

**NATIONAL BIOSOLIDS PARTNERSHIP
INTERIM AUDIT REPORT**

**City of Richmond,
Department of Public Utilities
Wastewater Treatment Plant
Richmond, Virginia**

Audit conducted by

NSF-International Strategic Registrations

William R. Hancuff, Lead Auditor

References:

**National Biosolids Partnership (NBP) BMP Elements
NBP Third Party Verification Auditor Guidance – November 2001
(Latest Revision August 2011)
NBP Code of Good Practice
City of Richmond, Virginia
Wastewater Treatment Plant
Biosolids Management Program Manual
Issued and Approved by Rosemary Green - Deputy Director
(Revised – 2016)**

Draft Report – December 2, 2017

INTRODUCTION

The purpose of the Biosolids Management Program (BMP) interim audits is to verify through regular reviews the program's health and effectiveness between verification audits. The third party on-site interim audits provide an independent review and supports credibility between re-verification audits. In addition, one of the purposes of the interim 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 covered. The audits determine whether the City of Richmond Wastewater Treatment Plant 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 BMP program objectives.

RECOMMENDATION

The results of the City of Richmond Wastewater Treatment Plant BMP interim audit are positive, and it is the recommendation of the audit team that the City of Richmond BMP retain its Platinum Level Certification recognition.

AUDIT SCOPE

The NSF-International Strategic Registrations, Ltd. (NSF-ISR) conducted a third party interim audit of the City of Richmond Wastewater Treatment Plant BMP from November 26, 2017 through November 28, 2017. The on-site audit team consisted of Dr. William R. Hancuff, Lead Auditor.

The scope of the interim audit specifically included a review of the requirements of Elements 5, 14, and 17; namely the organization's progress toward goals and objectives; BMP outcomes (environmental performance, regulatory compliance, interested party relations, and quality practices); actions taken to correct minor non-conformances; the management review process; and corrective and preventive action requests and responses. Because other system elements interact with the above specific requirements the interim audit also included partial auditing of activities found in elements 1, 2, 4, 6, 9, 15, and 16.

Since the NBP allows that any individual interim audit cover a portion of the BMP, but requires that over the course of the four interim audits conducted between verification audits the entire BMP (i.e. all 17 elements) must be covered, the following elements were audited in their entirety as part of this sixth interim audit: elements 1, 8, 15, and 17. . Auditing these elements involved document review, interviews, and activity evaluations.

The physical biosolids facilities included in the audit and visited during the interim audit included the following critical control points of the biosolids value chain: bar screens, scum tanks, anaerobic digesters, two biosolids storage tanks, final dewatering centrifuges, effluent filter building, truck biosolids loading facilities, truck scales, and concrete pad biosolids storage area and auxiliary landfill pad, the covered offsite temporary biosolids storage area, and the open offsite biosolids storage area. Visited one land application site, the Ragland track plots 1, 2, 4, 6, and 8 near Gum Springs in Goochland County used for hay/pasture. Observed staging and application activities and interviewed land application contractor employees.

The following individuals were interviewed as part of the audit process:

Ricky Hatfield, Acting Deputy Director II
Clair Watson, Utility Operations Superintendent II – Plant Manager
Edwin Edmondson, Utility Operations Superintendent I – Assistant Plant Manager
Noureddine E. Elamghari, Utility Operations supervisor and BMP coordinator
Avis Purrington, Chief Chemist, Quality Assurance, Pretreatment Water Quality Lab
Don Bruner, Plant Operator
Willie Whitaker, Chief Operator
Faheem Abdul-wahhaab, Plant Operator
Donald Carter, Project Management Analyst, Maintenance (Internal Auditor)
Cordell Hayes, Maintenance Program Manager
David Simons – Vice President, Nutriblend (biosolids contractor)
Paul Lanier – spreading subcontractor landowner and farmer
Owen Lanier – biosolids land applicator no. CLA0627
Neil Zahradka, State of Virginia, Department of Environmental Quality, Biosolids Program Manager

INTERIM AUDIT FINDINGS

The interim audit found no major non-conformances, 1 minor non-conformance, 3 opportunities for improvement and 1 positive commendation.

The following is a review of the positive observation made during the interim audit. The opportunities for improvement follow and 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.

Positive Observation

The Richmond Wastewater management and all plant personnel involved in the biosolids environmental management program development and maintenance should be recognized for their outstanding achievements, and the exceptional features of their Biosolids Program. The following is the positive observation made during the interim audit.

Commendation:

- The Maintenance Group has done an excellent job in supporting the accomplishment of the action plan needed to lower the average time for completion of Work Orders and improving the ratio of corrective work orders relative to preventive work orders.

The hard work and dedication of the BMP Team must also be acknowledged. Maintaining the BMP platinum level certification recognition is obviously a team effort and the BMP team is to be commended. Additionally, the support, encouragement and active participation of Rosemary Green, during her tenure as the Deputy Director II ensured the continuous improvement of the program.

Minor Non-conformance

Element 14 requirements – the NBP standard minimum conformance requirement includes identifying the cause and taking action to correct any noncompliance or nonconformance in addition to identifying the root causes and actions taken to prevent recurrence. Also estimating the completion date, tracking progress of corrective action status and completion. The Richmond Element 14 procedure 6 requires the biosolids supervisor to verify the nonconformance has been completed and closed. A review of several corrective actions identified the following deficiencies: 136 – missing long term solution and no verification of closure; 137 – no verification of closure; 139 – no verification of closure; 140 – no verification of closure; and 141 – target date for closure too broad, i.e. 2017 and no verification of closure.

Opportunities for Improvement

Element 5 requirements – Consider establishing a goal and objective for the planned project to construct a covered facility for a wastewater treatment plant on-site biosolids storage area.

Element 5 requirements – Consider expanding the measurable efficiency of the maintenance management program goal to include specifically identifying a “planned” labor estimate for each work order assigned and comparing with the “actual” labor required to complete each work order. Measurements to include the number of work orders that include “planned” labor hour estimates verses total number of work orders issued. Also to include comparisons of “actual” labor hours required to close work orders verses “planned” estimated labor hours made.

Element 16 requirements – Consider establishing a monthly walk around housekeeping evaluation activity involving a variety of operational personnel to conduct unannounced checks with the results presented in the “monthly chief meeting.”

Element 17 requirements – Consider regularly including a status report of the Biosolids Management Program in the Mayor’s Cabinet Meeting Briefing, as was proposed management review meeting held September 25, 2017.

CITY OF RICHMOND COMMENTS

The City of Richmond is proud to maintain its National Biosolids Partnership platinum certification. Richmond continues its commitment to best management practices and continual improvement. The interim audit helped us find organizational strengths and weaknesses. The City is pleased to work with Dr. Bill Hancuff the lead auditor and to address the audit's recommendations in a timely manner.

The Biosolids management program BMP has been very helpful and fruitful for the City to achieve its strategic goals and objectives. In 2017, The City of Richmond have made great improvement in the polymer usage, this resulted in an annual cost saving of \$226,000.00. The BMP will continue their efforts for continual improvement.

OUTCOMES MATTER

The City of Richmond Public Utilities Biosolids Management Team worked at improving its approach to more clearly formulating and rechecking its goals employing Specific, Measurable, Achievable, Relevant, and Time Bound (SMART) criteria and using cost savings as an addition measure of improvement. The wastewater treatment plant biosolids goals for its BMP were established cognizant of each of the four outcome areas of the NBP program as identified below:

- Environmental Performance,
- Regulatory Compliance,
- Relations with Interested Parties, and
- Quality Biosolids Management Practices

The biosolids team revised the goal numbering system and use the date on which the goal was established as its unique identifier. The narrative title is also used for clarification. The discussion below is presented using the goal number (date of origin) and descriptive titles.

While it is not a requirement to accomplish all objectives established, it is a critical part of the system to make progress towards the overall goals. The Plant’s performance relative to each of its goals is addressed below and the outcome areas affected by the goal are addressed at the end of each discussion.

The BMP coordinator and Biosolids Team modified or adjusted several of its existing goals in 2017. Currently there are five on-going goals and objectives.

08/01/12 – Lower Methanol Consumption from 2.1 gal/lb of Nitrate/Nitrite reduced to 1.6 gal/lb reduced. (In Progress).

This goal, originally introduced in 2012 has been moved forward through 2016, with only partial success. A very limited description of how this goal is to be accomplished is documented. However, the concept is to convert one of the plant digesters (#6) into a fermentation tank that will produce organic acids that can be used in the denitrification process as an energy source to replace methanol. The measurability of the goal is in the reduction of gallons of methanol used to reduce nitrate/nitrite nitrogen in pounds to nitrogen gas. The baseline for the reduction is the relatively smooth operation of the denitrification process observed in 2014, which for the year averaged 2.1 gallons of methanol per pound of nitrate/nitrite converted.

The fermentation pumps and associated piping, electrical, etc. were put into service in May 2014; and the foul air control system associated with the gravity thickeners commenced. The system was partially ready to be placed into service but the fermentation pumps had to be upgraded. Additionally through 2015 there were operational difficulties that caused the use of methanol to increase substantially from the baseline average of 2.1 gal/lb. to 3.4 gal/lb. It was discovered that landfill leachate being added to the influent cause a massive increase in ammonia nitrogen and the resultant nitrates/nitrite from nitrification. This caused the jump in methanol consumption. Since banning the addition of landfill leachate from the plant the use of methanol had dropped to 1.9 gal/lb as of July 2016. However, as of December 2016 the fermentation system was operating as intended and redesign of grinders was necessary. While redesign was completed in the first quarter of 2017 the system was never operated because of additional operational problems associated with failed pumps in April 2017. Currently the system is awaiting pump parts, and attainment of the target is anticipated to be accomplished by June 2018 as the process is optimized.

The primary target of this goal is to improve environmental performance through quality management practices and reduce the quantity of methanol purchased. The baseline demand for methanol is 3,000 to 3,500 gallons per day and reduction in methanol consumption by 25% has a highly significant impact on costs. At current rates the overall reduction could be in the range of \$500,000 per year with no loss in quality of product.

This goal results in outcomes in all required areas; namely, environmental performance, regulatory compliance, relations with interested parties (cost savings), and quality biosolids management practices.

10/01/14 – Improve Maintenance Management Work Order Processing And Closure (In Progress).

The objective of improving maintenance management was originally established in 2011. It was associated with improving the response time for maintenance work requests. This was found to be highly successful, and logically lead to establishment of two new objectives namely: generation of work requests for 100% of the incidents in the biosolids areas and improving internal communication in the biosolids areas such that the number

of days a work order remains open is reduced. The latter was accomplished through daily monitoring of work order status.

In 2014 an evolved objective demonstrated considerable measurable improvement. The target was to lower the total days spent to close work orders. This was tracked by measuring three parameters: 1) lowering the percentage of open work orders closed in 100 days and up, to fewer than 10%, 2) increasing the percentage of work orders closed in less than two weeks to over 85%, and 3) increasing the percentage of work orders closed the same day to over 5%. Once this target was achieved the next goal for 2015 was established.

For 2015 the target was to lower the percentage of open work orders closed in 100 days and up, to fewer than 6%, to increase the percentage of work orders closed in less than two weeks to 90%, and to increase the percentage of work orders closed the same day to over 10%. The results thus far in 2015 showed a reduction to only 3.9% open after 100 days, 40% closed in less than two weeks, and 9.6% work orders closed the same day. The over 100 day open work orders surpass the target and the same day closures are close to the target, while the closure of work orders within two weeks is below target, but considerably improved from 2014 measure of 26%.

By the close of 2016 there was a significant increase in work orders open more than 100 days and was running 13% - over double the intended percentage and an increase of over triple the percentage of the previous year. The work orders closed in two weeks were 38% (less than half off the desired target) and virtually no improvement over the past year; and the same day closure were 12%, slightly better than the desired target, and the best showing to date. The latter target was the only one accomplished in 2016.

In 2017 the goal was redefined to lower the average time required to close open work orders by 5% from 37 days to 35 days for 2017. For comparison the average time required to close work orders in 2015 was 84 days, in 2016 was 37 days, in June 2017 was 33 days and in October 2017 was 29 days. The projected measurement for 2017 will more than meet the goal.

The reduction in time to correct operational deficiencies will improve the environmental performance of the biosolids value chain as well as the entire plant, thus minimizing the time when additional operational complications can develop. This goal also satisfies the requirements of the quality biosolids management practices outcome area.

10/02/14 – Generate Zero Noticeable Odors In The Gravity Thickening Area (In Progress).

This goal evolved from an earlier goal and is to create zero noticeable odors in the gravity thickening area upon startup of the fermentation process. To accomplish this goal, in 2013 thickening tank covers were installed along with biofilters and carbon filters. This target was established to maintain zero noticeable odors for 2 years after start-up of

the fermentation tank. Once operations begin, the shift operators will perform the subjective odor monitoring twice per day.

Considerable delays have been experienced with the full operation of the fermentation tank, therefore causing a delay in the establishment of routine monitoring of odors associated with that tank. There were startup attempts but considerable problems associated with rags. Delays are expected to carry this goal into 2017. Additionally in 2016 it was determined to use a more scientifically based measurement of odors by employing an olfactometer that provides objective numerical readings and a goal of 4 odor units is being considered as the target for this objective. The measurement device has been purchased and background readings were reported to commence by the first of 2017. Routine readings will be made once the fermentation tank begins operation, which is now scheduled for June 2018.

This goal results in outcomes in environmental performance and quality biosolids management practices. The attainment of this goal will have an impact in the relations with interested parties' outcome area though reducing noticeable biosolids odors on tours.

01/01/15 – Improve Ratio of Preventive/Corrective Maintenance Work Hours to 70/30 (In Progress).

This is a new goal in 2015, which has long-term implications. To change the ratio of hours spent on preventive work orders to corrective work orders requires a long lead-time to attain. Preventive measures reduce the frequency and resources required for corrective measures however, many assets that have not been properly maintained will fail even if the required preventive measures are introduced. This is due to the fact that the asset may have already sustained damage because of the lack of maintenance. The true savings associated with the improvement in this ratio is the cost reduction in replacement parts, materials and equipment associated with high cost assets.

A view of the history of preventive hours to corrective hour's ratios shows how the variation stays within a range: 2012: 51/49; 2013: 41/59; 2014:43/57; 2015: 52/48; and as of Aug 2016: 55/45. The shift in this ratio requires a few years to demonstrate an improvement. The year 2016 had the best record to date, however the target was still a long way from accomplishment. However, it is contemplated that by increasing as much as possible the number of assets in the preventive maintenance program that this will increase the preventive hours used for maintenance, and hopefully concurrently reduce the corrective hours required in the future. Also, the measurement of material/equipment/supply costs may be added to the tracking system in the future since this component can ultimately be a controlling variable in equipment replacement decision making.

In 2017 it was determined to refine the goal to be only applied to the biosolids areas, namely: thickening building, and dewatering control building (digesters 1 & 2). The goal for 2017 was set at a ratio of 62/38. For historical comparison purposes the ratios were:

2015 – 72/28; for 2016 – 67/33; for June 2017 – 66/34 and for Oct 2017 – 63/37. Continual decreasing in the ratios should allow meeting this goal for 2017.

This goal results in outcomes in environmental performance and quality biosolids management practices.

02/19/16 – Remove 90% of the influent grit through the new headworks degritting operation

Modification of the plant through the addition of a new headworks operation is the action plan required to ensure this goal and objective is attained. The final engineering design was completed in June 2016. Permitting and approvals were granted in August and the bid and award was scheduled for March 2017 but slipped. In August 2017 eight firms were determined to be qualified contractors eligible to bid on the contract. In invitation for bid (IFB) is scheduled to be issued the first quarter of 2018 with award by mid 2018 and completion of construction by the end of calendar year 2020.

This goal and objective will result in outcomes in environmental performance and quality biosolids management practices.

CONCLUSIONS AND RECOMMENDATIONS

The results of the interim audit are positive. The review and approval of the proposed action plans for the minor non-conformance identified during the audit has been completed. The full implementation of the corrective actions for the minor finding will be accomplished according to the schedule proposed in the corrective action reports (CARs) and it is the recommendation of the audit team that the City of Richmond Wastewater BMP retain its platinum certification recognition status.

As was mentioned previously, the BMP is a continually improving process. 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 Plant's BMP Coordinator and the third party auditor, the schedule of individual elements to be audited in their entirety such that all the elements of the BMP are covered before the next re-verification audit are as follows:

Year 6 (third party) – Elements 3, 10, 12, 13 (completed)

Year 7 (third party) – Elements 1, 8, 15, 17 (completed)

Year 8 (third party) – Elements 5, 6, 9, 14, 16

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

Year 10 (third party) Re-verification

Attachment 1

Documents and Other Objective Evidence Reviewed During the Interim Audit

Element 1. Documentation of Biosolids Management Program

- City of Richmond Wastewater Treatment Facility Biosolids Management Program Manual Issued and Approved by Deputy Director II – 2016.
- BMP Element 1 – Documentation, Rev 15, 11/07/2016.
- Table 1.1 – BMP Organization by Categories.
- BMP Element 2 – Biosolids Management Policy, Rev 14, 10/28/2015.
- BMP Element 3: Critical Control Points, Rev 15, 11/08/2016.
- Element 3: Critical Control Points, Table 3.1- Critical Control Points (CCP) Operations (undated).
- BMP Element 6 – Public Participation in Planning, Rev 14, 10/28/2015.
- BMP Element 7 – Roles and Responsibilities, Rev 15, 11/10/2016.
- BMP Element 9 – Communication, Rev 15, 11/11/2016.
- BMP Element 11 – Emergency Preparedness and Response, Rev 14, 10/28/2015.
- Interview with Ricky Hatfield, Acting Deputy Director II
- Interviews with Noureddine E. Elamghari, Clair Watson, and Ed Edmondson.

Element 2. Biosolids Management Policy

- BMP Element 2 – Biosolids Management Policy, (including Code of Good Practice), Rev 14, 10/28/2015.
- BMP Element 9 – Communication, Rev 15, 11/11/2016.
- Interview with Rosemary Green, Deputy Director II
- Interviews with Noureddine E. Elamghari, Clair Watson, and Ed Edmondson.
- Policy displayed throughout wastewater treatment plant on posters.
- Policy communicated to interested parties through availability on web site.

Element 3. Critical Control Points

- BMP Element 3: Critical Control Points, Rev 15, 11/08/2016.
- Element 3: Critical Control Points, Table 3.1- Critical Control Points (CCP) Operations (undated).
- Operations (including relationship to value chain, operational control references and environmental impacts). (undated)
- Aerial view of Richmond Wastewater Treatment Facility layout with processes identified
- Field observation of select biosolids significant Critical Control Points.
- Field visit to land application site – Goochland County, VA – the Ragland track plots 1, 2, 4, 6, and 8 near Gum Springs

- Interviews with Nouredine E. Elamghari, Clair Watson, Ed Edmondson, Don Bruner, Willie Whitaker, Faheem Abdul-wahhaab, Donald Carter, and Cordell Hayes.
- Interviews with contractor personnel: David Simons – Vice President, Nutriblend, Paul Lanier – spreading subcontractor landowner and farmer, Owen Lanier – biosolids land applicator no. CLA0627.

Element 4. Legal and Other Requirements

- BMP Element 4 – Legal and Other Requirements, Rev 15, 11/09/2016.
- Table 4.1 List of Relevant Legal and Other Requirements.
- VPDES Permit Number VA0063177, expiration June 30, 2018.
- Interviews with Nouredine E. Elamghari, Clair Watson, Ed Edmondson, Don Bruner, Willie Whitaker, Faheem Abdul-wahhaab, Donald Carter, and Cordell Hayes.
- Interviews with contractor personnel: David Simons – Vice President, Nutriblend, Paul Lanier – spreading subcontractor landowner and farmer, Owen Lanier – biosolids land applicator no. CLA0627.
- Interview with regulator – Neil Zahradka, State of Virginia, Department of Environmental Quality, Biosolids Program Manager.

Element 5. Goals and Objectives for Continual Improvement

- BMP Element 5 – Goals and Objectives for Continual Improvement, Rev 14, 10/28/2015. (Element Procedure)
- BMP Element 5.1 (Table) – Goals and Objectives for Continual Improvement, Rev 15, 06/03/16.
- 2016 Biosolids Management Program Performance Report.
- Biosolids Goal Action Plan form for tracking outcomes and objectives and targets (last updated Nov 2017).
- Evaluated all G&O for SMART criteria.
- Reviewed detailed data on work order processing and corrective action vs preventive action work order hours' ratio.
- Interview with Ricky Hatfield, Acting Deputy Director II
- Interviews with Nouredine E. Elamghari, Clair Watson, Ed Edmondson, and David Simons.
- Reviewed grit removal evaluation particle size distribution and cyclone grit removal technology to determine efficiency (Feb 18, 2016).

Element 6. Public Participation in Planning

- BMP Element 6 – Public Participation in Planning, Rev 14, 10/28/2015.
- BMP Element 9 – Communication, Rev 15, 11/11/2016.
- Reviewed the City's Biosolids BMP website information.
- Interviews with Nouredine E. Elamghari, Clair Watson, and Ed Edmondson.
- Interview with contractor – David Simons – Vice President, Nutriblend

- Interview with regulator - Neil Zahradka, State of Virginia, Department of Environmental Quality, Biosolids Program Manager.

Element 7. Roles and Responsibilities

- BMP Element 7 – Roles and Responsibilities, Rev 15, 11/10/2016.
- Table 7.1 – Biosolids BMP Responsibilities.
- Interview with Ricky Hatfield, Acting Deputy Director II
- Interviews with Clair Watson, Ed Edmondson, and Nouredine E. Elamghari.
- Interview with contractor – David Simons – Vice President, Nutriblend

Element 8. Training

- BMP Element 8 – Training, Rev 14, 10/28/2015.
- Interview with Nouredine E. Elamghari.
- Interviews with plant personnel – Clair Watson, Edwin Edmondson, Don Bruner, Willie Whitaker, Faheem Abdul-wahhaab, Donald Carter, and Cordell Hayes.
- Interview with contractor – David Simons – Vice President, Nutriblend
- Reviewed EMS Awareness Training Power Point slides.
- Reviewed sign in sheets for training conducted on 10/1/17. (20 persons)
- BSI Certificate for 1) ISO 14001:2015 Lead Auditor Training, 2) Environmental Management Systems Training, and 3) Leading Management System Audit Teams for Nouredine ezzine elamghari – 7/28/17.

Element 9. Communications

- BMP Element 9 – Communication, Rev 15, 11/11/2016.
- BMP Element 6 – Public Participation in Planning, Rev 14, 10/28/2015.
- Richmond Public Utilities webpage on Biosolids.
- Virginia Department of Environmental Quality – Biosolids Frequently Asked Questions – Get the Facts (website information.)
- Reviewed EMS Awareness Training Power Point slides.
- Reviewed sign in sheets for training conducted on 10/1/17. (20 persons)
- Periodic Treatment Plant publication – Biosolids News: 8/5/2017 and 8/27/2017.
- Interview with Ricky Hatfield, Acting Deputy Director II
- Interviews with Nouredine E. Elamghari, Clair Watson, and Ed Edmondson.
- Interview with regulator - Neil Zahradka, State of Virginia, Department of Environmental Quality, Biosolids Program Manager.
- Interviews with contractor personnel: David Simons – Vice President, Nutriblend, Paul Lanier – spreading subcontractor landowner and farmer, Owen Lanier – biosolids land applicator no. CLA0627.

Element 10. Operational Control of Critical Control Points

- BMP Element 10 – Operational Control of Critical Control Points, Rev 15, 11/11/2016.

- Element 3: Critical Control Points, Table 3.1- Critical Control Points (CCP) Operations (including relationship to value chain, operational control references and environmental impacts). (undated)
- BMP Element 13 – Monitoring and Measurement, Rev 14, 10/28/2015.
- Reviewed detailed hours and costs for work orders processed, including the lack of data on estimated hours required for each work order issued.
- Interviews with Nouredine E. Elamghari, Clair Watson, and Ed Edmondson.
- Additional interviews with plant personnel – Don Bruner, Willie Whitaker, Faheem Abdul-wahhaab, Donald Carter, and Cordell Hayes.
- Interviews with contractor personnel: David Simons – Vice President, Nutriblend, Paul Lanier – spreading subcontractor landowner and farmer, Owen Lanier – biosolids land applicator no. CLA0627.

Element 11. Emergency Preparedness and Response

- BMP Element 11 – Emergency Preparedness and Response, Rev 14, 10/28/2015.
- SOP: Biosolids Spill Response Plan, Rev 3, 12/08/2016.
- Interviews with Nouredine E. Elamghari.
- Interview with contractor – David Simons – Vice President, Nutriblend
- Biosolids Spill drill, post evaluation undated but conducted in 2016. (tabletop exercise)
- Reviewed Biosolids Spill drill post evaluation report for spill drill conducted on 10/01/2017.

Element 12. BMP Documentation and Document Control

- BMP Element 12 – Documentation, Document Control, and Record Keeping, Rev 14, 10/28/2015.
- Document Control Log – Last Updated Feb 16, 2016.
- Interviews with Nouredine E. Elamghari and David Simons.

Element 13. Monitoring and Measurement

- BMP Element 13 – Monitoring and Measurement, Rev 14, 10/28/2015.
- Element 3: Critical Control Points, Table 3.1- Critical Control Points (CCP) Operations (including relationship to value chain, operational control references and environmental impacts). (undated)
- BMP Element 10 – Operational Control of Critical Control Points, Rev 15, 11/11/2016.
- Summary of Work Request Status Report (prepared daily) to track number of days since work request was entered into system.
- Reviewed detailed hours and costs for work orders processed, including the lack of data on estimated hours required for each work order issued.
- Interviews with Nouredine E. Elamghari, Clair Watson, and Ed Edmondson.
- Additional interviews with plant personnel – Don Bruner, Willie Whitaker, Faheem Abdul-wahhaab, Donald Carter, and Cordell Hayes.

- Interviews with contractor personnel: David Simons – Vice President, Nutriblend, Paul Lanier – spreading subcontractor landowner and farmer, Owen Lanier – biosolids land applicator no. CLA0627.

Element 14. Nonconformances: Preventive and Corrective Action

- BMP Element 14 – Nonconformance: Preventive and Corrective Action, Rev 14, 10/28/2015.
- Reviewed CARs prepared to address third party interim audit from 2016 (CAR 134 – 144).
- Reviewed CARs prepared to address internal audit from 2017 (CAR 146 – 156)
- Reviewed Wastewater Plant Biosolids BMP Internal Audit Report for audit conducted October 30, 2017.
- Interviews with Nouredine E. Elamghari and Donald Carter.

Element 15. Periodic Biosolids Program Report

- BMP Element 15 – Performance Report, Rev 14, 10/28/2015.
- BMP Element 6 – Public Participation in Planning, Rev 14, 10/28/2015.
- BMP Element 9 – Communication, Rev 15, 11/11/2016.
- Reviewed 2016 Biosolids Management Program Performance Report (BMPPR)
- Interview with Ricky Hatfield, Acting Deputy Director II
- Interview with Nouredine E. Elamghari.

Element 16. Internal BMP Audit

- BMP Element 16 – Internal BMP Audit, Rev 14, 10/28/2015.
- Reviewed Wastewater Plant Biosolids BMP Internal Audit Report for audit conducted October 30, 2017.
- Reviewed 2016 internal audit results and actions taken in response to the audit results (7 minor and 4 OFIs).
- Summary of Response to internal Audit results – November 16, 2017.
- Reviewed CARs prepared to address internal audit from 2017 (CAR 146 – 156)
- Interviews with Nouredine E. Elamghari and Donald Carter

Element 17. Periodic Management Review of Performance

- BMP Element 17 – Periodic Management Review of Performance, Rev 14, 10/28/2015.
- 2016 Biosolids Management Program Performance Report.
- BMP Management Review Meeting Agenda – August 31, 2017, 10:30 – 12:30.
- BMP Management Review Meeting minutes for August 31, 2017, 10:30 am.
- Interview with Ricky Hatfield, Acting Deputy Director II
- Interviews with Clair Watson, Edwin Edmondson, and Nouredine E. Elamghari.