



**National Biosolids Partnership  
Biosolids Management Program  
Interim Audit**

**Knoxville Utilities Board  
Kuwahee Wastewater Treatment Plant  
Knoxville, Tennessee**

Audit Dates: December 4 & 5, 2017

Audit Conducted By: DEKRA Certification, Inc.

Audit Team: Mr. Jon Shaver, Certified Biosolids EMS Lead Auditor / Biosolids Auditor

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Report Date: Final January 15, 2018

Reviewed By: Hannah Claytor, Knoxville Utilities Board

Approved By: Michelle Hunn, DEKRA Certification Inc. (January 15, 2018)

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### 1. EXECUTIVE SUMMARY

DEKRA Certification, Inc. (DEKRA) conducted an independent third party audit of the environmental management system (EMS) being used by the Knoxville Utilities Board (KUB) in managing its biosolids program. The audit was conducted at KUB's request December 4 and 5, 2017 as part of an integrated audit covering requirements of the National Biosolids Partnership (NBP) BMP Elements. The audit was an Interim Audit (#2-1) for continuing DEKRA Verification and NBP Certification.

#### Audit Purposes

This Interim Audit was conducted to:

- Verify that the biosolids management program being used by KUB meets National Biosolids Partnership (NBP) expectations and conforms with requirements of the NBP BMP Elements.
- Confirm that the KUB biosolids management program is functioning effectively, with practices and procedures being performed as documented.
- Examine outcomes KUB is achieving by using a systematic approach for managing its biosolids program.
- Verify the effectiveness of corrective action taken in response to open nonconformances from previous DEKRA third party audits.

#### Summary of Audit Activities and Results

DEKRA reviewed KUB's Biosolids Management Program and audited that program for conformance with expectations and requirements of the NBP Biosolids Management Program Elements (audit criteria). The audit scope was consistent with NBP requirements, as stated in the NBP Auditor Guidance (2011).

No major nonconformances and two minor nonconformances with respect to the audit criteria were found during this audit. KUB has developed corrective action plans to address the nonconformance that have been approved by DEKRA's Lead Auditor. DEKRA will review the effectiveness of the completed corrective actions during the next third-party audit.

#### Conclusions

Based on the results of this audit, DEKRA has determined that:

- Use of a management system approach is generating positive outcomes for KUB's biosolids program in the areas of regulatory compliance, environmental performance, quality practices and relations with interested parties.
- KUB biosolids practices are consistent with NBP expectations and meet requirements of the NBP BMP Elements, with minor exceptions.
- All nonconformances from prior DEKRA audits have been effectively corrected.

This audit has verified that the KUB biosolids management program meets NBP expectations and requirements and we recommend continuing certification within the NBP Biosolids Management Program.

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## **2. AUDIT DETAILS**

### **2A. Agency Details**

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

Number of Employees = 42

Biosolids Production Sites: Kuwahee Wastewater Plant, Knoxville, TN

Volume of Wastewater Treated = 25 MGD (average); design 44MGD, capacity 120 MGD

Biosolids Produced = 6,200 dry tons per year (all Class B)

Biosolids Use Options: 100% agriculture land application

#### 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 Use. A contractor (Synagro) is employed for managing biosolids dewatering and transportation and use options.

KUB manages their biosolids program using a "Biosolids Environmental Management System (BEMS) that is based on the NBP BMP Elements.

#### Contractors Participating in Audit

Synagro

#### Interested Parties Interviewed

The following interested parties were interviewed to verify the effectiveness of the Communications, Public Participation and Compliance processes.

Anastasia Sharp – Environmental Specialist TDEC

Bill Loy – Farmer (biosolids user)

### **2B. Audit Criteria**

The KUB biosolids program activities were assessed against requirement of the NBP BMP Elements (July 2011) and the KUB EMS.

### **2C. Audit Team**

KUB authorized DEKRA Certification Inc. to conduct this third-party audit of their biosolids program. DEKRA is an accredited Third Party Audit Company within the NBP Biosolids Management Program. Mr. Jon Shaver led the audit on behalf of DEKRA. Mr. Shaver is certified by NBP as a Biosolids EMS Lead Auditor and Biosolids Auditor. DEKRA and the auditor assigned to this audit have an independent relationship with KUB that meets NBP criteria for Third Party Auditors.

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### 2D. Audit Scope and Locations

The audit was consistent with NBP requirements for Interim Audits and the Scope of Work agreed by KUB and DEKRA. It was conducted to cover requirements of the NBP BMP Elements (July 2011), with special attention to practices and management activities that directly support biosolids-related operations, processes and activities.

The following processes were audited:

1) Management Direction

- Communication Program
- Management involvement (including direction, Biosolids Policy, biosolids program planning, management review)

2) BMP Planning Processes

- Identification of Critical Control Points & Operational Controls
- Biosolids Program Goals & Objectives

3) Support Processes

- Competency, Training & Awareness (including internal communication)
- Document Control & Recordkeeping

4) Checking & Improvement Processes

- Internal EMS Audits
- Corrective and Preventive Action

5) BMP Implementation

- Biosolids Dewatering (including contracted operations)
- Biosolids Preparation (Stabilization, Conditioning & Handling)

6) Review corrective action for open nonconformances (DEKRA 2016 audit)

7) Examination of outcomes being achieved in the areas of regulatory compliance, interested party relations, environmental performance and quality practices

#### Notes:

- Transactions were tested to verify the continuing health of the EMS
- Interested party interviews were conducted to verify the effectiveness of the Communications Program, and included interviews with a biosolids regulator (TDEC) and a user of KUB biosolids.

### 2E. Audit Methodology

The audit was conducted by qualified auditors following guidelines stated in the NBP Auditor Guidance (August 2011). The auditor observed practices in place, interviewed key persons and reviewed pertinent documents and records using sampling techniques to assess the systematic performance of the process being audited and the consistency of biosolids management practices

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with written procedures. This audit is not a verification of compliance with any legal requirements applicable to biosolids practices performed by the agency or its contractors.

### 2F. Reference Materials

The following documents were used as references during this audit:

- KUB EMS Manual (November 2017)

- National Biosolids Partnership "BMP Elements" (July 2011)

- National Biosolids Partnership Biosolids EMS Third Party Auditor Guidance (August 2011)

- National Biosolids Partnership Code of Good Practice

- National Biosolids Partnership Manual of Good Practice

### 2G. 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 continue, major nonconformances must be corrected and verified by 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 the third party auditor during the next third party audit.

Opportunity (for improvement) – a possible improvement in the management system based on audit observations. There is no obligation for action in response to these observations.

### 2H. Additional Information

Further information about this audit and/or the National Biosolids Partnership BMP can be obtained from Knoxville Utilities Board by contacting Ms. Hannah Claytor at [Hannah.Claytor@Kub.org](mailto:Hannah.Claytor@Kub.org).

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### 3. SUMMARY OF AUDIT RESULTS

#### 3A. Verification Conclusion

The Knoxville Utilities Board has been independently verified by DEKRA Certification, Inc. as having an effective biosolids environmental management system that supports continual improvement in environmental performance, meeting regulatory compliance obligations, utilizing good management practices and creating meaningful opportunities for public participation and is in conformance with requirements of the National Biosolids Partnership Biosolids Management Program.”

We recommend continued Certification within the NBP Biosolids Management Program.

#### 3B. Strengths Observed

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

- Internal auditors understand the use and value of process audits, particularly for assessing effectiveness based on interactions between processes.

#### 3C. Audit Findings – Nonconformances

The following minor nonconformance was identified during the audit. KUB has prepared corrective action plans for each nonconformance and those plans have been approved by the Lead Auditor. Verification of effective corrective action will occur during the next DEKRA audit at KUB.

Minor Nonconformance JS/17-01/5 NBP BMP Element 5 requires the organization to the establish and periodically review measurable objectives for its biosolids management activities to continually improve the performance of its BMP.

6 of 9 biosolids objectives established for 2017 are not sufficiently measurable to identify intended improvement (e.g. “collect more qualitative data from famers”).

Minor Nonconformance JS/17-02/14 NBP BMP Element 14 requires the organization to develop and implement a procedure to investigate nonconformance with internal BMP procedures, take actions to correct the nonconformance and document corrective actions taken to prevent a recurrence.

Review of completed corrective actions does not consistently verify the effectiveness of the action to ensure problems do not re-occur. In addition, the responsibility and timing for corrective actions is not always stated in the CAR Plans.

#### 3D. Status of Nonconformances from Previous DEKRA Audits

Corrective action taken in response to nonconformances from the DEKRA's audit of the KUB Biosolids Management Program in September 2015 were reviewed for effectiveness. The results are summarized below.

#### 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

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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 Mr. Patrick Dube at [pdube@wef.org](mailto:pdube@wef.org)

### **3F. Agreements**

KUB and DEKRA have agreed that the next audit, an Interim Audit, will occur in December 2018 (exact timing to be agreed in advance). That audit will be conducted by DEKRA as a Third Party Audit. The scope will be consistent with NBP requirements and be arranged in advance.



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### **4. BIOSOLIDS MANAGEMENT PROGRAM DYNAMICS**

Review of the biosolids management program dynamics and outcomes is conducted to verify that the biosolids management program is functioning effectively and generating positive outcomes (results) and that changes are being incorporated consistent with requirements. The following summarizes DEKRA's review of the dynamics of the KUB Biosolids EMS.

#### **4A Significant Changes**

Two organizational changes have occurred in the past year:

Josh Johnson has assumed responsibility as Manager – Plant Operations

Steve Clattenberg has assumed responsibility as Wastewater Operations Supervisor

No other significant changes affecting the KUB Biosolids EMS have occurred since the previous Third Party Audit.

#### **4B Revisions to the Management System**

Minor changes were made in the KUB Biosolids EMS that did not significantly affect the management system.

#### **4C Biosolids Policy Commitments**

The KUB Biosolids Management Policy remains as previously approved. The Policy includes a commitment to meet NBP requirements, which by inference includes following the principles of the Code of Good Practice. Review of performance in meeting commitments made in that Policy demonstrated it has been incorporated into the Biosolids Management Program and that continual improvements are occurring.

#### **4D Effectiveness Reviews**

##### Communications Program

The KUB Communications Program includes proactive methods for communicating with interested parties, including the public and regulators. Communications occurs through public presentations and an interactive website. Interested parties interviewed during this audit noted that effective and useful channels of communication are in place..

##### Biosolids Goals and Objectives Process

2 biosolids program objectives from 2017 were achieved and 3 have adequate progress in achievement. Three objectives were not met and KUB investigated reasons for the lack of achievement and took corrective action. These results demonstrate that the Goals and Objectives process is working effectively.

##### Internal Audits

Internal audits were conducted 6/9/17 and 9/9/17. A finding was addressed using the corrective action process. The Internal Audit process is functioning effectively.

##### Corrective and Preventive Action Process

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The Corrective and Preventive Action process was used to address nonconformances from previous Third Party Audits and internal audits. The process is working effectively.

### **Management Review**

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. Follow-up actions are recorded. The Management Review process is functioning effectively.

### **4E Examination of Outcomes**

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

#### **Relations with Interested Parties**

KUB voted a “favorite” in Green Business category in Knoxville Sentinel reader poll.

No official complaints since 2013.

Product has been rebranded (new logo) with intent of improving public understanding about biosolids

#### **Regulatory Compliance**

Increased inspections of SIUs has helped reduce pretreatment NOVs from about 5 / month to 1 / month and significant noncompliances from 5 / six months to about 1 / six months.

#### **Environmental Performance**

KUB is participating in several governmental environmental programs that will lead to increase energy efficiency and peak shaving.

#### **Quality Practices**

Increased attention to Gravity Belt Thickener operation, including monitoring % solids, has led to more consistent operation and better dewatering.

Improved screening (1/2 inch replaced by ¼ inch) has resulted in a biosolids product with far less trash.

A “Knowledge Management Initiative” is about 70% implemented intending to improve overall personnel understanding and competence.

### **4F Interested Party Interviews**

DEKRA interviewed 2 interested parties during this audit, including an EPA Regulator and a farmer who uses KUB biosolids. Both noted that good two-way channels of communication are in place. The TDEC regulator noted that the KUB program is in full compliance with regulations. The process for interested party input and communications process was found to be functioning effectively.

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### **4G Use of NBP Certification and DEKRA Verification**

Use of and references to NBP Certificate and DEKRA Verifications were reviewed. There were no concerns.

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### 5. EFFECTIVENESS REVIEWS AND PROCESS AUDITS

#### 5a. Summary of Effectiveness Reviews

Process	Applicable BMP Elements	Conformance
Communications	6, 9, 15	Conforms
Corrective Action	14	Conforms
Goals and Objectives	5	Conforms, except as noted in Minor Nonconformance 17-01
Internal Audits	16	Conforms
Management Review	17	Conforms

#### 5b. Summary of Process Audits

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	Applicable BMP Elements	Conformance
Critical Control Points & Operational Controls (Identification)	3, 10, 13	Conforms
Communication Program	6, 9, 15	Conforms
Competency, Training & Awareness (including internal communication)	8, 9	Conforms
Biosolids Program Goals & Objectives	5	Conforms, except as noted in Minor Nonconformance 17-01
Management involvement (including direction, Biosolids Policy, biosolids program planning, management review)	2, 6, 7, 17	Conforms
Document Control & Recordkeeping	12	Conforms
Internal EMS Audits	14, 16	Conforms
Corrective and Preventive Action	14	Conforms, except as noted in Minor Nonconformance 17-02
Biosolids Preparation (Stabilization, Conditioning & Handling)	3, 10, 13	Conforms
Biosolids Dewatering (including contracted operations)	3, 10, 13	Conforms

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### **5c. Opportunities for Improvement**

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

- Consider stating the “intention” of the BEMS in the beginning of the manual as a starting point for implementing and continually improving the biosolids program.
- Biosolids goals and objectives could more directly include environmental performance improvement.
- It could be helpful to include how progress in achieving objectives will be measured / assessed.
- Dewatering operation (by Synagro) could be included in the Knowledge Management Initiative.
- Work Instructions could better state environmental, quality, public acceptance and regulatory compliance requirements. A “Process Description” could do this as well.
- Internal audits could identify more findings about process effectiveness to help the BEMS improve.

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### APPENDICES

#### List of Participants

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

##### KUB Personnel

Kelsey Campbell	Student Intern
Hannah Claytor	Business Management Analyst / BEMS Coordinator Plant Operations
Steve Clettenburg	Wastewater Operations Supervisor
Thomas Pucci	Wastewater Team Lead
Leslie Glover	Pretreatment Coordinator / Regulatory Compliance
John Gresham	Vice President – Operations
Brian Hamel	Business Management Analyst Safety and Technical Services
Josh Johnson	Manager, Plant Operations
Kelly Lane	Business Management Analyst Communications
David Obenschain	Business Management Analyst Operations
Leanne Parker	BMA Process and Admin Support Team Lead Plant Operations
Brittany Travis	BMA Safety Specialist

##### Contractor Personnel

Bill Bailey	Area Director (Synagro)
Wayne Pearson	Field Manager (Synagro)
Daniel Dodson	Technical Service Specialist (Synagro)

##### Interested parties

Anastasia Sharp – Environmental Specialist TDEC  
Bill Loy – Farmer (biosolids user)

#### List of Documents & Records Reviewed

Audit scope & schedule 4/14/17	KUB webpage
BEMS Manual 11/17/17	Management Review record June 2017, Nov 2017
Biosolids Goals & Objectives 2017	New hire packet
Biosolids Management Policy (2.2 in Manual)	O&M Manuals (various)
Biosolids Performance Report 2016	Process control point table (11/1/17)
CAPA – Gap Creek 12/7/16	Public Presentations list 2017
CAPA 10/26/16	Request for information 11/10/17, 11/15/17
CAPA report May 2017	Root cause analysis 12/7/16
Centrifuge work instructions	TDEC letter to KUB 6/30/17
Internal audit checklist 5/25/17	TDEC permit TN0023582
Internal audit report 6/9/17, 9/9/17	Work Instructions (various)
KUB Blueprint 2014	

### END OF REPORT