

# 2015 Periodic Biosolids Program Performance Report

Issued: March 2016

***"It is the goal of the City to manage biosolids processing, handling, and final disposal in a manner which meets public acceptance and to produce a product that complies with all state and federal regulatory requirements."***

## Introduction

The Grand Rapids Water Resource Recovery Facility (GR-WRRF), located in Grand Rapids, MI, provides wastewater collection and treatment for the City of Grand Rapids and 11 surrounding communities totaling approximately 270,000 customers within a 200 square mile geographical area. The Wastewater plant treated 14215 million gallons in 2015. The GR-WRRF has a design capacity of 61.1 million gallons a day (MGD) and in 2015 had an average daily flow of 39 MGD. The facility was constructed in the 1920's and treatment consisted of primary clarification, anaerobic digestion, and drying beds. The Biosolids from the drying beds were bagged and sold to businesses and homeowners for fertilizer for many years. In the mid 1950's the plant was expanded to include secondary treatment capability utilizing activated sludge as the biological treatment process along with increased primary treatment capacity and disinfection. In the 1970's the facility was again expanded to increase flow capacity and solids handling processes. Solids handling converted from anaerobic digestion to thermal heat treatment using low pressure oxidation.



The GR-WRRF was part of a third round of agencies participating in the National Biosolids Partnership (NBP) Environmental Management System (EMS) for Biosolids. The GR-WRRF BMP was formally certified by the NBP in December of 2006. The title of the program changed in 2011 with Biosolids Management Program (BMP) replacing EMS.

ESD's BMP has gone through many changes and improvements since its inception, and has matured into a productive and healthy program. Engaging employees in goal setting and critical control points keeps people in tune and keeps the BMP in the foreground.

During July of 2009, the Joint Biosolids Management Project Agreement was approved by the City of Grand Rapids and City of Wyoming. This finalized the creation of the Grand Valley Regional Biosolids Authority (GVRBA). On July 1, 2009 the GVRBA became responsible for processing 100% of the biosolids from the City of Grand Rapids Wastewater Plant and the City of Wyoming Clean Water Plant.

In 2015, modifications, improvements and studies were completed and/or undertaken at the WRRF and collection system support facilities including:

- CIPP Lining (Cured in place piping) various locations
- ESCSO Cn# 26C (Mary Waters Park)
- Livingston Reservoir Discharge Line Cn #1 (Lafayette Ave / Leonard St)
- Cascade Rd / Old 28<sup>th</sup> St gravity Sewer & Forcemain Replacement
- Completed bulkheads of overflow points F-01, F-03, F-04, F-10
- Completion of WWTP berm protection
- Completion of North Aeration Blower Replacement
- Creston Plaza
- Scribner Ave
- Bartlett, Finney & Williams (Streets around Founders Complex)
- State St – Jefferson to Lafayette
- Fox River Drv @ Dean Lake Ave
- Agape Plastics P.E. (sewer relocation) – Tallmadge Twp
- ESCO project in design with Chevron and City Engineering for HVAC improvements to reduce energy consumption was completed in 2015.

### **Outcomes Matter**

The NBP has identified key outcomes which serve as good indicators of successful and well managed Biosolids Management practices. Efforts undertaken by GR-WRRF during the past year in support of these outcomes are detailed below.

### **Quality Management Practices**

The City of Grand Rapids Environmental Services Department (ESD) has made several improvements in its goals and objectives over the past few years and has continued to simplify and streamline its program through 2015. The internal BMP team dropped several goals and objectives and modified others to reflect changes in the system. Continuing with the evolution will involve the addition and/or removal of goals and objectives as needed on a quarterly basis.

The modified goals and objectives were developed recognizing the need to optimize performance of solids processing and improve operation and maintenance to reduce the financial burden on taxpayers. Overall the goals and objectives are anticipated to result in substantial gains in biosolids management and reduction in cost of operation.

The ESD Biosolids Management Program (BMP) established goals and objectives consistent with the required NBP outcome areas. The goals and objectives for 2015

were reduced to two with the intention of developing wholly new additions in 2016, such as the reduction of dry tons of biosolids generation through implementing real time control of ammonia and reduction of the concentration of total suspended solids in the centrate at the new TWAS, thus reducing solids returned to the plant. The 2015 goals were developed using Specific, Measurable, Achievable, Relevant, and Time-bound (SMART) criteria through input from the internal BMP Team and consideration of public concerns. The goals 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.

#### **Reduce The Amount of Ferrous Chloride Feed by 15% in 2015 versus 2014 Without Lowering the Final Effluent Quality Below Permit Limits.**

This goal is a follow-on goal to the long-term goal from 2010 – 2013 of improving wastewater processes resulting from the North Plant Modification Project. The 2014 objective of this goal was to reduce the quantity of ferrous chemical added for phosphate removal by 25% on a quarter-by-quarter basis, while maintaining the effluent quality below the 1.0 mg/l discharge limit. The variation on a quarter-by-quarter basis historically has been significant and the controls implemented to attain the desired results were ineffective going from 2013 to 2014. The quantity of ferrous chloride usage increased from an average of 84,637 gallons per quarter in 2013 to 107,174 gallons per quarter in 2014 – an increase of 26%. It was clear a major adjustment to this goal was needed.

A process change was implemented to optimize the biological removal of phosphorus and thereby reduce the quantity of ferrous required for that activity. A conservative objective of reducing the ferrous chloride year over year by 15% was established. The changes implemented in the last quarter of 2014 and carried over into the first quarter of 2015 resulted in ferrous usage 43% below the annual objective. The second quarter resulted in usage 88% below the annual objective. Although the third quarter showed an increase above the second quarter it was still below the annual objective. Based on the process changes made it is now possible to eliminate all of the ferrous usage for phosphorus removal, except for occasional emergency situations and its use as a backup for odor control. This goal and objective has proven to be very successful and results in positive outcomes in environmental performance, regulatory compliance, relations with interested parties (cost savings) and quality biosolids management practices.

#### **Reduce the GVRBA Recycle Total Solids by 5% in 2015**

This Increase goal and objective is a carryover from 2014 when it was described as reducing the GVRBA Centrate Quality by 10%, which was to be measured as the reduction of total suspended solids (TSS) concentration in the recycle stream of the centrifuge. The controls associated with this goal and objective proved to be ineffective and the total suspended solids increased from 2013 to 2014 by 40% instead of decreasing by 10%. Therefore, a more modest goal and objective was established to reduce the recycled total solids by 5% in 2015; however the controls

were still not well defined in the action plan to control or measure the accomplishments. (Note: the operations of the GVRBA equipment were severely affected by multiple large-scale issues, including broken welds on the feed tubes into the centrifuges.)

Because of the significant malfunctioning of the equipment the entire year of 2014 should be considered an aberration and in order to measure improvements associated with identified controls in the action plan the 5% reduction in TSS should be compared to a more stabilized year such as 2013. Reviewing the data for 2015 compared with 2013 shows a very slight increase in efficiency more in line with the projected reduction of 5%. This goal is being revisited in 2016 to determine if the measurement of concentration is more important than the total loading of TSS, which includes flow as well as concentration.

This goal results in positive outcomes in environmental performance, relations with interested parties (cost savings) and quality biosolids management practices.

### **Sharepoint SOP Revision**

Standard Operating Procedures will now auto update the version number when modifications are published.

### **Relations with Interested Parties**

In 2015, the City changed the wastewater treatment plant's name to the Water Resource Recovery Facility (WRRF), to better represent the facility's growing focus on energy efficiency and other sustainability practices. Staff focused on the many educational opportunities that were afforded to us in the Grand Rapids metropolitan area and within the Environmental Services Department (ESD).

- For the sixth time, several staff members volunteered at an informational booth at the upcoming March "Home and Garden Show". This event is the largest of this type of event in West Michigan with attendance in excess of 30,000. This was the Home and Garden Show's 36<sup>th</sup> season and was held at the De Vos Center in downtown Grand Rapids. Staff from a variety of workgroups have volunteered for this event in the past.
- The City required customer service training also relates to the maintaining of relations with interested parties. Good customer service skills helps to build trust with citizens and maintains good working relationships with the public. All City employees have taken this mandatory training required by the City Manager.
- 1595 people toured the wastewater plant in 61 tours in 2015. Plant staff is optimistic about our field of work and encourages students to consider Wastewater Treatment as a career path.
- Continue to move forward and refine the new City "311" application for City departments. This customer service program enhances and improves customer service to City residents. Staff has also taken the duty of after hours call center for city waer, sewer, sign and lighting issues.
- Citizens can explore various areas of the wastewater treatment process and the Biosolids Management Program on our Environmental Services Department website at the City of Grand Rapids website [www.grcity.us](http://www.grcity.us)

- There are quarter page hand-outs that the City uses as an insert in all of the water/wastewater invoices that are mailed out. These types of hand outs help ESD maintain relations with interested parties. This is also a good public outreach tool.

### Regulatory Compliance

- ESD exceeded the fecal coliform 30 and 7 day limits in August, and exceeded the daily concentration limit of NH3-N on August 3<sup>rd</sup>.
- Achieved 100% compliance with regulatory requirements as related to Biosolids in 2015.
- As stated last year, we are still waiting on the approval of the application for our new National Pollution Discharge Elimination System (NPDES) permit.

### Environmental Performance

- A motivated staff striving to achieve 100% compliance with all regulatory requirements is focused on protecting the environment. The City of Grand Rapids Environmental Services Department staff operates in a highly effective and professional manner and consistently achieves regulatory compliance.
- For more than 20 years, the City of Grand Rapids has worked aggressively to eliminate Combined Sewer Overflows. The combined sewer overflow elimination project is complete.

### Biosolids Value Chain - Monitoring and Measurement Report and Progress

Monitoring and measurement provides critical input to the organization relative to the effectiveness of its operational controls and related SOP's in relation to the critical control points. Critical control points are checked annually in July and operational controls are checked annually in October. The information obtained from these annual checks helps us to identify any weaknesses, missing information, new information or any other ways in which the BMP can be improved. As new SOP's are made, they are incorporated into the BMP. This annual check of operational controls assures any relevant monitoring and measurement is done and that the correct SOP's are in place. The department continues to develop and utilize more accurate and easily maintained monitoring equipment.

### Wastewater Collection and Pretreatment

*Significant Industrial Users (SIU)* – In 2015, the industrial Pretreatment Program, (IPP), staff worked with industrial users and State regulators to maintain compliance with local, state and federal discharge laws. There are eighty four (84) Significant Industrial Users monitored by the Industrial Pretreatment Program. IPP utilizes Linko Data System for tracking compliance for Industrial Users. IPP continues to expand the utilization of functionality of Linko and currently is partnering with Linko in pursuing approval by the EPA for electronic reporting, called CROMERR.

*Industrial/Commercial User Discharges* –A business requesting new water service or to transfer a water service requires submittal of a completed survey prior to activation of water service. This completed survey is scanned by the Utility Billing Office into Cayenta Utilities Software. IPP then reviews the completed survey and determines if the user requires an industrial user permit.

*Discharge Authorizations* –. Discharge requests are for one-time or short-term discharges, or for discharges that do not meet the criteria for a Significant Industrial User. A discharge request containing Material Safety Data Sheets (MSDS), waste characterization, flow volumes, discharge rates and location is submitted by potential dischargers. The proposed discharge is reviewed by IPP staff to determine potential impacts to the WRRF. The user then receives an approval or denial letter for the discharge.

*Pollutant Minimization* – Toxic metals, including mercury, are the main focus for pollutant minimization for IPP staff. Permitted industries are sampled annually by IPP while individual user self-monitoring is performed a minimum of semi-annually. WRRF influent mercury is sampled and analyzed monthly, with low level influent and final effluent sampling performed quarterly.

## **Wastewater Treatment and Solids Generation**

*Solids Screening and Grit Collection* – ¼” bar screens that were installed in 2004-2005 at the GR wastewater plant headworks area continue to significantly reduce screening type debris in the biosolids. The screenings compactor at the end of the screen conveyor washes the screenings with final effluent water; then compresses the screenings removing much of the water. This saves the WRRF from hauling the screening bin as often as we used to. Much less water weight is being hauled to landfill.

*Scum* – This product consists of greases and oils which enter the wastewater plant through the collection system. A proactive program to capture and remove grease and oil at lift stations by cleaning the wet wells on a routine basis continues to help reduce grease and oils contained in the biosolids. Schedules for cleaning wet wells are continually adjusted according to condition of the well at last cleaning. The captured grease and oil is collected and transported to local landfills for disposal. We continue to educate the public about grease in the sewers during WRRF tours. Since the installation of the bar screens in 2004 -2005, scum is only pumped about once every three weeks instead of weekly. This alone has saved the City over 1200 man hours of labor over the ten years they have been in service. That is a savings of over \$45,000 alone on labor and electricity charges due to less handling and pumping.

*Primary Treatment* – We have been very proactive in maintaining our primary tank mechanisms and associated equipment during “fair weather” months so that repairs during the winter months are minimized and/or not necessary. The newer Kaizer compressed air system along with air driers continue to work well. Six of the twelve Primary tanks have completed preventative emaintenance to replace chains, sprockets and various mounts and bushings. These main components had reached the end of their life cycle after approximately twenty years of service.

*Raw Solids Storage* – Biosolids are stored in the GVRBA primary storage tank. Currently the WAS tank is out of service and not being used, but is available for additional storage if needed.

*Secondary Treatment* – Biological phosphorus facilities in the North and South aeration plant continue to be exceptionally effective. Ferrous chloride is no longer used for phosphorous removal, but is still available on site for dewatering odor control and backup phosphorous removal.

The Grand Rapids plant is now thickening its (WAS) waste activated solids from secondary treatment. Optimization of the new process continues. New SOP's and operational controls are being developed and implemented for this critical control point.

### **Solids Stabilization, Conditioning, and Handling**

*Centrifuge Dewatering* –The Biosolids Program Manager and Operations & Maintenance Supervisors monitor the performance of the units. Operations staff strives for 25% cake solids, polymer dosage less than 20 lbs per dry ton, and a 95% capture rate. Various SOP's have been developed since 2009 when the GR-WRRF O&M staff were awarded the opportunity to run the GVRBA dewatering facility.

*WAS (Waste Activated Sludge) Thickening* – The Improvements to the Waste Activated Sludge (WAS) Thickening System project was substantially completed in 2014 and operational during 2015. New SOPs and operational controls for the process are currently being reviewed.

*Odor Control* – There are three carbon adsorption units at the Grand Rapids (GVRBA) facilities. Odor control is of primary concern for proper operation of the facility. These are maintained by regular checking of the units through preventive maintenance and through our Odor Minimization Plant (OMP) and Malfunction Abatement Plan (MAP). This plan (GVRBA SOP #12) was set up to minimize the potential for unreasonable odors to migration beyond the property line; to provide for proper operation and maintenance of the odor control units, and satisfy the Nuisance Minimization and Malfunction Abatement Plan requirements of our air quality permit with the Michigan Department of Environmental Quality.

### **Solids Storage and Transportation**

*Truck Loading* – The contractor (Cordes Trucking Inc.) maintains log-sheets and inspects each truck before departure from the site to ensure that there is no leakage or trucking issues. The contractor maintains their SOP's and spill plans at their main location and all the drivers are familiar with the SOP's. At least two employees of the contractor are audited each quarter during the year to assure that current SOP's are in each truck driver's possession; and that the copies in the trucks are the current versions of those SOP's.

*Truck Cover* – All trucks are covered during transport to the landfill site in accordance with state law.

*Truck Transport to Landfill* – The contractor maintains records of dates, driver(s) and landfill destination site(s) for each load leaving the site.

*Truck Washing Procedures* – The contractor maintains procedures to wash and inspect trucks to minimize odors and biosolids tracking issues.

### **Biosolids End Use or Disposal**

*Landfill* – The contractor works with the three landfills to properly incorporate the biosolids into the municipal trash. This augments the decomposition process and maximizes the potential for methane gas which is recovered and beneficially used.

### **Internal Audit**

An internal audit of the City's BMP was conducted during the first quarter of 2015 and completed March 30, 2015. Five (5) non conoformances were noted. Element 5: goals and objectives were not properly documented. Element 7: The list of BMP team members were not updated during staff changes. Element 9: Website not updated with current BMP documents. Element 10: critical point centrifuge thickening not removed as a critical control point. Element 12: Website not current version.

These non-conformances were corrected.

### **Third Party Eighth Interim Audit**

The ninth (9<sup>th</sup>) interim audit was performed by William Hancuff. The Environmental Services Department appreciates the input received from the external auditor in keeping our BMP program healthy. The main objective of the interim audit was to ensure our program's health with review of our progress toward goals and objectives, corrective and preventive action requests and responses, actions to correct minor nonconformances and review of key outcome areas. This external audit keeps us in check and makes sure we stay within the guidelines necessary to maintain our platinum certification with the National Biosolids Partnership. The feedback we receive through this process is of great assistance in our commitment of continual improvement as well as our four key outcomes of the program...(Quality Management Practices, Credibility with Interested Parties, Regulatory Compliance and Protection of the Environment). As our BMP continues to mature, we strive to encourage the public, educators, representatives of local and state agencies, ESD staff and other interested parties to become more knowledgeable and involved in our BMP. The audit was successful and Grand Rapids received a platinum level certification letter and award for our tier 4 platinum level achievement in our Biosolids Management Program. The audit's positive observations, nonconformances and opportunities for improvement are listed below.

### **Positive Observations**

The Environmental Protection Services Department's Wastewater Treatment Plant personnel involved in biosolids management should be recognized for their outstanding achievements, and the exceptional features of their Biosolids Management Program. The following was found to be noteworthy during this audit.



The new Biosolids Management Program (BMP) coordinator has an excellent understanding of the BMP and has an exceptional comprehension of its use as a management tool.

Additionally, the hard work and dedication of the BMP management team must be acknowledged. While maintaining the BMP certification goal is obviously a team effort the leadership provided by the Environmental Services Department Manager assured maintenance of this common goal.

### **Minor Nonconformances**

Requirement 3.5 – The new WAS low energy/low shear volute thickener became fully operational several months ago but formal notification of the third party auditor of this additional critical control point was not made.

Requirement 5.1 – The Table 5.1 – Goals and Objectives for 2015 was not completed. Also, Table 5.1 – Goals and Objectives found in the Grand Rapids BMP manual presented the 2014 Goals and Objectives instead of a blank Table, as intended.

Requirement 9.5 – Relevant information about biosolids management activities must be communicated to employees. Goals and Objectives, Action Plans and Progress Reports (required in Element 5 procedures) are not regularly communicated with appropriate employees at the monthly Operations Maintenance Group (OMG) meetings. Similarly, tracking status in completing corrective actions (required in Element 14.6) are not communicated at the monthly OMG meetings.

Requirement 10.1 – Standard Operating Procedures for startup, shut down and troubleshooting have not been prepared for the new WAS low energy/low shear volute thickener. While SOP 3350 and SOP 3351 are identified as startup and shut down procedures they are blank holding places for two of the required documents.

Requirement 11.2 – The organization is required to review and evaluate the effectiveness of emergency preparedness and response procedures. Element 11 – Emergency Preparedness and Response does not adequately address “spill drills” nor has the effectiveness of the procedures been evaluated.

Requirement 14.2 – Although required by the BMP procedure, Table 14.2 – Nonconformance Investigation Worksheet was not used for tracking nonconformances in 2014.

### **Opportunities for Improvement**

Requirement 1.2 – Consider including in the list of references at the end of Element 2: Biosolids Management Policy procedure, the commitment to the Code of Good Practice included in the December 17, 2004 letter from the Mayor of the City of Grand Rapids.

Requirement 5.1 – Consider developing a list of “Potential Future Goals and Objectives” for inclusion in a table in Element 5: Goals and Objectives.

Requirement 5.6 – Consider developing an attachment or Appendix to Element 5 – Goals and Objectives procedure to track current and past goals and objectives to update the current progress or status, and/or record the history of past accomplishments.

Requirement 8.2 – Consider having the BMP Coordinator attend a 36-hour ISO 14001 lead auditor-training course.

Requirement 14.4 – the preventive and corrective action program was not implemented for problems identified during routine monitoring and maintenance, i.e. operational problems that require significant resources, such as parts, equipment, contracts, personnel or labor.

Requirement 14.6 – Consider developing a summary table of corrective actions that can be used to track status of preventive/corrective actions.

In order to address the above minor non-conformances, the City of Grand Rapids, Michigan Environmental Services Department has prepared a non-conformance investigation report and will implement corrective actions according to their procedures to provide continual improvement to their BMP.

### Interested Parties Input/Participation

- During the last quarter of each year the City develops a list of goals and objectives for the next year. As part of this process we seek input from our interested parties regarding concerns and issues they may have. We did receive goal ranking form back from two interested parties which will help us to prioritize our goals for 2016. The City appreciates all responses it receives back from the public in regards to our goals and objectives.
- The City will continue to keep interested parties apprised of our efforts to seek input as part of our continuous improvement process. The City has also incorporated our customer service goal into element 9 and made that part of our BMP.

### 2016 - Current Year Goals & Objectives

An important component of our Biosolids BMP is continual improvement. Annually, goals are identified based on key outcomes, Biosolids value chain, or BMP improvements. For 2016 staff will pursue the following goals which could help us achieve these objectives:

#### NITROGEN CONTROLLER AT THE WRRF NORTH PLANT AERATION:

Install real time nitrogen controller at the WRRF north plant aeration; and monitor power consumption of the system compared to power consumption before the system was put online. This type of controller throttles our blowers in secondary treatment allowing just enough oxygen to our biomass for proper treatment and control of nitrogen (ammonia).

This unit monitors many criteria and allows us to use less oxygen. Less oxygen is less cost to the WWTP and ideally our customers.

#### TWAS PROCESS:

Complete a Facility specific Operations and Maintenance Manual for the Thickened Waste Activated Sludge (TWAS) process. Proper operation, maintenance, and optimization of the new thickened waste activated sludge process are beneficial to a nutrient rich Biosolids stream. Optimizing the TWAS process for this facility will increase efficiency and lower costs.

#### EVALUATE THE ODOR CONTROL SYSTEM OF GVRBA:

Goal is reduced costs. Carbon expense for current odor control system appears prohibitive. Current odor system should be evaluated for operation efficiency, and compared to alternate technologies for cost effectiveness.

### Summary

In 2015 the City of Grand Rapids was again certified Platinum by the National Biosolids Partnership for dedication to continued improvement, and for supporting excellence in biosolids management practices, augmenting regulatory compliance obligations, environmental performance and providing meaningful opportunities for public participation.

In 2015 The City of Grand Rapids Water Resource Recovery Facility Biosolids Management Program continued to evolve and improve. Dedication of staff to the processes involved in the BMP not only allows for the continued Platinum Level Certification from the National Biosolids Partnership, it also provides the satisfaction of documenting the successes we achieve.

As GR-WRRF moves into the future, updating and adding processes as well as personnel, we will continue to utilize the principles of BMP to guide our transformation, not only with regards to biosolids but all plant management .

GR-WRRF looks forward to working with our Interested parties this coming year, exploring additional opportunities to achieve and enhance the four NBP focal points.

GR\_WRRF is also looking forward to the upcoming NBP re-verification audit to be conducted in 2016.

William R. Kaiser  
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