

2016 Periodic Biosolids Program Performance Report

Issued: March 2017

"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 15805 million gallons in 2016. The GR-WRRF has a design capacity of 61.1 million gallons a day (MGD) and in 2016 had an average daily flow of 43 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. In October of 2016, ESD successfully completed the tenth year re-verification audit; retaining its platinum certification with the (NBP).

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 2016, modifications, improvements and studies were completed and/or undertaken at the WRRF and collection system support facilities including:

- Primodal Real Time Nitrogen Controller Project for the North aeration at the WRRF
- Primary Tank Upgrades (Sprockets, Chains, etc...)
- Jefferson Alley – In April, a fairly significant sinkhole developed indicating a problem with an old 10" sanitary sewer. The challenge to this particular location was that in the 1980's a large 48" transmission water main was installed over the top of said sanitary sewer. It was determined that during the installation of the water main, the sanitary was slightly "in-the way", so rather than raising the water main, the installers just pushed the sanitary down to get it out the way. This worked OK for a few years, but ultimately, the structural integrity of the sanitary failed, so we invested \$17,000 to repair this section and made it right.
- 921 Division Ave – near the Auto-Die complex. A cross connection between the sanitary sewer and the storm sewer was discovered. After a detailed investigation of the source, repairs were implemented, resulting in a cost of \$57,750 to relay approx. 260 feet of 6" sewer, setting two new MHs and also working "inside" the Auto-Die building.
- Godfrey / Oxford, SW – A hole alongside a 24" clay tile was discovered during a routine televising. Being that the surrounding soil was clay and the pipe was outside the influence of the road, no sink-hole collapse was evident from the surface. However, it was only a matter of time before the pipe would have collapsed, as 50% of the sidewall of the pipe was gone. The pipe section was repaired at a cost of \$10,000.
- Embassy Drv, SE (City of Kentwood) – A "dip" in the road kept occurring over the past 3 years, despite numerous televising and road subgrade repairs. This was an area of extremely high ground water and muck / marl soils. A soil boring was taken 10' DEEPER than the bottom of the sewer and it was discovered that the SOILS below were the cause of the settlement in the road... including the dip

which was occurring in the sewer. A contractor was hired to dig deep to replace the bad soils. The cost was \$104,500 to replace approx. 90' of sanitary sewer.

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 2016. Continuing with the evolution will involve the addition and/or removal of goals and objectives as needed on a quarterly basis.

2016 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 2016 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.

Install Real time nitrogen controller the WRRF north plant aeration

This type of controller throttles the blowers in secondary treatment allowing just enough oxygen to our biomass for proper treatment and control of nitrogen (ammonia). This will allow the use of less oxygen which is less cost to the WRRF and ESD's customers. This controller was just recently completed and electrical usage for the North Plant blowers is being evaluated over the next year to compare to pervious usage.

Complete a Facility specific Operations and Maintenance manual for the thickened Waste Activated Sludge (TWAS) process

This manual was completed. During the re-verification audit it was determined that this was not a goal. The previous audit had determined the lack of the manual was a non-conformance and as such should have been a Corrective action plan.

Evaluate the Odor Control System of the GVRBA

Recent increased use of carbon in the daily operation of the GVRBA dewatering facility has increased costs. An evaluation to determine the cause of the increase was initiated. One of the main variables to be evaluated was Wyoming's sludge mixed with GR sludge. Wyoming chose not to send to us during the summer months and this goal was tabled until data could be gathered.

Relations with Interested Parties

In 2016, 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 seventh 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 37th 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.
- 1032 people toured the wastewater plant in 49 tours in 2016. Plant staff is optimistic about our field of work and encourages students to consider Wastewater Treatment as a career path.
- 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
- 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 handouts help ESD maintain relations with interested parties. This is also a good public outreach tool.
- The City's ESD Facebook page received 499,499 insights.

Regulatory Compliance

- ESD WRRF received a violation on the NPDES permit for failure to analyze a daily ammonia nitrogen sample due to equipment failure.
- 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 2016, 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.

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. Eight of the twelve Primary tanks have completed preventative maintenance 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 continues to thicken its (WAS) waste activated solids from secondary treatment. Optimization of the new process continues. New SOP’s and operational controls were 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. The thickened sludge is pumped to the GVRBA reducing the phosphorous load to the plant when the WAS was co-settled.

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 2017 and completed March 30, 2017. Three (3) nonconformances were noted. Element 5: Names of staff trained were missing. Element 10: 4th quarter contractor inspection was not completed.

Corrective action plans are in place to address these issues.

Third Party Re-verification Audit

The re-verification audit (10th 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 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.

Requirement 2.1 – Opportunity for improvement – 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 – Opportunity for improvement – Consider developing a list of potential future Goals and Objectives for inclusion in a table in Element 5: Goals and Objectives.

Requirement 5.1 – Opportunity for improvement – Consider one of the operations staff suggestion for formulating a Goal and Objective related to establishing certain preventive maintenance (PM) activities based on operational information acquired through the supervisory control and data acquisition (SCADA) system.

Requirement 5.5 and 5.7 – Minor nonconformance – The standard requires that each program goal used the SMART criteria (Specific, Measureable, Achievable, Relevant and Time-bound); and that there be an action plan that describes improvement activities, containing schedules, milestones, and responsibilities for achieving biosolids goals and objectives. The goals and objectives for 2016 did not accurately describe the specific details of the goals and their measurability. Additionally, they did not provide a step by step action plan with schedules and milestones.

Requirement 6.2 – Minor nonconformance – In the key areas of interpretation of the standard minimum conformance requirement for public participation in planning it indicates that auditors must verify that the biosolids organization has notified interested parties about their intent to receive an independent third party audit and have built into their BMP planning a discussion with interested parties about approaches for observing the third party audit. Grand Rapids' Element 6: Public Participation in Planning Procedure does not specifically describe the above process and there was no formal direct contact with the list of stakeholders regarding the opportunity to observe the 2016 third party audit.

Requirement 7.1 – Opportunity for improvement – Review the membership of the internal Biosolids Management Program (BMP) Team in Element 7 Roles and Responsibilities procedure 2, with those identified in Table 7.3 Internal BMP Team (Name and Contact information) for consistency (i.e. what role does the contractor play in the BMP Team.)

Requirement 7.1 – Opportunity for improvement – Consider identifying specific regularly scheduled meetings with an agenda to review the activities of the BMP Team as identified in Element 7 - Roles and Responsibilities procedure 8.

Element 8 – Positive Observation – While not everyone at the water resource recovery facility has received training on the BMP, of those trained and interviewed 100 percent had an excellent understanding of the Critical Control Points, Biosolids Value Chain and the Grand Rapids Biosolids Mission Statement.

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

Requirement 9.5 – Opportunity for improvement – Consider documenting how relevant information about biosolids management activities such as Goals and Objectives, Action Plans and Progress Reports (required in Element 5 procedures) and tracking of corrective action plans progress (required in Element 14) are regularly communicated with appropriate employees at the monthly Operations Maintenance Group (OMG) meetings and the ESD manager’s meetings. (Agenda items)

Element 11 – Positive Observation – A post incident audit was conducted on a force main failure and a second sanitary sewer overflow (SSO). This is an excellent tool for identifying the response activities that were well executed as well as the ones needing improvement. It provided recommendations for continuous improvement, including providing proper training for this type of emergency response and improving communication between multiple job sites and management.

Requirement 11.2 – Minor nonconformance – The organization is required to review and evaluate the effectiveness of emergency preparedness and response procedures. Element 11 – Emergency Preparedness and Response does not currently address how the organization will evaluate the effectiveness of the procedures in the Annual Biosolids Spill Drill Policy No. 3618. Additionally, a spill drill has not yet been conducted.

Requirement 12.1 - Positive Observation – Grand Rapids has substantially improved its recordkeeping and now has a color coded filing system to identify all the BMP required records in file folders for each year.

Requirement 12.2 – Minor nonconformance – The standard requires that program documents be properly marked with version number, effective date(s), and reference to replaced or superseded versions. A review of several procedure documents revealed that the date the procedure was revised and approved did not appear on the document as the effective date.

Element 14 – Minor nonconformance – The Grand Rapids BMP Element 14 – Nonconformance’s: Preventive and Corrective Action procedure requires certain NBP minimum conformance requirements (such as cause analysis, recommendation for corrective action, completion of corrective action plan, etc.) to be carried out exclusively by the “investigation committee.” The investigation committee has not been used to address minor nonconformances identified during audits, therefore several of the minimum conformance requirements have not been developed according to the procedure.

Element 14 – Opportunity for improvement – Consider reviewing Grand Rapids BMP

Element 14 – Nonconformance’s: Preventive and Corrective Action procedure for simplicity in defining how Grand Rapids will meet the minimum conformance requirements identified in the NBP standard.

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

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

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. 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.

The surcharges assessed to Industrial Customers were adjusted to include a new rate for participants in our upcoming High Strength Waste treatment.

2017 - Current Year Goals & Objectives

An important component of our Biosolids BMP is continual improvement. Annually, goals are identified based on key outcomes, the Biosolids value chain, or BMP improvements. To address an opportunity for improvement a list of possible future goals will be kept and added to annually. The yearly goals will be chosen from the compiled list. In 2017 staff will evaluate the following goals:

ENACT A NEW SEWER USE ORDINANCE (SUO):

An updated ordinance can provide for further assurances that the incoming waste is acceptable for our biosolids stream.

ADD REAL-TIME CONTROL FOR THE MIXED LIQUOR WASTING:

With the addition of automated wasting the sludge age and mass can be optimized for the least sludge production.

UPDATE REAL-TIME CONTROL FOR ULTRAVIOLET DISINFECTION:

There is potential for additional reduction in energy use with a real-time controller.

EVALUATE ODOR CONTROL AT DEWATERING BUILDING:

Increased usage of Carbon for odor control of the dewatering process is resulting increased processing costs. Determine cause of increased usage and evaluate alternate technologies.

USE HIGH STRENGTH WASTE TO EVEN LOADS TO AERATION TANKS.

Separate high strength waste flows and feed to facility during diurnal periods when excess capacity exists.

UTILIZE A LABORATORY INFORMATION MANAGEMENT SYSTEM (LIMS) FOR THE ENVIRONMENTAL ASSESSMENT LABORATORY.

Utilizing a LIMS system can document the proper handling and methods for the analysis performed in the laboratory, reducing paper and time spent.

DESIGN AND BUILD DIGESTERS

Great potential for reduced solids handling and energy recovery.

PHOSPHOROUS RECOVERY

Will be required so struvite does not build up in digestion and dewatering processes.

Summary

In 2016 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 2016 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.

William R. Kaiser
City of Grand Rapids BMP Coordinator