NATIONAL BIOSOLIDS PARTNERSHIP

LOUISVILLE GREEN MANAGEMENT SYSTEM INTERNAL AUDIT REPORT

LOUISVILLE & JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT
LOUISVILLE, KY

Audit Report Date    December 14, 2018
Audit Conducted By   Sandra Conner, CIA
                     Jennifer Garland-Waters, CICA
Audit Date           December 12, 2018
Report Written By    Sandra Conner, CIA
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AUDITOR’S OPINION STATEMENT

Louisville and Jefferson County Metropolitan Sewer District (MSD) continues its commitment to the National Biosolids Partnership (NBP’s) Code of Good Practice and NBP Minimum Conformance Requirements for the 17 Elements (“Elements”). MSD’s Louisville Green Management System (“LGMS” / “System”) appears mature and functioning at a highly maintained level.

The results of this audit did not identify any major nonconformance issues. Since MSD received the NBP certification on July 31, 2008, MSD’s System has undergone seven (8) third-party external audits and twelve (12) internal audits.

1. SUMMARY

The MSD Internal Audit Team conducted the thirteenth internal audit of the System. MSD uses the system in managing its biosolids program at the Morris Forman Water Quality Treatment Center (MFWQTC). Internal Audit conducted the onsite portion audit on December 12, 2018.

The objective of this internal audit is to evaluate the effectiveness of Metropolitan Sewer District’s Louisville Green Management System; compliance with MSD’s Biosolids Management Policy (effective October 23, 2017); and compliance with the National Biosolids Partnership’s Code of Good Practice.

1A. AUDIT SCOPE

In accordance with NBP requirements for internal audits, audit included a review of the following topics:

- Progress Toward Goals and Objectives
- LGMS Outcomes
  - Environmental Performance
  - Regulatory Compliance
  - Relations with Interested Parties
  - Quality Biosolids Management Practices
- Actions Taken to Correct Minor Nonconformance
- Management Review Process
Preventive Action Requests and Responses
Corrective Action Requests and Responses

The NBP has developed a blueprint that sets forth the important principles and goals which govern the operation of environmentally sustainable biosolids management systems. The NBP developed 17 Biosolids Management System Elements to define the specific expectations and requirements; the performance of these activities the NBP believes to be important for ensuring that the performance of the biosolids management activities is environmentally sound and publicly accepted manner.

The following elements were reviewed to adequately address the NBP requirements included in the scope of the audit as listed above.

- **Element 1**: Biosolids Management Program (BMP) Manual
- **Element 2**: Biosolids Management Policy
- **Element 3**: Critical Control Points
- **Element 4**: Legal and Other Requirements
- **Element 5**: Goals and Objectives
- **Element 6**: Public Participation in Planning
- **Element 7**: Roles and Responsibilities
- **Element 8**: Training
- **Element 9**: Communications
- **Element 10**: Operational Controls
- **Element 11**: Emergency Preparedness and Response
- **Element 12**: BMP Documentation and Document Control
- **Element 13**: Monitoring and Measurement
- **Element 14**: Nonconformances: Preventative & Corrective Action
- **Element 15**: Biosolids Management Program Report
- **Element 16**: Internal BMP Audits
- **Element 17**: Management Review
1B. SUMMARY OF AUDIT FINDINGS

The audit identified (1) positive observation, one (1) opportunity for improvement, and two (2) minor nonconformance. Audit results and management responses are in Section 4 of this report.

1C. REPORT DISTRIBUTION PLAN

Internal audit team members shall submit a Draft Internal Audit Report of their findings to the Process Support Supervisor within thirty (30) days completion of onsite audit work. The Process Support Supervisor shall provide a corrective action plan to the lead auditor within thirty (30) days of the receipt of the draft report. The Lead Auditor shall provide a Final Internal Audit Report including the corrective action plan and management comments within ten (10) days of receipt of the corrective action plan.

The Process Support Supervisor may distribute the Draft and Final Internal Audit Report to members of MSD management and staff as appropriate.

2. AUDIT DETAILS

2A. AGENCY DETAILS

Agency Name: Louisville and Jefferson County MSD  
Address: 4522 Algonquin Parkway, Louisville, KY  
Volume of Wastewater Treated: 120 MGD Average, 330 MGD Peak  
Biosolids Produced: 18,000 dry tons per year  
Number of Employees: 90

Contractors Audited: A-J Inc., Clarke and Alberta Fenimore; Sales Agent

MSD Internal Audit Team: Sandra Conner, CIA – Internal Auditor  
Jennifer Garland-Waters, CICA – Staff Auditor I

Auditor Qualifications are in Appendix 5C.
2B. DEFINITIONS

Positive Observation: Recognition of an area in the biosolids management system that should be recognized for outstanding achievements and/or exceptional features.

Opportunity for Improvement: A program element that conforms to requirements outlined in the Elements, but which may be improved by following suggestions, examples, or benchmarks cited by the auditor.

Major Nonconformance: An issue that occurs when one of the elements in the Elements has not been addressed or has not been addressed adequately. Major nonconformances can occur when an organization has documented a process or procedure, but has not implemented it or cannot demonstrate effective implementation; when a number of minor nonconformance’s in a given activity or element point to a systemic failure; when an element is being disregarded sufficiently during organization operations that it is having a noticeable effect on the organization’s environmental compliance, environmental impacts, or the quality of the material being produced – there is a gap or problem that could lead to a systemic failure.

Minor Nonconformance: An issue that, when taken by itself, does not indicate a systemic problem with the Program. It is typically a random or isolated incident. Minor Nonconformance involves discrepancies within an element of the Elements that do not significantly affect the implementation of the Program and commitment to conform to the Code of Good Practice – a systemic problem is not indicated.

2C. REFERENCE MATERIALS

The following materials were used as a reference by the auditors during the internal audit:

- MSD LGMS Manual (2018 Version 2)
- NBP Third Party Verification Auditor Guidance Manual (effective August 2011)
- NBP Minimum Conformance Requirements for Elements #1 – 17
  - (Documented within the NBP Third Party Verification Auditor Guidance Manual)
3. **EFFECTIVENESS REVIEW**

In accordance with NBP audit requirements, the following topics were reviewed for the effectiveness of the System.

**Progress Toward Goals and Objectives**

The establishment and review of goals and objectives drive and guides the System's continuous improvement efforts by defining the specific aspects performance that MSD, as well as its various interested parties, plan to target while aligning resources and efforts to maximize beneficial results. In developing program goals and objectives, the LGMS Management Team ("Management Team") considers the critical control points of the biosolids management system, identified or potential environmental impacts, legal and other requirements, best management practices as defined by NBP, and input from interested parties. Goals and objectives are developed using SMART criteria (i.e., be Specific, Measurable, Achievable, Relevant, and Time-bounded), documented with an action plan, schedules, milestones, resources, and assigned responsibilities, and the Team meets monthly to evaluate progress and effectiveness.

**LGMS Outcomes**

The NBP has identified four areas where it has defined specific, auditable expectations for examining outcomes as important indicators of biosolids management program health. These four areas include environmental performance; regulatory compliance; relations with interested parties; and quality biosolids management practices.

**Environmental Performance**

The System is required by NBP to identify goals and objectives to encourage continuous improvement. The Management Team redefines the goals and objectives to be consistent with the biosolids management policy as needed, assuring biosolids management activities comply with applicable laws and regulations, meet quality and public acceptance requirements, and prevent other unregulated adverse environmental and public health impacts by effectively managing all critical control points.

**Regulatory Compliance**

The System has established a robust compliance management system that effectively identifies and tracks regulatory compliance obligations, proactively identifies potential regulatory compliance issues, assures effective implementation of applicable compliance activities, quickly detects regulatory compliance problems, and addresses regulatory compliance problems in a timely fashion.

**Relations with Interested Parties**
The Management Team has set up quality, two-way flows of information with interested parties; giving the Team the capacity to understand the concerns and perspectives of interested parties. Conversely, this provides methods of effective communications to stakeholders and interested citizens regarding the key elements of the biosolids management system, including information about system performance.

**Quality Biosolids Management Practices**

In accordance with NBP’s Code of Good Practice, the System has implemented good housekeeping practices for biosolids production, processing, transport, and storage, and during final use or disposal operations. The Management Team has implemented sustainable, environmentally acceptable biosolids management practices and operations. The Team identified best practices in the NBP National Manual of Good Practice, and from other sources such as industry benchmarking.

**Actions Taken to Correct Minor Nonconformance**

The Management Team is thorough in their efforts to document and address all noncompliance’s identified by internal and external auditors. The corrective action plans identify steps planned and taken to change policies, procedures, operational controls, and monitoring and measurement processes to prevent future nonconformance. Once the Team is satisfied that the corrective actions are sufficient to address the root-cause of the issue and prevent recurrence, the Team communicates the completed action plan with the internal or external auditor that issued the nonconformance to review and close out the nonconformance.

**Management Review Process**

The System undergoes annual Management Reviews conducted by members of MSD’s Executive Management Team. This review includes monitoring and measurement data, progress toward goals and objectives, internal and external audit results, conformance to NBP Conformance Requirements, and the Biosolids Management Policy. To date, the participants have consistently provided quality input and recommendations for the improvement of the System.

**Corrective and Preventive Action Requests and Responses**

The establishment of a systematic process for preventing and responding to nonconformance is crucial to the effectiveness of a biosolids management system; facilitating continuous improvement and helps prevent issues from occurring or recurring. The Management Team has recently improved this process by redesigning the tools used to record and track nonconformances and associated corrective action plans. The Team meets monthly to review and track the progress of any open corrective action plans.
4. **DETAILED AUDIT RESULTS**

This section describes observations noted and categorized by Positive Observations, Opportunities for Improvement, Major Nonconformance, and Minor Nonconformance. The following observations were identified by the internal audit team while reviewing the Minimum Conformance Requirements outlined in the NBP Third Party Auditor Guidance Manual.

**Positive Observation**

**ELEMENT 1 – Biosolids Management Program (BMP) Manual**

Document the Biosolids Management Program in a BMP Manual or equivalent set of program documents that describe, at least at a general level, the applicable policies, programs, plans, procedures, and management practices in the BMP.

_Auditor:_ The dedication of the Louisville Green Management Team has led to achieving NBP double platinum-level certification. The LGMS Manual shows a clear and concise plan to manage and maintain the certification. Internal Audit noted the work the LGMS staff performs to keep the LGMS processes effective and current.

**Opportunity for Improvement**

Consider having a member(s) of the treatment plant operation staff participate as a member(s) of the internal audit team.

_Auditor:_ The Third Party Audit identified this as an opportunity for improvement as well. Having an employee familiar with the biosolids process from the “manufacturing side” adds a different perspective to the discussions surrounding the process. At the time of the internal audit, the replacement person for this position had not been assigned.

**Management Response:**

At the last Louisville Green Team Meeting an operator was choses to participate in the third party audits, the monthly team meetings and any site visits during the year.

**Minor Nonconformance - 2**

**ELEMENT 6 – Public Participation in Planning**
Element 6 addresses the public participation requirements of the NBP BMP, including specific areas that must be included in the public participation approach, such as the commitment to the ten principles in the Code of Good Practice, as well as specific requirements for when public participation ought to happen, such as during development of BMP goals and objectives.

Auditor: The Process Support Supervisor did not send notice of the #13 Internal Audit to interested parties as outlined in Appendix 6B, point 2.

Management Response:

The Process Support Supervisor will make a checklist for audit preparation to prevent a future re-occurrence.

**ELEMENT 8 – Training**

Element 8 describes training requirements to ensure that biosolids management activities are being performed by competent and qualified employees and contractors.

Auditor: A list was created to identify the internal parties who need to receive annual training. Online training was created and was sent to all parties identified as needing training. Of the 182 people who needed training, 16 did not complete the training. Eight were MSD Board members, four were MSD Executive staff, and the remaining four were employees on leave.

Management Response:

The MSD Board members did not participate in the online training due to computer connectivity restrictions to the MSD network. If a resolution is not found before the next yearly training, the MSD Board members will be provided the training in a closed session.

**THIRD PARTY EXTERNAL AUDIT FOLLOW-UP**

**Minor Nonconformance**

Element 2 – LGMS is committed to following the Code of Good Practice for Biosolids developed by the National Biosolids Partnership. The first principle is compliance, which
is a commitment to compliance with all applicable federal, state, and local requirements regarding production at the wastewater treatment facility, and management, transportation, storage, and use or disposal of biosolids away from the facility. The LGMS does not have in place a method of evaluating the land application of biosolids in Indiana and Kentucky to assure it is complying with the federal and state regulations.

6/27/2018 Status: Complete
The Core Team has committed to visiting one land application site in Kentucky and Indiana each calendar year.

Requirement 7.1 – The Core LGMS Team plays a critical role in the Biosolids Management Program, however it’s roles and responsibilities are not addressed in the Element 7 procedure of the Louisville Green Management System Manual.

6/25/2018 Status: Complete
Element 7 has been updated to reflect Core Team Responsibilities.

Requirement 16.1 – The standard requires the internal audit program cover all the organizations biosolids management program activities including those performed by contractors. The most recent internal audits have not included auditing the activities performed by contractors.

6/25/2018 Status: Complete
Items will be addressed during the 2018 Internal Audit.

Opportunities for Improvement

Requirement 3.2 – Consider including in the Appendix 3A – List of Critical Control Points more details on specific potential environmental impacts associated with each critical control point, such as air pollution, surface water pollution, groundwater pollution, soil contamination, resource depletion, impact on human health, etc.

7/31/2018 Status: Complete
Appendix 3A Environmental Impact Column has been updated. Waiting on Core Team Review.

Requirement 4.2 – Consider including in Appendix 3A – List of Critical Control Points reference to IN and KY Land Application Permits in appropriate column or row locations associated with each critical control point.

7/31/2018 Status: Complete
Appendix 3A has been updated. Awaiting Core Team Review.

Requirement 5.3 – Consider developing a goal and objective for odor measurement and control related to air quality as a result of input from interested parties developed through proactive public participation.

11/12/2018 Status: Complete
1. It was decided to have a G&O directly related to air quality. We discussed to also tie it to the biosolids on plant as they are the cause of any off site odors. Air related G&O will be created for 2019.

2. MSD currently is having problems with the Envirosuite program. It is not reliable to give real time data and we do not feel confident in dedicating time and resources for a goal this year.

3. Staff has made a different goal for odor, relating it to the solids inventory on the plant. 11-12-18 RB

Requirement 5.6 – Consider having the public relations personnel develop a goal and objective that directly relates to the “relations with interested parties” outcome area.
10/19/2018 Status: Complete
Sheryl Lauder was emailed to inquire about G&O’s specific to Biosolids and Louisville Green. With the departure of R. Bates the question was asked if there was still going to be outreach in this field. The answer was yes, but no goal and objective would be created.

Requirement 5.6 – Consider developing a goal and objective for the pretreatment program that directly relates to the “regulatory compliance” outcome area.
10/19/2018 Status: Complete
The pretreatment dept structures their existence to protect the treatment plants. Thought was given to create a goal for regulatory compliance, but was deemed un-necessary as IWD is in compliance with all of their requirements.

Requirement 5.6 – Consider developing a goal and objective for improving performance of maintenance management.
10/19/2018 Status: Complete
The maintenance group has just converted to Hansen for all work order entry and tracking. Hansen is capable of providing more reports than we previously had in SAP. It was decided to finish to use next year to capture the work order completion data and use this information to create a goal for 2020.

Requirement 8.1 – Consider developing a training effort for operations staff to facilitate the use of corrective action forms (including root cause analyses) for identification of operational upsets, unusual occurrences, or other improvement areas that are not necessarily associated with scheduled or unscheduled maintenance.
7/2/2018 Status: Complete
Ron Scherer stated he would take the first few minutes of any training session at Morris Forman and remind the operators of the nature and use of the Corrective Action Form. Ron has committed to do this for the next 4 training sessions.

Requirement 11.1 – While Louisville conducts training and field exercises to evaluate the effectiveness of emergency preparedness and response procedures they do not prepare
written post action reports addressing corrective actions required and preventive actions proposed to eliminate problem recurrences.
10/19/2018 Status: Complete
No additional information will be provided as Safety does not deem necessary.

Requirement 11.3 – Currently the locations of emergency response equipment are not identified (e.g. a map).
12/12/2018 Status: NOT COMPLETE
Safety is currently working on updating the list of all safety equipment. It was stated that this information could be incorporated into one of the exit maps already presented throughout the plant.
Emailed Mitchell for an update 12-7-18

Requirement 12.2(c) – The hard copy MSD Emergency Response Plan found in the files was the 2010 version, while the currently effective version was issued in 2014.
7/2/2018 Status: Complete
All identified Red Binders have been updated.

Requirement 15.1 – The Louisville Green Program Performance Reports did not contain sufficiently detailed results of the most recent independent third party interim audit.
7/2/2018 Status: Complete
2017 Program Performance Report has been updated with the audit findings from the External June 2016, Internal Dec 2016 and Internal 2017 audit findings.

Element 16 – Consider having a member(s) of the treatment plant operation staff participate as a member(s) of the internal audit team.
6/18/2018 Status: NOT COMPLETE

Requirement 16.3 – The standard requires the organization to maintain identification of the lead auditor qualifications. Element 16: Internal LGMS Audits does not identify the criteria for lead auditor qualifications.
7/3/2018 Status: Complete
Manual revisions have been made.
5. **APPENDICES**

5A. **LIST OF REQUESTED RESOURCES**

- MSD LGMS Manual (2018 Version 2)
- NBP Third Party Verification Auditor Guidance Manual (effective August 2011)
- NBP Minimum Conformance Requirements for Elements #1 – 17

5B. **LIST OF REVIEWED DOCUMENTS**

- Contractor Requirements – Revision 5  
  Source: W:\DATA\EMS\EMS Manual\6. Operational Control\Contractor Control\Contractor LGMS Requirements

- Contractor Safety Training Manual – 2015  
  Source: W:\DATA\EMS\EMS Manual\6. Operational Control\Contractor Control\Contractor LGMS Requirements

- Appendix 4A, List of Legal and Other Requirements – Revision 022  
  Source: W:\DATA\EMS\EMS Manual\4. Compliance

- Appendix 4B, List of Permits and Licenses – Revision 014  
  Source: W:\DATA\EMS\EMS Manual\4. Compliance

- Appendix 4C, List of Permit and License Due Dates – Revision 009  
  Source: W:\DATA\EMS\EMS Manual\4. Compliance

- Appendix 4D, List of Information Sources – Revision 003  
  Source: W:\DATA\EMS\EMS Manual\4. Compliance

- Appendix 5A, Goals and Objectives – Revision 019  
  Source: W:\DATA\EMS\EMS Manual\5. Improvement and Communication\Goals and Objectives

- Appendix 6A, List of Interested Parties – Revision 013  
  Source: W:\DATA\EMS\EMS Manual\5. Improvement and Communication

- Appendix 9A, Record of Public Input and Inquiries (11/26/2018)
Source: W:\DATA\EMS\EMS Manual\5. Improvement and Communication

- Appendix 3A, Critical Control Points – Revision 028
  Source: W:\DATA\EMS\EMS Manual\6. Operational Control\Critical Control Points

- LGMS Contractor Requirements (03/12/2018)
  Source: W:\DATA\EMS\EMS Manual\6. Operational Control\Contractor Control\Contractor LGMS Requirements

- Louisville Green Brochures – Updated March 2018
  Source: W:\DATA\EMS\EMS Manual\5. Improvement and Communication\Public Communication\Louisville Green Brochure\2015

- http://www.louisvillegreen.com/

- Appendix 14A, Corrective Action Plan Spreadsheet – Revision 90
  Source: W:\DATA\EMS\EMS Manual\5. Improvement and Communication\Corrective Actions

- Appendix 14B, Corrective Action Plan Form Operations Blank – Revision 002
  Source: W:\DATA\EMS\EMS Manual\5. Improvement and Communication\Corrective Actions

- Corrective Action Plans from External Audit #8 (#CA77-#CA92)
  Source: W:\DATA\EMS\EMS Manual\5. Improvement and Communication\Corrective Actions\Active Corrective Actions

- Louisville Green Program Performance Report for 2017 – Revision 002
  Source: W:\DATA\EMS\EMS Manual\5. Improvement and Communication\Program Performance Reports\2017

- LGMS Internal Audit Report #11 – Conducted June 2017
  Source: W:\DATA\EMS Audit\2017 Audit

- LGMS Third-party Audit Report #8 – Conducted June 2018
  Source: W:\DATA\EMS\EMS Manual\5. Improvement and Communication\Audits\3rd Party Audit\#8 – 3rd Party Audit – June 2018

- Management Review Scope 2017
Source: W:\DATA\EMS\EMS Manual\2. Management Direction\Management Review Meetings\2018

- Management Review Minutes – April 26, 2018
  Source: W:\DATA\EMS\EMS Manual\2. Management Direction\Management Review Meetings\2018

- Action Plan for 2018 Management Review – Revision 000
  Source: W:\DATA\EMS\EMS Manual\2. Management Direction\Management Review Meetings\2018
5C. AUDITOR QUALIFICATIONS

Sandra Conner: Internal Auditor  
Certified Internal Auditor  
MSD Executive Offices  
Over 20 Years Internal Audit Experience

Jennifer Garland-Waters: Staff Auditor I  
Certified Internal Controls Auditor  
MSD Executive Offices  
10 Years Internal Audit Experience