."

None of the above mentioned measurable criteria were identified in the corrected 2015 Goals and Objectives for the Calumet Plant. (Note: a new goal and objective was established for Calumet in 2015 "To stabilize sludge temperatures and reduce operations and maintenance costs of the current sludge heating system." No measurable criteria were identified for this goal and objective.)

Requirement 14 and Requirement 5.3 – Corrective Action Plans must be developed and implemented, and Program goals must be developed using measureable criterion. During the interim audit performed in June 2014 a minor nonconformance was identified for Monitoring and Research associated with the requirements for goals and objectives being developed without fully defining measurability. (Note that the measurability criteria presented in the original minor nonconformance were identified by personnel in Monitoring and Research and given to the auditor as representative of what should be measured as performance criteria, aside from the production goal of 1000 dry tons.) The following is a summary of the original information contained in the 2014 minor nonconformance:

Requirement 5.3 – Program goals must be developed using measureable criterion. The Monitoring and Research Goal is to increase compost production by 1000 dry tons each year beginning in 2014. The objective is to produce a biologically stable and odor free compost having a consistent nutrient content. The latter environmental performance benefits can be specifically quantified with measurable criteria identified in the objective. It was suggested that 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 consistency of nutrient content of compost was not identified in the objective; however, it was observed to be N = 1.5% to 2.0%; P = 1.5% to 2.0% and K = 0.05% to 0.10%. This goal and objective supports the MWRDGC Executive Director's EMS goal of using 100% of the biosolids in Cook County and odor mitigation throughout the district.

In the August 5, 2014 management approved corrective action plan to be implemented to correct this nonconformance it stated "Re-establish 2015 Goals and Objectives identifying measurable criterion as stated in the Interim Audit report for each plant and/or division."

Although the action plan indicated samples of the final product would be tested for volatile solids, nutrient content, and odor degree; none of the above mentioned measurable criteria were identified with the specific numerically desired levels, i.e. biologically stable criteria (38% reduction in volatile solids and pathogen reduction to below 1000 fecal coliform); ED50 less than 5; and consistent nutrient content as identified above.

(Note: While some – not all – of these measurable criteria were monitored in the field, most were not reported in quarterly progress reports of measurable performance. That said; the progress reports were otherwise well written and very useful.)

Requirement 14 and Requirement 5.3 – Corrective Action Plans must be developed and implemented, and Program goals must be developed using measureable criterion. During the interim audit performed in June 2014 a minor nonconformance was identified associated with the requirements for goals and objectives at Hanover being developed without fully defining their measurability. (Note that most of the measurability criteria presented in the original minor nonconformance were identified by personnel at Hanover

and given to the auditor as representative of what should be measured as performance criteria.) The following is a summary of the original information contained in the 2014 minor nonconformance:

Requirement 5.3 – Program goals must be developed using measureable criterion. Hanover Park has established two goals with objectives that have not completely identified measurable performance criteria.

a) *The first goal is distribution of supernatant to accessible farms with the objective of being able to distribute lagoon supernatant to all seven available farm fields. The result of this is to have improved crop growth and reduce high nitrogen and coliform presence in well samples. There is no quantitative measure presented as an objective for improved crop growth, such as bushels per acre increase or total bushels produced during the season, and there are no numerical objectives established for the reduction of nitrogen concentration (mg/l) or number of fecal coliforms (MPN or plate count) in the wells.*

b) *The second goal is to improve digester facilities with the objective of improving digester gas generation and use and reducing the amount of digester gas wasted. The potential measureable targets that have <u>not</u> been specifically quantified in the goals and objectives include: quantity of digester gas produced (cubic feet or terms), quantity of natural gas purchased during digester gas shortfalls; quantities of gas used for heating buildings, and quantity of gas used for heating digesters. No quantities have been identified for this objective; such as increase in digester gas used (cubic feet or therms) or dollars save by not using natural gas. Environmental benefits may also be quantified in terms of greenhouse gas effects (methane loss reduction and CO2 generated when flaring that has no energy use benefit.) This goal and objective supports the MWRDGC Executive Director's EMS goal of becoming energy neutral, and odor mitigation throughout the district.*

In the August 5, 2014 management approved corrective action plan to be implemented to correct this nonconformance it stated "Re-establish 2015 Goals and Objectives identifying measurable criterion as stated in the Interim Audit report for each plant and/or division."

In the "tracking progress" section of the revised first goal it indicated that nitrogen and fecal coliform counts will be monitored and historically tracked, however there is no mention of how better crop production will be measured. Also no results of sampling and analysis was found in quarterly progress reports to demonstrate that historic background levels of nitrogen and coliforms had been measured and established while awaiting implementation of the next phase of this project.

Although in the corrected 2015 Goals and Objectives for the Hanover Plant in the tracking progress section it mentions that digester gas produced/used/flared and natural gas used will be tracked, none of these measureable criteria were found to have been

reported. There were no estimates of the potential benefits associated with positive impacts on greenhouse gas effects and no identification of the financial benefits (measured in dollars) of these goals and objectives. None of the quarterly progress reports identified current quantities of natural gas purchased for various purposes, quantity of digester gas generated, quantity of digester gas flared, quantity of digester gas used to heat the plant buildings and operations, etc.

Minor Nonconformance

Requirement 14.1 – The standard requires the development and implementation of a procedure to investigate any nonconformance with internal Biosolids Management Program procedures. Procedure number 02.1 - MWRDGC Biosolids Policy commits the District to following the principles of conduct set forth in the Code of Good Practice, which includes seeking continual improvement in all aspects of biosolids management. There are numerous opportunities for improving aspects of biosolids management associated with operational controls, monitoring and measurement, environmental performance, advancing quality biosolids management practices, improving reliability of regulatory compliance, and relations with interested parties. Corrective action plans associated with continual improvement of biosolids management have not been completed except in conjunction with audit findings. (Note: Weekly evaluations of progress on the most important on-going projects at each of the plants are conducted by the Director of Operations and Maintenance. All of the projects that relate to some aspect of the biosolids value chain could be considered corrective and/or preventive actions and represent continual improvement.)

Requirement 14.4 - the standard requires the development of corrective action plans to address nonconformances identified during routine monitoring and measurement. During the field audit, 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. There is presently no corrective action plan to address this issue.

Opportunities for Improvement

Requirement 2.1 – 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 delays in contract processing have caused inefficiencies in biosolids management. Consider establishing a "Problem Solving Team" to improve the contracting process.

Requirement 2.1 – requires the establishment of a Biosolids Management Policy that commits the organization to following the principles set forth in the "Code of Good Practice." Two of the principles of conduct of the Code are "Sustainable Management

Practices and Operations" and "Continual Improvement." The force main that delivers the solids from O'Brian to Stickney is beyond its useful life, especially the first one-third ductile iron section. There have been a number of failures in the 1990's and again in 2008, and one more recently. The operating pressure and percent solids that can be pumped have been downgraded in recent years to minimize failures. A replacement of the upper third of the line was designed and estimated to cost $10,000,000. The project has been placed on hold. When the line breaks, solids are diverted to the TARP until the break can be repaired. This can create odor problems near the TARP. Every time there is a break, it becomes a negative public relations issue. Consider establishing a goal and objective or a corrective action plan to address this situation (e.g. replacing the first third of the line).

Element 5 – After all of the existing goals and objectives at Stickney are accomplished, consider establishing a future goal and objective to improve the percent volatile solids destruction in the digesters. This will maximize the production of gas (with the potential of recovery for use) and minimize the amount of solids (quantifiable) that need to be processed (quantifiably reducing costs).

Element 5 – Consider establishing goals and objectives for increasing customer direct pickup of biosolids product at the LASMA and CALSMA facilities. Measurable goals discussed include total tons of product picked up during a specified period (month, quarter or year) and the cost savings (dollars). The primary outcome impacted by accomplishing this goal is "relations with interested parties" because of its potential impact on cost of operations and user charges.

Element 5 – The District's Biosolids Management Policy commits the organization to following the principles set forth in the "Code of Good Practice." Two of the principles of conduct of the Code are "Preventive Maintenance" for equipment and "Continual Improvement. Consider establishing goals and objectives for maintenance activities. It has been suggested that measurable goals may be established for percentages of direct labor hours spent on work orders, and time goals for completing various steps in work order processing through completion; although other measurable parameters may be more appropriate for the District.

Element 5 – Consider modifying the goals and objectives template to specifically include a major heading entitled "Measurability" to be used to evaluate performance. Also consider modifying the template's major heading entitled "Tracking Progress" to "Proposed Schedule of Activities (or steps)"

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

Requirement 9.1 – Consider developing an SDS (formerly known as an MSDS) for each of the District's biosolids products. (See Louisville Green Biosolids MSDS as an example.)

Element 10 – The Stickney plant is now transitioning to a substantially more complex operation with all new operations being interrelated. These interrelationships must be studied and optimized. Currently, the managers are required to perform this function along with many other duties. Consider having one or two process engineers on staff, whose sole responsibility would be to optimize treatment along with monitoring and controlling processes.

Requirement 10.1 – The standard requires standard operating procedures to be developed and implemented at all critical control points to effectively manage potential environmental impacts. At the Stickney plant the percent solids feed to the digesters needs improvement. The gravity thickeners are currently in startup, not functioning well and need to be optimized. Based on the audit team member's extensive experience in solids thickening and discussion with Stickney plant managers, consider shutting off some tanks, reducing the percent solids feed from the primaries (from 4% to about 1%), and (counterintuitively) adding dilution water to allow the thickeners to perform the function for which they were designed. The dilution water will allow the on-line thickeners to be optimized for both hydraulic and solids loadings.

For the major non-conformances, District personnel prepared Corrective Action Notices (CANs) and Corrective Action Work Plants, and implemented the corrective actions prior to the recommendation for continued certification at the Platinum level. For the minor non-conformances, District personnel prepared Corrective Action Notices (CANs) and Corrective Action Work Plans, 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 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.

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 and the facilities corrective and preventive action programs.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO COMMENT

The District's Environmental Management System continues to improve over time. The Third Party Audits provide an insight into new growth of the program. As a result of the 2014 and the current audit field representatives have taken more of an ownership role. The internal audit is completed during the first quarter of each year by the EMS Coordinator and the team of field representatives from each Plant. Goals which have been set by the Executive Director have brought various divisions together to combine efforts in achieving the set goals. In addition, opportunities for improvement and daily non-conformances in operations have become more formal, as EMS field representatives will receive a memo or email notification related to each. The Disrtict's Biosolids program is

strong due to the dedication of all members of the team working together. The District strives for excellence in all areas and the EMS employed by the District supports that effort.

OUTCOMES MATTER

The MWRDGC 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 MWRDGC 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 MWRDGC 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). There were three major non-conformances related to the lack of 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 have been tracked quarterly through 2014.

In his management role the Executive Director initially established three top goals for 2013/14, namely 1) becoming energy neutral, 2) beneficially using 100% of MWRGDC 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 biosolids compost program.

Individual goals and objectives were established for each of the water reclamation plants as well as the General Division, Monitoring and Research and Public Affairs. Many of these goals and objectives were developed in support of the Executive Directors goals. The District's performance relative to the above outcome areas are addressed below and identified immediately after the discussion of each goal.

Stickney Water Reclamation Plant (WRP) Goal 1 - Improve Solids Concentration to Digesters:

This goal is to improve the solids concentration to the digesters. This is an extension of a long-term project, which began in 2009 and was carried forward to 2010 and 2011 and expanded at that time 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.

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

Outcome Areas: Environmental Performance and Quality Biosolids Management Practices.

Stickney Water Reclamation Plant (WRP) Goal 2 - Improve West Side Solids feed to Digesters:

The original goal, which predates 2008, was to convert the Imhoff tanks (Battery A) to circular primary tanks and replace grit facilities at the Stickney WRP. The demolition contract for the Imhoff tanks was awarded August 12, 2010 and has been completed. Other intermediate objectives associated with screens and grit removal have also been implemented. The final objective is to install new primary settling tanks. This will increase the concentration of volatile solids to 60% fed to the digesters. The increase in volatile solids delivered to the digester will increase the quantity of methane gas produced and available as an energy source.

This objective was included in a contract scope for "Westside Imhoff Battery A and Skimming Tank Demolition, Stickney WRP". The bid opening for the design and build contract for construction of the primaries was on October 7, 2014, with a contract duration of 1200 days. Construction completion is anticipate to be in fall 2016.

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

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

Stickney Water Reclamation Plant (WRP) Goal 3 – Minimize Polymer and Electrical Use at Post-Centrifuge Building:

This goal had one objective, i.e. to increase low solids pumping to Lawndale Avenue Solids Management Area (LASMA) from approximately 30,000 dry tons in 2012 to 55,000 dry tons in 2013. 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. The Stickney WRP produced 47,900 dry tons, slightly less than projected due to a number of factors, which included the long term solids production reduction related to dry conditions in the region and a shift in operational priorities. 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 MWRDGC.

For 2014 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. Review of the six months of data from October 2014 through March 2015 showed a monthly savings range of between $36,715 to $308,252, with a total savings for half the year at approximately $1.1 million. No costs were immediately available to compare the additional costs of solids handling at LASMA.

Outcome Areas: Environmental Performance and Quality Biosolids Management Practices.

Calumet Water Reclamation Plant (WRP) Goal 1 – Create a more efficient solids handling system:

This is a long-term project that has been carried forward since 2010. It was originally a project entitled Engineering Project #96-251-2P, Sludge Thickening Facilities at Calumet WRP and consisted of installation of new solids thickening facilities including four gravity belt thickeners (GBTs) and possibly two more in the future. The project was planned to improve the anaerobic digester performance and reduce operations and maintenance costs of solids handling. The objective was to increase the pre-digestion thickening from 0.7 percent to 5.0%. Construction and testing of the GBTs was completed in December of 2012, thus finishing this phase of the goal. The facility

suspended operations during 2013 but was restarted during July 2013. Tracking of the WAS thickness continued since that time and resulted in production of solids in excess of 5.0% until May 2014 when it was shut down. The operation was put back into operation the first quarter of 2015 and then shut down again after producing a solids concentration of about 3.6%.

While the GBT was initially found to be able to produce greater than 5.0 % solids, the true measureable environmental performance benefit was not identified or quantified. The performance improvements of the digester considered to be attainable was to increase the volatile solids reduction to an average of 37% and thereby increase the amount of digester gas available energy for use. Additionally the cost savings associated with increased use of digester gas is reported to be attributable to reducing the heating requirement for the digesters due to a smaller quantity of WAS required to be heated. An additional benefit was the increase in digester capacity to handle a greater quantity of digestible solids and therefore increase the potential for the digesters to produce more useable methane gas as an energy source.

It was verbally discussed that the cost of polymer forced the operation of the GBTs to cease operation. No quarterly reports were found presenting the above discussed performance improvements and cost savings. And no short summary of the cost analysis used to justify ceasing operation was found in the reports.

Outcome Areas: Environmental Performance and Quality Biosolids Management Practices.

Calumet Water Reclamation Plant (WRP) Goal 2 – 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 2015 to create a baseline. However, no quarterly reports were found that identified these baselines or existing levels. A new potential objective within this goal was the production of pipeline quality gas using digester gas as the feedstock. Since this is a relatively new and evolving goal tracking the comparison of actual measurable environmental performance improvements resulting after implementation with the estimated measurements of selected options of progress.

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. Also for the initial stage or phase of implementation the cost and revenue projected to be generated was not estimated as a measureable objective.

Additional environmental benefits to be quantified (estimated) include greenhouse gas impacts avoided.

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

Outcome Areas: Environmental Performance and Quality Biosolids Management Practices.

Calumet Water Reclamation Plant (WRP) Goal 3 – Stabilize Sludge Temperatures and Reduce Operations and Maintenance Costs of Sludge Heating System:

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. 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.

Outcome Areas: Environmental Performance and Quality Biosolids Management Practices.

Hanover Park Water Reclamation Plant (WRP) Goal 1 – Distribution of Supernatant to Accessible Farms:

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. Presently the supernatant is 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. Replacement of damaged equipment will allow a more even distribution among all seven fields and improve environmental performance. 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. The environmental performance improvement is associated with an improved crop production and reduction in high nitrogen and coliform presence in well samples. There was no quantitative measure presented as an objective for improved crop growth, such as bushels per acre increase or total bushels produced during the season, and there are no numerical objectives established for the presence of or reduction of nitrogen concentration (mg/l) or number of fecal coliforms (MPN or plate count) in the wells.

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

Hanover Park Water Reclamation Plant (WRP) Goal 2 – Digester Facility Improvements:

The second goal for Hanover Park WRP was originally established in 2009. It has since been expanded by combining it with another past objective and carried 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. Improving the digester gas piping system will also reduce methane alarms and methane venting events, thus reducing the potential for odor complaints. The measurements originally identified to be tracked were only generally addressed as digester gas and natural gas.

The potential measureable targets that were not specifically quantified in the goals and objectives include: quantity of digester gas produced (cubic feet or terms), quantity of natural gas purchased during digester gas shortfalls; quantities of gas used for heating buildings, and quantity of gas used for heating digesters. No quantities have been identified for this objective; such as increase in digester gas used (cubic feet or therms) or dollars save by not using natural gas. Environmental benefits may also be quantified in terms of greenhouse gas effects (methane loss reduction and CO2 generated when flaring that has no energy use benefit.) Although in the corrected 2015 Goals and Objectives for the Hanover Plant mentions that digester gas produced/used/flared and natural gas used will be tracked, none of the quarterly progress reports identified current quantities of natural gas purchased for various purposes, quantity of digester gas generated, quantity of digester gas flared, quantity of digester gas used to heat the plant buildings and operations, etc. This goal and objective supports the MWRDGC Executive Director's EMS goal of becoming energy neutral, and odor mitigation throughout the district.

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

Hanover Park Water Reclamation Plant (WRP) Goal 3 – To eliminate odor complaints at Fischer Farm:

The third goal for Hanover Park WRP is to eliminate odor complaints by injecting biosolids in the fall as opposed to the spring. The biosolids were injected during the 3rd and 4th quarter of 2012. And there were no odor complaints; however, it was not possible to inject in the fall of 2013 due to a late harvest of the corn crop and a winter freeze. Removal of this activity as a goal and objective was made because injecting solids in the fall was a one time operational change.

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

John E. Egan Water Reclamation Plant (WRP) Goal 1 – Maximize Solids Utilization at the Egan WRP:

This goal was originally established in 2006 and the objective was to maximize the amount of digested biosolids processed through the centrifuges thereby minimizing the amount of biosolids that would have to be pumped to the Terrence O'Brien Water Reclamation Plant (WRP) – formerly known as the North Side Water Reclamation Plant (WRP). The end result is that the biosolids produced in the centrifuge cake would be utilized for land application instead of double processing the biosolids through downstream water reclamation plants. The plant established as its goal to pump no more than 15% of total solids processed to the O'Brien WRP. This goal was accomplished by improved preventive maintenance on the centrifuges to keep them operational at all times and increasing the digester capacity for storage to function as a backup should the centrifuges suffer outages.

Although it has been a few years since the plant has had to pump over 15% of its total solids to the O'Brien WRP, Egan exceeded expectations by pumping no biosolids to the former facility in 2007 and 2008. All of the 8,672 dry tons of digested solids were centrifuged, resulting in 8,166 dry tons of biosolids cake that was either directly land applied or stored for later land application. In addition, 9.99 dry tons was picked up by Interstate Brands to aid in operation of their biological treatment. The Egan plant established this goal again for 2009, and had a successful year, having pumped only 454 dry tons of solids to the NSWRP and provided 2.6 tons to Interstate Brands to aid in their operations. This goal has been completely successful over the past several years. Due to this and expected mandatory operational changes this goal was determined to have been a success and was not needed to be continued. This objective was dropped in 2010, but inadvertently added again as an objective in 2011, 2012 and 2013. Egan continued to pump 0 dry tons of sludge to the O'Brien WRP in 2012 and 2013. All of the 7,228 dry tons of digested solids in 2011 and 6,133 dry tons of digested solids in 2012 were centrifuged. This resulted in 6,841; 5,822, and 6,539 dry tons of biosolids cake in 2011, 2012 and 2013 respectively, that was either hauled to HASMA or directly land applied.

Consideration of dropping the goal may have been premature since Egan did not continue its track record and did not achieve this goal. In 2014 Egan pumped a portion of its solids to O'Brien in January and September and then all of the digested solids processed during the fourth quarter. In 2014 Egan hauled 3,526 dry tons of centrifuge cake and pumped 1,893 dry tons to O'Brien representing 35%. This was a result of the dewatering building shut down. The pumping is still ongoing with 1,631 dry tons pumped during the first quarter of 2015.

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

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

This objective was originally established in 2012. It was to improve the dewatering facility. Under Engineering Contract 06-494-3P, the existing conveyor system with a proven track record of high maintenance costs and poor reliability will be replaced with a new conveyance system. Additional biosolids storage capacity will be provided by replacing two existing hoppers with four silos. The goal is to improve dewatering facilities with the objective of reducing the duration of centrifuge outages, increasing uninterrupted periods of centrifuge operation, lowering maintenance costs, reducing cleanup costs, and reducing odors. In 2014 construction of the dewatering truck garage began and demolition of the North hopper and the first new silo was completed in the spring of 2014. By September the majority of the construction work was completed; including installation of the new siloes, reversible screw conveyor pumps, and associated equipment and piping. The contactor was given a 75-day deawatering shutdown in September 2014 to complete all the remaining work. However, during the shutdown the contractor identified missing electrical and control wiring work. A change order is expected to take 10-12 weeks beginning in March, with the testing of new equipment scheduled for June 2015. On completion a new measure to track equipment downtime will be implemented.

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

Kirie Water Reclamation Plant (WRP) Goal 1 – Upgrade Instrumentation for Flow Measurement of Waste Activated Solids Transmission to the Egan WRP

This goal and objective was created mid-year 2013 as a 2014 goal. It is not completely clear what the basis for measureable benefit was, however it is anticipated that improved accuracy may result along with redundancy in flow measurement. Nevertheless 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 interuptions will be lowered by 70%. Progress has been made and completion of the operation is anticipated in June 2015.

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. It is not completely clear what the basis for the measureable benefit was, however it is projected that there will be a reduction in corrosion that will extend the life expectancy of the pipeline and reduce the loss of solids dewatering production at the Egan WRP due to pipeline failure. Progress has been made on specifications and forwarded to M&O Contracts Section.

General Division Goal 1 – Optimize Efficient Drying Operations (Removed):

This goal was established in 2009 and spanned a five-year period. It involved optimizing the most efficient method of drying biosolids. The specific objective was to minimize heavy equipment time in drying operations, and improving the overall performance in drying biosolids. New equipment was researched and contracted for purchase in 2009. Also, new methods of biosolids processing at the drying sites were investigated. Equipment used to dry biosolids include paddle aerators and tractor-tillers. Evaluation of spreading biosolids at various depths was conducted using aerator/tiller combinations in order to achieve greatest operational efficiencies at varying depths. The optimization of performance was originally scheduled to require three years of data collection but was extended to cover five years. The efficiency was determined by tracking the usage of various combinations of drying equipment and compared the overall operational hours spent in order to achieve 60% total solids. This project provided measurable benefits, and was replaced with new goals since LASMA operations underwent unforeseen changes due to the increase in low solids added to the lagoons and the decrease in centrifuge cake production.

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

General Division Goal 2 – Beneficial Reuse of Solids Production at Lawndale Avenue Solids Management Area (LASMA):

The following description is an historical account of this long term goal along with how it has evolved. This goal was established in 2009 and carried forward through 2014. It was originally established to maximize the utilization of solids production at the Lawndale Avenue Solids Management Area (LASMA) and based on the intent of reducing odors and improving public perception of the final product. Biosolids are aged in lagoons at LASMA for a minimum of 18 months to produce Class A product, so the timing of product availability can be accurately predicted. In order to meet the process to further reduce pathogens (PFRP) the site specific regulatory requirements for Chicago allows air-drying the biosolids from April through November of each year. The air-drying is conducted until 60 percent total solids content is achieved. Agitation drying is conducted such that complete turning, aeration, and agitation of solids are accomplished at an average of three times a week. Typical drying periods are six to eight weeks

depending on initial percent total solids and various weather conditions. Any biosolids that are produced without an outlet (receiving site) are stockpiled. This stockpiling of biosolids increases the likelihood of odor generation. Therefore it is highly advantageous to schedule drying operations to coincide with outlet availability thereby eliminating stockpiling and reducing the probability of creating odors.

The primary objective is to synchronize the drying operations with availability of outlets. This orchestration enhances the environmental performance of the biosolids stabilization and beneficial use through reducing the generation of odors and meeting customer expectations. In 2009 the objective of this goal was to beneficially utilize 100% of the estimated 101,000 dry tons of biosolids produced. During that year 98,439 dry tons (97%) of biosolids were utilized through land application and the controlled solids distribution programs and 3,462 dry tons were shipped as unsuitable material to landfill. Unsuitable material was primarily inorganics collected from digester cleaning projects. The same goal was carried over into 2010, but the target was shifted to utilize 98,711 dry tons of biosolids produced at LASMA. The final result was that 98,711 dry tons (100%) were beneficially reused through land application; controlled solids distribution and daily/final cover landfill programs. The same objective was established for 2011 with the intent of utilizing 90,000 dry tons of biosolids. The specific objective of this goal continued to be to utilize 100% of the estimated 75,000 dry tons of biosolids. In 2012, 118,639 dry tons of biosolids were utilized, while in 2013, 45,699 dry tons were used. The quantities produced were substantially below normal because of unusually high rainfall and long periods of wet conditions. The solids were beneficially reused through land application, controlled solids distribution and final cover landfill programs; although the latter landfill cover will no longer be considered part of the goal.

Going forward, because of the variability of the quantity of solids produced at LASMA, measurement of the objective in dry tons is not appropriate, making percent utilization more relevant. The measureable objective is therefore to use a specific percent of LASMA product for community application in Cook County, and another specific percent for farmland application, and zero percent for use in landfill. The projected increase in percent used for community application each year will demonstrate continual improvement. This objective is conducted in concert with the M&R objective for producing compost product and the promotion of beneficial use in Cook County by the Public Affairs office. The goal for 2014 was attained by beneficially using 100% of biosolids produced – 15% of it being Controlled Solids Distribution in and around Cook County and 85% being through farmland application. No use for landfill was reported.

Because of a major breakthrough in Illinois State regulations the majority of biosolids produced will now be permitted to be applied as Class A biosolids. This coupled with the purchase of large scale pile turners that can be used to aid drying and/or composting will result in major changes in goals and objectives for 2015.

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

General Division Goal 3 – Beneficial Reuse of Solids Production at Calumet Solids Management Area (CALSMA):

Similar to the discussion of LASMA, the following is a summary of the history of goals and objectives for CALSMA. CALSMA goals have been through several years of evolution beginning in 2009 when it was the target to beneficially use 100% of the 32,400 dry tons of solid produced. The objective in 2013 was to beneficially use 100% of the estimated 20,000 dry tons of biosolids and 19,041 were used. The goal established at CALSMA has been to beneficially use solids production, which has generally been quantified in dry tons. But going forward, this objective was restated as production of 100% "aged" product annually beginning in 2015. This objective excludes material that is diverted for further processing, such as composting. The measurable environmental performance benefit associated with aged product is a high level of product stability and relatively low odor generation resulting in a more publicly acceptable and marketable product. Review of the historic measurements associated with "aged" material verses non-aged material shows that the stability as measured by average volatile solids concentration of aged material is 47.8 %, with a narrow variability range of 45.0% to 51.8%; while non-aged material has an average volatile solids concentration of 49.7% and a broad variability range of 41.4% to 55.7%. The CALSMA goals and objectives have now been combined with LASMA in terms of Controlled Solids Distribution Program and the District Utilization Program. Excellent monthly progress records are maintained for all solids produced. As with LASMA significant changes will be made to biosolids goals and objectives due to new Illinois regulations and purchase of biosolids turning equipment.

Outcome Areas: Environmental Performance, 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 newly established in 2011 and continues through 2014. This objective involves providing GIS mapping for all beneficial reuse, 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 will provide easy access to all historic records for any land application site, controlled distribution points, and landfill applications. The farmland application data to be entered includes mapping showing the property and application areas and application data, such as delivery dates, biosolids quantities, application areas, and metal loading history. Eventually this data will facilitate 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 Constrolled 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).

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

General Division Goal 5 – Increase Use of Biosolids within Cook County and the 125 Community Service Areas of the District:

This goal is primarily to address 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 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. 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.

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

Public Affairs Goal – Identify Potential Customers:

This is a new goal established in 2013 and carried forward into 2014. It is fully complementary of the General Division's goal 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. The objective was modified slightly in 2014 to reflect the measurability in terms of outreach activities. The Public Affairs Office is accomplishing this goal by using all of the public relations and educational tools available to the office. The objective will be to develop a better understanding of user experiences and communicate success stories related to biosolids use activities. Coordination with M&R in their biosolids efforts is essential in identifying new target audiences for outreach efforts. The tools to be used include enhanced print and electronic material. A comprehensive quarterly report was prepared throughout 2014 and thus far in 2015 presenting the results of the following outreach methods: community outreach (109 activities), Student/teacher/administrator educational visits (55), tours (181), marketing materials (2), website (1), letters (1), press releases/social media coverage (11), and event planning (2).

Outcome Areas: Relations with Interested Parties.

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

The 2014 goal is 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.

Modification of this goal did not meet the intent of measurability of environmental performance but only changed incidentally by increasing the compost production by 1000 dry tons each year beginning in 2014. The measureable objective was to produce a biologically stable and odor free compost having a consistent nutrient content. The latter 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 consistency of nutrient content of compost was observed to be N = 1.5% to 2.0%; P = 1.5% to 2.0% and K = 0.05% to 0.10%.

Although the action plan indicated samples of the final product would be tested for volatile solids, nutrient content, and odor degree; none of the above mentioned measurable criteria were identified with the specific numerically desired levels, i.e. biologically stable criteria (38% reduction in volatile solids and pathogen reduction to below 1000 fecal coliform); ED50 less than 5; and consistent nutrient content as identified above. (Note: While some – not all – of these measurable criteria were monitored in the field, most were not reported in quarterly progress reports of measurable performance. That said; the progress reports were otherwise well written and very useful.)

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

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

Monitoring and Research Goal 2 – Attend 10 Community Outreach or Agency Networking Meetings, Training Sessions, or Conferences:

This objective involves conducting or attending ten community outreach or agency networking meetings, training sessions, or conferences. The Field Services Section of the Industrial Wasted Division reported attending 4 networking meetings, training sessions, or conferences during 2013, and this objective was removed in mid-2014 from M&R and shifted to the above described goals and objectives of Public Affairs.

Outcome Areas: Relations with Interested Parties.

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

This goal and objective was newly established in mid-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 5 new SIUs.

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

CONCLUSIONS AND RECOMMENDATIONS

The results of the third party interim audit show MWRDGC has a strong mature Environmental Management System. The NSF lead auditor reviewed and approved the corrective action plans for the major and minor nonconformances, and verified the closure of the major nonconformances. Therefore, it is the recommendation of the audit team that MWRDGC's Biosolids Environmental Management Program (BMP), Chicago, Illinois retain its "Platinum Level Certification" status.

As was mentioned, a BMP is a continuously improving process, and retention of the certification status 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 following interim audit schedule is proposed for the next five years.

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 nonconformances; 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 (third party) – 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

David St. Pierre – Executive Director – Metropolitan Water Reclamation District Of Greater Chicago
Manju Prakash Sharma – Director Maintenance and Operations (M&O) Division
Anthony Quintanilla – Assistant Director Maintenance and Operations (M&O) General Division
Dan Collins – Managing Civil Engineer - Biosolids Manager & Biosolids EMS Coordinator – LASMA
Ahmad Laban – Principal Engineer – LASMA and CALSMA
Rich Kuzminski – Associate Civil Engineer - LASMA
Raphael Frost – Senior Civil Engineer - CALSMA
Gahana Patel – Associate Civil Engineer - CALSMA
Steve Hall – Senior Civil Engineer - CALSMA
Lakhwinder Hundal, Ph.D – Supervising Environmental Soil Scientist, M&R Department, Stickney WRP
Sharon Sopcak-Phelan – Field Operations Officer – M & R Department, Industrial Waste Division Field Services – Stickney WRP
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
Joe Costello, Operating Engineer, (Control Room) – Stickney WRP
Tom Conway – Assistant Director Maintenance and Operations (M&O) Division – Calumet WRP
Neil Dorigan – Managing Engineer – Calumet WRP Pat Connolly – Principal Engineer – Calumet WRP
Pat Connolly – Principal Engineer – Calumet WRP
John Kargbo – TPO III – Calumet WRP
Sherry Kamenjarin – TPO III – Calumet WRP
Al Nicols – Chief Operating Engineer – Calumet WRP
Charles Jones – Operations Engineer – Calumet WRP
Aruch Poonsapaya – Principal Engineer – Terrence J. O'Brien WRP
Sandra Matual – Operations Manager – Terrence J. O'Brien WRP
Yipling Zhou – Managing Engineer – Kirie WRP
John Smoody – Operations Manager (by phone) – Kirie WRP
Jim Cloonan – Assistant Chief Operating Engineer – Kirie WRP
Sean Kelly, TPO II (Control Room) – Kirie WRP
Katarzyna (Kathy) A. Lai – Principal Engineer, Operations Manager – John E. Egan WRP

Hitesh Shah, Plant Manager – Egan WRP
Kent Anderson, Assistant Chief Operating Engineer – Egan WRP
Mark D'Ambrosia, Construction Technician – Egan WRP
Sanjay Goel, Resident Engineer for construction – Egan WRP
John Lazicki, Plant Manager – Hanover Park WRP
Dan Mikso – Chief Operator – Hanover Park WRP
Allison Fore - Public and Intergovernmental Affairs Officer
Dan Wendt – Assistant Public and Intergovernmental Affairs Specialist
Justin Brown – Public Affairs Specialist – Graphic Artist
Greg Firrantello – Agronomy Manager – Steward Spreading
Ed Thompson – Operations Manager Spreading Crew – Stewart Spreading
Chris Mhachrzak Field Coordinator – Stewart Spreading
Shane Edwards – Landscaping Manager – Twin Oaks Landscaping – Maggie Daly Park
Jeff Hutton – Illinois EPA – Environmental Protection Specialist III – Land Application Permits Section

Element 1. BMP Manual

- Document 00.1 – EMS Manual Document Control Summary
- Document 00.5 – District Organizational (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 6, 10/13/11
- Document 02.1 – MWRDGC Biosolids Policy (containing Code of Good Practice) – Version 2, 10/13/11
- Interview with David St. Pierre – Executive Director
- Interview with Manju Prakash Sharma – Director Maintenance and Operations (M&O) Division
- Anthony Quintanilla – Assistant Director Maintenance and Operations (M&O) General 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
- Interviews with:

- Dan Collins – Managing 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
- Henry Marks, Chief Operating Engineer – Stickney WRP
- Joe Costello, Operating Engineer, (Control Room) – Stickney WRP
- Pat Connolly – Principal Engineer – Calumet WRP
- John Kargbo – TPO III – Calumet WRP
- Sherry Kamenjarin – TPO III – Calumet WRP
- Al Nicols – Chief Operating Engineer – Calumet WRP
- Charles Jones – Operations Engineer – Calumet WRP
- Aruch Poonsapaya – Principal Engineer – Terrence J. O'Brien WRP
- Sandra Matual – Operations Manager – Terrence J. O'Brien WRP
- Yipling Zhou – Managing Engineer – Kirie WRP
- John Smoody – Operations Manager (by phone) – Kirie WRP
- Jim Cloonan – Assistant Chief Operating Engineer – Kirie WRP
- Sean Kelly, TPO II (Control Room) – Kirie WRP
- Hitesh Shah, Plant Manager – Egan WRP
- Kent Anderson, Assistant Chief Operating Engineer – Egan WRP
- Mark D'Ambrosia, Construction Technician – Egan WRP
- Sanjay Goel, Resident Engineer for construction – Egan WRP
- John Lazicki, Plant Manager – Hanover Park WRP
- Dan Mikso – Chief Operator – Hanover Park WRP
- Greg Firrantello – Agronomy Manager – Steward Spreading
- Ed Thompson – Operations Manager Spreading Crew – Stewart Spreading
- Chris Mhachrzak Field Coordinator – Stewart 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 Jeff Hutton – Illinois EPA – Environmental Protection Specialist III – Land Application Permits Section
- Interview with Sharon Sopcak-Phelan – Field Operations Officer – M & R Department, Industrial Waste Div. Field Services – Stickney WRP

Element 5. Goals and Objectives

- EMS Manual Element 05 – Goals and Objectives – Version 7, 4/25/12
- Document 05.1 – Goals and Objectives Guidance – Version 1, 10/13/11
- Monitoring and Research Goals and Objectives for 2014

- General Division's Goals and Objectives for 2014
- Calumet WRP's Goals and Objectives for 2014
- Egan WRP's Goals and Objectives for 2014
- Kirie WRP - Goals and Objectives for 2014
- Hanover Park WRP's Goals and Objectives for 2014
- Division 900's Goals and Objectives for 2014
- Public Affairs Biosolids EMS Goals and Objectives for 2014
- 2013 Biosolids Program and Environmental Management System (EMS) Performance Report – Final – May 1, 2015
- First Quarterly Status Report on Biosolids Goals and Objectives – 2015 (April/May 2015).
- Summary of MWRDGC's Biosolids EMS Goals and Objectives for 2014
- Summary of Activities for the Office of Public Affairs for 2014
- Summary of Activities of the Districts Land Application Program for 2014
- Interviews with:
    - 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
    - Pat Connolly – Principal Engineer – Calumet WRP
    - Yipling Zhou – Managing Engineer – Kirie WRP
    - John Smoody – Operations Manager (by phone) – Kirie WRP
    - Hitesh Shah, Plant 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 - Public and Intergovernmental Affairs Officer
    - Dan Wendt – Assistant Public and Intergovernmental Affairs Specialist
    - Justin Brown – Public Affairs Specialist – Graphic Artist

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 - Public and Intergovernmental Affairs Officer
- Interview with Dan Wendt – Public and Intergovernmental Affairs Specialist

- Interview with Justin Brown – Graphic Artist – Public and Intergovernmental Affairs
- Interview with Dr. Lakhwinder Hundal – Supervising Environmental Soil Scientist – Monitoring and Research Department – Stickney WRP
- Notification Mailing List – City Managers and Mayors
- Biosolids – A Sustainable Soil Amendment and Fertilizer Pamphlet
- 2014 – Soil in the City Conference (June 29 – July 2014) – Brochure
- Sustainability Summit – 2014 (July 2, 2014) - Brochures
- Biosolids – A Sustainable Choice – Pamphlet
- Biosolids – Frequently Asked Questions - flier
- Sticker "Grown in MWRD Composted Biosolids"
- Visit Maggie Daly Park downtown Chicago – constructed utilizing biosolids

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
  - Manju Prakash Sharma – Director Maintenance and Operations (M&O) Division
  - Anthony Quintanilla – Assistant Director Maintenance and Operations (M&O) General Division
  - Dan Collins – Managing Civil Engineer - Biosolids Manager & Biosolids EMS Coordinator – LASMA and CALSMA
  - Ahmad Laban – Principal Engineer – LASMA and CALSMA
  - Steve Hall – Senior Civil Engineer - CALSMA
  - Lakhwinder Hundal, Ph.D – Supervising Environmental Soil Scientist, M&R Department, Stickney WRP
  - Sharon Sopcak-Phelan – Field Operations Officer – M & R Department, Industrial Waste Division Field Services – Stickney WRP
  - 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
  - Pat Connolly – Principal Engineer – Calumet WRP
  - Aruch Poonsapaya – Principal Engineer – Terrence J. O'Brien WRP
  - Sandra Matual – Operations Manager – Terrence J. O'Brien WRP
  - Yipling Zhou – Managing Engineer – Kirie WRP
  - John Smoody – Operations Manager (by phone) – Kirie WRP
  - Jim Cloonan – Assistant Chief Operating Engineer – Kirie WRP
  - Hitesh Shah, Plant Manager – Egan WRP
  - Kent Anderson, Assistant Chief Operating Engineer – Egan WRP
  - John Lazicki, Plant Manager – Hanover Park WRP

- Dan Mikso – Chief Operator – Hanover Park WRP
- Allison Fore - Public and Intergovernmental Affairs Officer

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)

Element 9. Communications

- EMS Manual Element 09 – EMS Communications, Version 10, 3/23/15
- Interview with Allison Fore - Public and Intergovernmental Affairs Officer
- Interview with Dan Wendt – Public and Intergovernmental Affairs Specialist
- Interview with Justin Brown – Graphic Artist – Public and Intergovernmental Affairs
- Interview with Dr. Lakhwinder Hundal – Supervising Environmental Soil Scientist – Monitoring and Research Department – Stickney WRP
- Notification Mailing List – City Managers and Mayors
- www.mwrd.org
- Biosolids – A Sustainable Soil Amendment and Fertilizer Pamphlet
- 2014 – Soil in the City Conference (June 29 – July 2014) – Brochure
- Sustainability Summit – 2014 (July 2, 2014) - Brochures
- Biosolids – A Sustainable Choice – Pamphlet
- Biosolids – Frequently Asked Questions - flier
- Sticker "Grown in MWRD Composted Biosolids"
- Visit Maggie Daly Park downtown Chicago – constructed utilizing biosolids

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 and CALSMA
  - Ahmad Laban – Principal Engineer – LASMA and CALSMA
  - Rich Kuzminski – Associate Civil Engineer - LASMA
  - Raphael Frost – Senior Civil Engineer - CALSMA
  - Gahana Patel – Associate Civil Engineer - CALSMA

- Steve Hall – Senior Civil Engineer - CALSMA
- Lakhwinder Hundal, Ph.D – Supervising Environmental Soil Scientist, M&R Department, Stickney WRP
- Sharon Sopcak-Phelan – Field Operations Officer – M & R Department, Industrial Waste Division Field Services – Stickney WRP
- 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
- Joe Costello, Operating Engineer, (Control Room) – Stickney WRP
- Pat Connolly – Principal Engineer – Calumet WRP
- John Kargbo – TPO III – Calumet WRP
- Sherry Kamenjarin – TPO III – Calumet WRP
- Al Nicols – Chief Operating Engineer – Calumet WRP
- Charles Jones – Operations Engineer – Calumet WRP
- Aruch Poonsapaya – Principal Engineer – Terrence J. O'Brien WRP
- Sandra Matual – Operations Manager – Terrence J. O'Brien WRP
- Yipling Zhou – Managing Engineer – Kirie WRP
- John Smoody – Operations Manager (by phone) – Kirie WRP
- Jim Cloonan – Assistant Chief Operating Engineer – Kirie WRP
- Sean Kelly, TPO II (Control Room) – Kirie WRP
- Hitesh Shah, Plant Manager – Egan WRP
- Kent Anderson, Assistant Chief Operating Engineer – Egan WRP
- John Lazicki, Plant Manager – Hanover Park WRP
- Dan Mikso – Chief Operator – Hanover Park WRP
- Greg Firrantello – Agronomy Manager – Steward Spreading
- Ed Thompson – Operations Manager Spreading Crew – Stewart Spreading
- Chris Mhachrzak Field Coordinator – Stewart Spreading

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

Element 13. Monitoring and Measurement

- EMS Manual Element 13 – Monitoring and Measurement, Version 6, 3/16/15
- Monitoring and Research Department Report 15-9 Annual Biosolids Management Report for 2014
- 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
- 2014 Biosolids Program and Environmental Management System (EMS) Performance Report – Final – May 1, 2015
- Corrective Action Plans (CAPs) from interim audit and internal audit conducted 2014.
- Corrective Action tracking spreadsheet for 2014 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
- 2014 Biosolids Program and Environmental Management System (EMS) Performance Report – Final – May 1, 2015
- Monitoring and Research Department Report 15-9 Annual Biosolids Management Report for 2014
- www.mwrd.org

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 January 1 – March 2, 2015
- Internal Audit Final Report – March 13, 2015

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
- Program and Environmental Management System (EMS) Performance Report – Final – May 1, 2015
- Monitoring and Research Department Report 15-9 Annual Biosolids Management Report for 2014
- Interview with David St. Pierre – Executive Director
- Interview with Manju Prakash Sharma – Director Maintenance and Operations (M&O) Division
- Interview with Anthony Quintanilla – Assistant Director Maintenance and Operations (M&O) General Division
- Interview with Dan Collins – Managing Civil Engineer - Biosolids Manager & Biosolids EMS Coordinator – LASMA and CALSMA
- Interview with Ahmad Laban – Principal Engineer – LASMA and CALSMA