



National Biosolids Partnership
Biosolids Management Program Interim Audit Report

Knoxville Utilities Board
Kuwahee Wastewater Treatment Plant
Knoxville, Tennessee

Audit Dates: December 12 to 13, 2013

Audit Conducted By: DEKRA Certification, Inc. (Chalfont, PA)

Audit Team: Jon Shaver, Biosolids EMS Lead Auditor / Biosolids Auditor

Report Written By: Jon Shaver, Biosolids EMS Lead Auditor

Report Date: December 19, 2013

Reviewed By: Ms. Adonia Phillips, Knoxville Utilities Board

Approved By: Michelle Hunn, DEKRA Certification, Inc.

Biosolids Management Program Interim Audit Report
Knoxville Utilities Board, Knoxville TN
Audit Dates: December 12 to 13, 2013

Table of Contents

1.	SUMMARY	3
2.	AUDIT DETAILS	4
2A.	Local Agency Details.....	4
2B.	Audit Team.....	4
2C.	Audit Criteria, Scope and Methodology	4
2D.	Definitions of Audit Findings & Required Corrective Action	5
2E.	Reference Materials	5
2F.	Additional Information	6
3.	SUMMARY OF AUDIT RESULTS.....	7
3A.	Strengths.....	7
3B.	Nonconformances Found This Audit	7
3C.	Nonconformances from Previous DEKRA Audits	7
3D.	Verification Conclusion.....	7
3E.	Appeals.....	7
3F.	Agreements.....	8
4.	BIOSOLIDS MANAGEMENT PROGRAM DYNAMICS	9
4A	Significant Changes Since the Previous DEKRA Audit.....	9
4B	Management Involvement	9
4C	Effectiveness Reviews	9
4D	Internal Audits	10
4E	Review of Nonconformances from Previous DEKRA Audits	10
4F	Interested Party Interviews	11
4G	Examination of Outcomes	11
5.	PROCESS AUDITS.....	12
5a.	Summary.....	12
5b.	Opportunities for Improvement	12
	APPENDICES	13
	List of Participants.....	13
	List of Documents & Records Reviewed	13

Biosolids Management Program Interim Audit Report
Knoxville Utilities Board, Knoxville TN
Audit Dates: December 12 to 13, 2013

1. SUMMARY

DEKRA Certification, Inc. (DEKRA) conducted an independent Third Party Audit of the biosolids management program being used by Knoxville Utilities Board, Knoxville TN (KUB). The audit was conducted December 12 to 13, 2013 at KUB's request. It was Interim Audit #2 following DEKRA's Verification of the KUB Biosolids Environmental Management System (BEMS) in December 2011.

Audit Purposes

This interim audit was conducted to:

- Confirm that the KUB Biosolids Environmental Management System (BEMS) is functioning effectively, with practices and procedures being performed as documented.
- Verify that the KUB BEMS meets NBP expectations and conforms with all requirements of the NBP Biosolids Management Program (BMP) Elements.
- Examine outcomes KUB is achieving by using a systematic approach for managing its biosolids program.
- Verify that effective corrective action has been taken in response to open nonconformances from previous third party audits.

Summary of Audit Activities and Results

Consistent with NBP requirements for interim audits, DEKRA reviewed the dynamics of KUB's BEMS and audited parts of that program for conformance with expectations and requirements of the NBP BMP Elements (audit criteria). The audit scope was consistent with NBP requirements and the interim audit program agreed by KUB and DEKRA.

No major nonconformance and two minor nonconformances with respect to the audit criteria were found during this audit. KUB has developed corrective action plans to address the nonconformances and those plans have been approved by DEKRA's Lead Auditor.

Audit Conclusions

The audit determined that:

- The KUB BEMS is functioning effectively and generating positive outcomes.
- The management system meets NBP expectations and requirements of the NBP BMP Elements, with minor exceptions.
- All nonconformances from prior DEKRA third party audits have been effectively corrected.

Based on results of this audit, DEKRA continues our Verification that the KUB biosolids management program meets NBP expectations and requirements of the NBP BMP Elements. We recommend continuing certification within the NBP Biosolids Management Program.

Biosolids Management Program Interim Audit Report
Knoxville Utilities Board, Knoxville TN
Audit Dates: December 12 to 13, 2013

2. AUDIT DETAILS

2A. Local Agency Details

Agency Detail

Agency Name: Knoxville Utilities Board, Knoxville TN (referred to as KUB in this report)

Number of Employees = 55

Biosolids Production Sites: Kuwahee Wastewater Plant, Knoxville, TN

Volume of Wastewater Treated = 35 MGD (average); design 44MGD, capacity 120 MGD

Biosolids Produced = 8,000 dry tons per year (30,000 wet tpy) - 100% Class B

Biosolids Use Sites Audited

Lane Chiles Farm, Knox County

Mike Clark Farm, Knox County

Luke Green Farm, Jefferson County

Contractors Participating in Audit

Synagro, Inc.

KUB Biosolids Program

KUB's Biosolids Program includes defined processes for Pretreatment, Wastewater Treatment and Solids Generation, Solids Stabilization, Dewatering, Biosolids Storage and Transportation and Biosolids Disposition (agricultural land application). A contractor (Synagro) is employed for managing and operating centrifuge dewatering and biosolids storage and transportation and for controlling biosolids use options. KUB manages their biosolids program using a Biosolids Environmental Management System (BEMS) based on the NBP BMP Elements.

2B. Audit Team

KUB requested DEKRA Certification Inc. to conduct this independent Third Party Audit of their biosolids program. Mr. Jon Shaver led the audit on behalf of DEKRA. Mr. Shaver is certified by the National Biosolids Partnership as a Biosolids EMS Lead Auditor and Biosolids Auditor. DEKRA asserts that our firm and auditor each have an independent and impartial relationship with KUB that meets NBP criteria for Third Party Audit Companies and Auditors.

2C. Audit Criteria, Scope and Methodology

Audit Criteria

Requirements stipulated in the NBP BMP Elements (July, 2011) and the KUB "Biosolids Environmental Management System" were used as criteria for this audit.

Audit Scope

The scope of this audit covered parts of the KUB biosolids program, with special attention to practices and management activities that directly support biosolids-related operations, processes and activities.

Biosolids Management Program Interim Audit Report
Knoxville Utilities Board, Knoxville TN
Audit Dates: December 12 to 13, 2013

The audit covered the following topics, consistent with NBP requirements for interim audits, the interim audits program previously agreed to by DEKRA and KUB and the Scope of Work for this audit agreed by KUB and DEKRA.

1. Management System Dynamics Review:
 - Significant changes affecting the biosolids management program
 - Internal Audits
 - Effectiveness:
 - Corrective & Preventive Action Process
 - Goals & Objectives Process
 - Management Review Process
2. Process Audits:
 - Biosolids Storage & Transportation
 - Biosolids Use – Land Application
 - Competence, Awareness & Training
 - Compliance (with legal & other requirements)
3. Interested party interviews
4. Verification of effective correction of open nonconformances from previous Third Party audits (i.e. Interim Audit, December, 2012)
5. Examination of outcomes being achieved through KUB's Biosolids Management Program

Audit Methodology

Each audit was conducted as a process audit covering all requirements of the audit criteria that apply to the process. The audits were performed by interviewing key personnel with biosolids responsibilities, observing practices in place and reviewing pertinent documents and records. Interested parties were interviewed and transaction tests were performed to verify management system effectiveness. Standard audit sampling techniques were used.

2D. Definitions of Audit Findings & Required Corrective Action

Major Nonconformance – a serious omission from requirements and/or other departure that represents, or could cause, a systemic failure, or the existence of multiple related minor nonconformances, or failure to effectively correct a nonconformance in a timely manner. For verification to proceed, correction of major nonconformances must be verified by a third party audit within 90 days.

Minor Nonconformance – an isolated departure from requirements that does not represent a systemic failure. Minor nonconformances require timely and effective correction by the agency and verification by a Third Party Auditor during the next third party audit.

Opportunity (for improvement) – possible improvement in the EMS based on auditor observations. There is no obligation for action in response to these observations.

2E. Reference Materials

The following documents were used as references during this audit:

Biosolids Management Program Interim Audit Report
Knoxville Utilities Board, Knoxville TN
Audit Dates: December 12 to 13, 2013

KUB BEMS Manual (current version)
NBP "BMP Elements" (July 2011)
NBP Biosolids Management Program Third Party Auditor Guidance (August 2011)
NBP Code of Good Practice
NBP Manual of Good Practice

2F. Additional Information

Further information about this audit and/or the National Biosolids Partnership Biosolids Management Program can be obtained from the Knoxville Utilities Board. Contact Ms. Adonia Phillips (e-mail: adonia.phillips@kub.org).

Biosolids Management Program Interim Audit Report
Knoxville Utilities Board, Knoxville TN
Audit Dates: December 12 to 13, 2013

3. SUMMARY OF AUDIT RESULTS

3A. Strengths

During this audit, DEKRA noted the following strengths in the KUB biosolids management program.

- KUB has an excellent understanding of how to use the corrective & preventive action process.

3B. Nonconformances Found This Audit

Two minor nonconformances were found with respect to the audit criteria. KUB has submitted a Corrective Action Plan for each nonconformance and DEKRA's Lead Auditor has approved those plans. KUB will complete the corrective action plans in a timely manner. DEKRA's Lead Auditor will verify the effective correction of each nonconformance during the next Third Party Audit (see Agreements). The nonconformances are listed below, with reference to the applicable EMS Element.

Minor Nonconformance JS/13-01/3 NBP Element 3 requires the organization to identify critical control points of biosolids management activities throughout the biosolids value chain consistent with authoritative sources. The table identifying operational controls and process control points incorrectly labels "operational controls" and includes several items that are not useful for controlling operations.

Minor Nonconformance JS/13-02/4 NBP Element 4 requires the organization to establish a procedure for identifying and tracking other requirements to which it voluntarily subscribes and to maintain records of those other requirements.. KUB has not identified requirements to which it voluntarily subscribes beyond applicable legal requirements.

3C. Nonconformances from Previous DEKRA Audits

All nonconformances found during previous DEKRA audits are closed as discussed in Section 4 of this report.

3D. Verification Conclusion

Based on the results of this audit, DEKRA has verified that the KUB Biosolids Management Program continues to meet the expectations and requirements of the National Biosolids Partnership BMP. Continuing NBP Platinum Certification is recommended.

3E. Appeals

The NBP provides an appeals process for biosolids organizations and interested parties that disagree with the Verification conclusion of a third party audit. The appeals process involves an Appeals Board; representing a balance of biosolids management interested parties, including an environmental advocacy group and wastewater industry professionals. An appeal must be submitted within 30 days of the Audit Company's verification decision or interim audit decision. Information about the appeals process is available from the National Biosolids Partnership. Contact Ms. Lisa McFadden at lmcfadden@wef.org.

**Biosolids Management Program Interim Audit Report
Knoxville Utilities Board, Knoxville TN
Audit Dates: December 12 to 13, 2013**

3F. Agreements

KUB and DEKRA have agreed that the next Interim Audit will occur in December 2014. That audit can be conducted by DEKRA as a Third Party Audit or by KUB as a self assessment. In either case, a scope of work will be prepared by DEKRA and KUB that is consistent with NBP requirements and the Interim Audits Program previously agreed by DEKRA and KUB.

Biosolids Management Program Interim Audit Report
Knoxville Utilities Board, Knoxville TN
Audit Dates: December 12 to 13, 2013

4. BIOSOLIDS MANAGEMENT PROGRAM DYNAMICS

Review of the management system dynamics and outcomes is intended to verify that the biosolids management system is functioning effectively and generating positive outcomes (results) and that changes are being incorporated into the system. The following summarizes DEKRA's review of the dynamics of KUB's biosolids management program.

4A Significant Changes Since the Previous DEKRA Audit

Two new bar screens were added with reduced screen size to help remove incoming trash. A digester cleanout is planned for June 2014.

The KUB Biosolids Environmental System (BEMS) and related documentation (BEMS Manual) have not changed significantly.

4B Management Involvement

Biosolids Policy Commitments

The KUB Biosolids Management Policy was reviewed by management on December 2, 2013 and remains unchanged as approved 2010. The Policy commits to follow the principles of the NBP Code of Good Practice. Review of performance in meeting commitments made in that Policy demonstrated the Policy has been effectively incorporated into the biosolids program and that continual improvements are occurring.

Management Reviews

Management involvement has been demonstrated through actions taken regarding issues raised in management reviews and programs for measurement and improvement. The actions taken are consistent with defined objectives. The review process includes discussion of BEMS performance and any need for changes at bi-annual BEMS Management Review led by the BEMS Coordinator. The review and follow-up actions are recorded.

4C Effectiveness Reviews

Communications Program

Regular communications with biosolids regulators occurs through meetings and e-mails. Brochures are used to provide information to the public about biosolids. The KUB website includes information about the Biosolids Management System. Interested parties interviewed confirmed the Communications Program is proactive. A Biosolids Performance Report for 2012 was prepared and issued publicly. Internal communication occurs through training and regular staff meetings.

Biosolids Goals and Objectives Process

Nine of the twelve objectives set in 2012 were achieved and adequate progress is occurring for the other three. New objectives were set for 2013/14. The Goals and Objectives process is working effectively.

Corrective and Preventive Action Process

Biosolids Management Program Interim Audit Report
Knoxville Utilities Board, Knoxville TN
Audit Dates: December 12 to 13, 2013

The Corrective and Preventive Action process was used to address nonconformances from previous Third Party Audits and internal audits. The process used includes a dynamic database that monitors progress in completing corrective / preventive actions. The process is functioning effectively.

4D Internal Audits

An internal audit of parts of the KUB BEMS was conducted in June 2013. Corrective actions from that audit were recorded and implemented. In addition, KUB performs quarterly inspections of biosolids use sites to monitor compliance and general conditions.

4E Review of Nonconformances from Previous DEKRA Audits

Corrective action taken in response to nonconformances from DEKRA's Interim Audit of the KUB Biosolids Management Program in December 2012 were reviewed for effectiveness. The status of those nonconformances is summarized below.

Minor Nonconformance JS 12-01 NBP EMS Element #3 requires the organization to identify critical control points for biosolids management throughout the biosolids value chain and that the critical control points be consistent with the National Manual of Good Practice. Identified operational control points (KUB term for critical control points) do not include the landfill option for biosolids disposition and there is no rationale stated for that exclusion.

Corrective Action - KUB determined that this nonconformance was caused by an oversight. In response, KUB added landfill to the biosolids use options in the critical control point identification table. Review by DEKRA's Lead Auditor verified that this action was effectively completed to prevent recurrence of the nonconformance. This nonconformance is now closed.

Minor Nonconformance JS 12-02 NBP EMS Element #14 requires the organization to investigate any noncompliance with applicable regulatory requirements, identify the cause and document the necessary corrective actions. The Corrective and Preventive Action process was not used in investigating and correcting a permit noncompliance (tss exceedance) that occurred 9/18/12.

Corrective Action - KUB determined that this nonconformance was caused by NOVs being addressed by a different procedure. In response, KUB modified the CAPA procedure to include investigation and correction of permit exceedances. Review by DEKRA's Lead Auditor verified that this action was effectively completed to prevent recurrence of the nonconformance. This nonconformance is now closed.

Minor Nonconformance JS 12-03 NBP EMS Element #16 requires the organization to establish and maintain an internal audit program to periodically analyze its BMP. Internal audits were conducted in December 2010 and November 2012. Audits conducted 23 months apart are not sufficient for monitoring management system performance.

Corrective Action - KUB determined that this nonconformance was caused by a lack of understanding of the need for "periodic" internal audits. In response, KUB modified the internal audit process so that audits are conducted more frequently at the request of management. Review by DEKRA's Lead Auditor verified that this action was effectively completed to prevent recurrence of the nonconformance. This nonconformance is now closed.

Biosolids Management Program Interim Audit Report
Knoxville Utilities Board, Knoxville TN
Audit Dates: December 12 to 13, 2013

4F Interested Party Interviews

During this audit, DEKRA interviewed local farmers who use biosolids and a representative of the State Department of Environmental Protection. All were positive about the KUB biosolids program and communication channels with KUB.

4G Examination of Outcomes

The KUB BEMS is improving through the use of a systematic approach to managing their biosolids activities. The following improvement outcomes within the past two years were confirmed.

Relations with Interested Parties

Quarterly assessments of contractor field performance are leading to better understanding and improved performance.

Environmental Performance

Reducing size of bar screens to 3/8 inch has led to improved biosolids quality (less trash) and improved grease removal.

Regulatory Compliance

KUB is considering voluntary setbacks from houses and property lines despite relaxation of setback rules by TDEC.

Quality Practices

The operating dashboard is used to ensure operations remain within set point parameters.

An Operator Qualification Program is being developed to improve operator skills and operating consistency.

Biosolids Management Program Interim Audit Report
Knoxville Utilities Board, Knoxville TN
Audit Dates: December 12 to 13, 2013

5. PROCESS AUDITS

5a. Summary

As part of this audit DEKRA audited the following processes that KUB uses within its biosolids management program and determined the level of conformance of each process with NBP expectations and requirements of the audit criteria.

Process	Conformance with Applicable NBP BMP Elements
Biosolids Storage & Transportation	Conforms
Biosolids Use – Land Application	Conforms
Competency, Awareness & Training	Conforms
Communications Program	Conforms
Control of Contractors	Conforms
Compliance (with legal & other requirements)	Conforms, with minor exception as noted in Section 3

5b. Opportunities for Improvement

The following “opportunities” for improving the KUB biosolids program were noted during the audit. Opportunities do not represent nonconformances and KUB has no obligation to take any action in response to them.

- Consider including environmental initiatives in Business Education Services communications.
- Establishing additional biosolids use options could help in developing more diversified biosolids reuse.
- Internal audit reports could more clearly define the purpose of the audit and conclusions could more directly relate to the purpose.
- Contractor Performance Assessments could provide a conclusion about the performance and identify any actions needed.
- A great deal of effort is being used to improve employee qualifications, skills and training. A measure of how effective that training is could help in continually improving the training.
- Feedback to persons who have complained about biosolids use discussing decisions and actions made could help alleviate future public concerns.
- Two interested parties asked about the effect of heavy metals in biosolids that is land applied. Information about heavy metals could be prepared to address this question.

Biosolids Management Program Interim Audit Report
Knoxville Utilities Board, Knoxville TN
Audit Dates: December 12 to 13, 2013

APPENDICES

List of Participants

The following persons participated in this audit. Other persons provided additional explanations, as needed.

KUB & Synagro Personnel

Mary Brown	Pretreatment Coordinator
Daniel Dodson	Technical Service Manager (Synagro)
Jimmy England	Plant Supervisor
Christine Gilmore	Technical Services
John Gresham	Plant Manager
Renee Henderson	Technical Writer
Ann Marie Johnson	Training
Kelly Lane	Communications Team Lead
Chris Mitchell	Operator (Synagro)
David Obenschain	Program Technician
Carol Payne	Training
Wayne Pearson	Field Manager (Synagro)
Adonia Phillips	BEMS Coordinator, Plant Supervisor
Stephanie Pickens	Operations Manager (Synagro)
Diane Rauch	Operations
Chris Thomas	Plant Supervisor
Sarah Walker	Operations

Interested parties

Mike Clark (farmer, biosolids user)
Phil Melhorn (farmer, biosolids user)
Hassan Sanaat (Environmental Protection Specialist, TDEC)

List of Documents & Records Reviewed

Annual regulatory update 12/5/13	Internal audit report 6/11/13
Biosolids Performance Report 2012	Key performance indicators
BMP Operational Controls table	KUB Biosolids Policy
Contractor Performance Assessment	KUB General Handout
Corrective and Preventive Action records (various)	Management review records 4/25/13, 12/2/13
Critical control point & operational controls table	Neighbor compliant record 7/16/13
Energy Worldnet Operator Qualification Training records	On-line training records (various)
Form 1b Biosolids	Operator qualification – new hires
General State Operation Permit for land application of biosolids	Record of public input
	SOPs (various)

**Biosolids Management Program Interim Audit Report
Knoxville Utilities Board, Knoxville TN
Audit Dates: December 12 to 13, 2013**

END OF REPORT