



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

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

Audit Dates: November 29 & 30, 2018

Audit Conducted By: DEKRA Certification, Inc.

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Report Date: December 30, 2018

Reviewed By: Hannah Claytor, Knoxville Utilities Board (12-28-18)

Approved By: Cem Onus, Dekra Certification (12-29-18)

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### 1. EXECUTIVE SUMMARY

DEKRA Certification, Inc. (DEKRA) conducted an independent third-party audit of the Biosolids Environmental Management System (BEMS) being used by the Knoxville Utilities Board (KUB) in managing its biosolids program. The audit was conducted onsite at KUB's request November 29 and 30, 2018 covering requirements of the National Biosolids Partnership (NBP) BMP Elements. The audit was an Interim Audit (#2-2) for continuing DEKRA Verification and NBP Certification.

#### Audit Purposes

This Interim Audit was conducted to:

- Verify that the Biosolids Environmental Management System (BEMS) being used by KUB meets National Biosolids Partnership (NBP) expectations and conforms with requirements of the NBP BMP Elements.
- Confirm that the KUB BEMS 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 BEMS 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 no minor nonconformances with respect to the audit criteria were found during this 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.
- 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 = 5,600 dry tons per year (all Class B)

Biosolids Use Options: 100% agriculture land application

#### KUB Biosolids Program

KUB manages their biosolids program using a “Biosolids Environmental Management System (BEMS) that is based on the NBP BMP Elements. The scope of the KUB BEMS includes activities within the full biosolids value chain, including 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.

#### 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.

Alex Miller – Farmer (biosolids user)

Calvin – 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 BEMS.

### **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 was the Biosolids EMS Lead Auditor on behalf of DEKRA. 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) Biosolids Management System Dynamics Review:
  - Significant changes affecting biosolids program
  - BEMS changes (incl documentation)
  - Biosolids Policy (demonstrated commitment, including CoGP)
  - Effectiveness Reviews
    - Communications Program
    - Corrective & Preventive Action
    - Goals & Objectives
    - Internal Audits
    - Management Reviews
- 2) Process Audits:
  - Biosolids Storage & Transportation
  - Biosolids Use – Land Application
  - Communications process
  - Competence, Awareness & Training
  - Compliance (with legal & other requirements)
  - Internal Audits
  - Objectives, Targets process
  - Records Management
- 3) Review corrective action for open nonconformances (DEKRA 2016 audit)
- 4) 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 BEMS
- 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 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.

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### **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.

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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.

- The contractor that KUB uses for land application (Synagro) has an excellent relationship with farmers in the area.

#### 3C. Audit Findings – Nonconformances

No major or minor nonconformances were identified during the audit.

#### 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 December 2017 were reviewed for effectiveness. The results are summarized below.

##### 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”).

**Corrective Action** KUB took immediate action to correct this deficiency by rewording objectives to ensure they are measurable . They determined the nonconformance was caused by misinterpretation of the requirements. In response, KUB reviewed criteria for developing goals and objectives to ensure measurability in each Management Review. DEKRA's Lead Auditor reviewed the completed Corrective action and found it has been effectively implemented. This nonconformance is now closed.

**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

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**Corrective Action** KUB took immediate action to correct this deficiency by holding a management team meeting to discuss nonconformance and plan of action. They determined the nonconformance was caused by incomplete procedure. In response, KUB modified the procedure so that before closing out CAPAs, individuals who are verifying, evaluate the effectiveness of the action, rather than if the action was complete. DEKRA's Lead Auditor reviewed the completed Corrective action and found it has been effectively implemented. This nonconformance is now closed.

### **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 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 by December 2019 (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 the Interim Audits Program that has been agreed by KUB and DEKRA.

### **3G. 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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### **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**

No 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

Long term goals are set by management team addressing regulatory compliance, environmental performance, quality, relations with interested parties. Four objectives for 2018 have been completed, 5 have had adequate progress and 1 has been deferred. These results demonstrate that the Goals and Objectives process is working effectively.

##### Internal Audits

Internal audits planned for 2018/2019. Most recent audit 10/5/18 covered most of the system. The Internal Audit process is functioning effectively.

##### Corrective and Preventive Action Process

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

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### 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

- A local media has selected KUB as a “favorite green business” based on readers’ poll.
- Increased communications within all of KUB has led to increase in KUB employees awareness of the biosolids program and its benefits.

#### Regulatory Compliance

- Volatile solids reduction has improved to 61% during warm months, leading to a bi-monthly average of mid-50% compared to 48% 2 years ago and regulatory limit 38%.

#### Environmental Performance

- Additional instrumentation in processing wastewater as reduced air emissions (control of ammonia) and improved effluent quality.
- Testing % solids from the Gravity Belt Thickener has helped improve volatile solids reduction and reduced total biosolids quantity needing to be land applied.

#### Quality Practices

- Increased preventive maintenance on dewatering filtrate has led to more consistent biosolids flow.

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

DEKRA interviewed 2 interested parties during this audit, 2 farmers who use KUB biosolids. Both are happy with the product supplied to them and the overall level of service and noted that good two-way channels of communication are in place. The process for interested party input and communications process was found to be functioning effectively.

### **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 status	5	Conforms
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
Biosolids Storage & Transportation	3, 10, 13	Conforms
Biosolids Use – Land Application	3, 10, 13	Conforms
Competence, Awareness & Training	7, 8	Conforms
Communications process	6, 9, 15	Conforms
Compliance (with legal & other requirements)	4, 14	Conforms
Objectives, Targets process	5	Conforms
Records Management	12	Conforms

#### 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 defining purposes of BEMS in terms of intended outcomes (e.g. continually improve environmental performance, maintain biosolids quality that exceeds regulatory standards)
- The Compliance process could more fully describe how compliance is systemically linked to operational controls, monitoring / measurement and corrective action processes.

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- Consider limiting “other requirements” to interested party expectations that are relevant and “must-do” obligations (e.g. biosolids quality for land application).
- The BEMS Training Program could include more information on environmental impacts (e.g. air emissions)
- Since Pretreatment is within the scope of the BEMS, required training for Pretreatment personnel could be added to the list of required training in the BEMS Manual.
- When writing internal audit reports, consider summarizing conclusions that directly relate to the defined audit purpose(s).
- Conclusions from Management Reviews could include a focus on the effectiveness of processes such as objectives, internal audits, corrective action.

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### APPENDICES

#### List of Participants

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

##### KUB Personnel

Alex Cawthern	Communications Analyst
Hannah Claytor	Business Management Analyst / BEMS Coordinator Plant Operations
Steve Clettenburg	Wastewater Operations Supervisor
Leslie Glover	Pretreatment Coordinator / Regulatory Compliance
Brian Heameel	Business Management Analyst Safety and Technical Services
Brittany Herman	BMA Safety Specialist
Drew Iles	Analyst
Joshua Johnson	Manager, Plant Operations
Stephanie Midgett	Communications Manager
David Obenschain	Business Management Analyst
Thomas Pucci	Wastewater Team Lead
David Rosecrance	Environmental Specialist

##### Contractor Personnel

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

##### Interested parties

Calvin Hoffner – Farmer (biosolids user)  
Alex Miller – Farmer / Biosolids user

#### List of Documents & Records Reviewed

BEMS Manual 11/17/17  
Biosolids objectives, 2018, 2017  
BEMS training program 2018  
Biosolids Management Policy (2.2 in Manual)  
Biosolids Performance Report 2017  
CAPA 2/19/18 (feb 2018 violation)  
CAPA records (various)  
Connection newsletter April 2018  
Contractor performance assessment 3/23/18  
Demonstration of Capability B Nicholson 5/22/18  
Farmer feedback 1/10/18  
Internal audit report 10/5/18  
Internal audit schedule 11/19/18  
KUB website – Community Outreach

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Land application monthly report January 2018

List of legal and other requirements

Maintenance meeting record (various)

Management review 6/23/18, 11

Mixed liquor trend analysis

Pay for performance review 2017

Permit TN0023582 annual report 2017

Plant Operator Job Posting 11/21/18

Plant Operator Qualification

Record of public input and requests 11/6/18

Scale calibration record 10/18/18

Sludge volume trend (Oct 15 to Nov 28)

SOPs (various)

**END OF REPORT**