



**National Biosolids Partnership**

**Biosolids Management Program Interim Audit Report**

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

Audit Dates: December 3 to 5, 2012

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: January 3, 2013

Reviewed By: Ms. Adonia Phillips, Knoxville Utilities Board (December 11, 2012)

Approved By: Mr. Pierre Salle, Managing Director - DEKRA Certification, Inc. (January 3, 2013)

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## **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 3 to 5, 2012 at KUB's request. It was Interim Audit #1 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 three 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.

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## **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), with capacity 120 MGD

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

#### Biosolids Use Sites Audited

None

#### Contractors Participating in Audit

Synagro, Inc.

#### Interested Parties Participating in Audit

Peg Beute (Ijam, Pace10)

Luke Greene (farmer, biosolids user)

#### 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 centrifuge dewatering, biosolids transportation and 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

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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. 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 Preparation (incl stabilization, conditioning & handling)
  - Biosolids Dewatering (incl contractor control)
  - BMP Planning & Public Participation
  - Communication Program (internal & external)
  - Control of Contractors
  - Corrective and Preventive Action
  - Critical Control Points & Operational Controls
  - Goals & Objectives (for improvement)
  - Internal Audits
  - Management Involvement (incl Policy, Mgmt Review)
3. Interested party interviews
4. Verification of effective correction of open nonconformances from previous Third Party audits (i.e. Verification Audit, December, 2011)
5. Examination of BMP outcomes (regulatory compliance, interested party relations, environmental performance, quality practices)

#### 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.

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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:

- KUB Biosolids Environmental Management System Manual (current version)
- National Biosolids Partnership “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. Appeals**

The NBP provides an appeals process for biosolids organizations and interested parties that disagree with the findings of a third party EMS audit. The verification 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 official verification decision or interim audit decision by the Audit Company. Information about the appeals process is available from the National Biosolids Partnership. Contact Mr. Jim Cox (703-684-2438, [jcoxl@wef.org](mailto:jcoxl@wef.org)).

An appeal process is available to persons concerned about the methods and/or scope of this audit. Further information about this appeal process can be obtained from DEKRA (contact Pierre Salle, [pierre.salle@DEKRA.com](mailto:pierre.salle@DEKRA.com) or Jon Shaver [jon.shaver@DEKRA.com](mailto:jon.shaver@DEKRA.com)) or from NBP (contact Jim Cox, [jcox@wef.org](mailto:jcox@wef.org)).

## **2G. 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](mailto:adonia.phillips@kub.org)).

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### **3. SUMMARY OF AUDIT RESULTS**

#### **3A. Strengths**

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

- Action plans to achieve biosolids objectives and progress in achieving those plans are well documented.
- Operational control points and process controls are well developed.
- A good review of communications systems occurred as part of review for emergency exercises in April 2012.

#### **3B. Nonconformances**

Three 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 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.

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.

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 audit were conducted in December 2010 and November 2012. Audits conducted 23 months apart are not sufficient for monitoring management system performance.

#### **3C. Correction of Nonconformances from Previous Third Party Audits**

Corrective action taken in response to nonconformances from the DEKRA's Verification Audit of the KUB Biosolids Management Program in September 2011 and the status of those nonconformances are summarized below.

Minor Nonconformance JS 11-04 NBP BMP Element #8 requires that KUB maintain training to ensure employees responsible for specific biosolids management activities are competent. The defined

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training needs for some key job categories (e.g. Op Tech 3) do not include some required regulatory training and some on-the-job training and are therefore incomplete.

Corrective Action - KUB determined that this nonconformance was caused by inadequate training. In response, they determined training needs for all operating and maintenance positions and developed an on-line training system to provide & record training. Review by DEKRA's Lead Auditor verified that this action was effectively completed to prevent recurrence of the nonconformance. This nonconformance is now closed.

### **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 Biosolids EMS Program. Continuing certification within the NBP Biosolids Management Program is recommended.

### **3E. Agreements**

KUB and DEKRA have agreed that the next Interim Audit will occur in December 2013 and will be conducted by DEKRA as a Third Party Audit. A scope of work will be prepared that is consistent with NBP requirements for Interim Audits and the Interim Audits Program previously agreed by DEKRA and KUB.



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#### **4. 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**

The following changes affecting the KUB biosolids management program have occurred since the previous Third Party Audit.

- The Kuwahee Plant Manager has recently changed
- The change in Vice President, which began last year, has been completed. Wayne Loveday, the initiator of the KUB Biosolids EMS, has retired.
- Bar screens at Kuwahee are being replaced by compactors
- Synagro has replaced side dump trucks with 2 quad end dump trucks

Review of these changes during the audit determined that they were implemented in a manner consistent with BMP requirements.

##### **4B Revisions to the Management System and Related Documentation**

Documentation of the "process controls" and "operational control points" has been modified based on operator input. Otherwise, the KUB BEMS Manual has not changed significantly since the previous DEKRA audit.

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

The KUB Biosolids Management Policy remains was reviewed by management and updated with Board approval in 2010. The Policy continues to commit to follow the principles of the NBP Cde 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.

##### **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 meetings, tours and through the KUB website. Internal communications occurs through regular staff meetings and contractor meetings.

###### Biosolids Goals and Objectives Process

All 2011 objectives were achieved. 2 of 6 objectives for 2012 have been achieved and the other 4 are showing acceptable progress. Objectives will be updated or continued for 2013. The Goals and Objectives process is working 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 used includes a dynamic database that monitors progress in completing corrective / preventive actions. The process is functioning 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. The review process includes discussion of BEMS performance and any need for changes at quarterly BEMS Management Team meetings led by the BEMS Coordinator. The meetings and follow-up actions are recorded.

#### **4E Internal Audits**

An internal audit of the complete BEMS was conducted in 2010 (reported 1/18/11). Corrective actions from that audit were recorded. The next formal internal audit was conducted in November 2012. Corrective actions from that audit are being developed. In addition, KUB performs quarterly inspections of biosolids use sites to monitor compliance and general conditions.

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

During this audit, DEKRA interviewed a local farmer who uses biosolids and a representative of a local citizens group interested in biosolids. Both were positive about the KUB biosolids program and communication channels with KUB and their contractor.

#### **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.

##### Regulatory Compliance

Working with regulators to eliminate duplicative regulatory requirements for trucked waste program

##### Environmental Performance

Use of external storage for raw wastewater has resulted in a significant reduction in diversion events and eliminated raw wastewater discharge to the river.

##### Biosolids Quality

The opening size for bar screens has been reduced and automatic compacting is in the process of being installed to reduce debris that would harm biosolids quality.

Development of document and records control methods has led to standardization, linking of procedures and maintaining documents up to date.

Expansion of MAXIMO, an asset management system, has led to understanding and prioritizing work based on criticality and is leading to predictive maintenance.

Objectives for improving the biosolids program are more meaningful and challenging.

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Regulatory Compliance

Use of a process improvement checklist procedure has been expanded and includes ensuring compliance in all areas of the plant and with new / modified regulatory requirements. This is in the process of being added into the work management system to assist in managing change.

Interested Party Relations

Discussion with employees about the biosolids program, including the performance dashboard, has improved recognition for biosolids as a product and encouraged bigger picture view of operations.

A more formalized process for controlling contractors has improved understanding and communication of respective responsibilities. It has also helped to improve the contractor's business with other agencies.

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**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.

<b>Process</b>	<b>Conformance with Applicable BMP Elements</b>
Biosolids Preparation (incl stabilization, conditioning & handling)	Conforms
Biosolids Dewatering (incl contractor control)	Conforms
BMP Planning & Public Participation	Conforms
Communication Program (internal & external)	Conforms
Control of Contractors	Conforms
Corrective and Preventive Action	Conforms, with minor exception
Critical Control Points & Operational Controls	Conforms, with minor exception
Goals & Objectives (for improvement)	Conforms
Internal Audits	Conforms, with minor exception
Management Involvement (incl Policy, Mgmt Review)	Conforms

**5b. Process Audit Results**

Audit of the processes listed above determined that they are functioning effectively and meet requirements of the NBP EMS Elements, except as noted 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.

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.

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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 2011 and November 2012. Audits conducted 23 months apart are not sufficient for monitoring management system performance.

**5c. 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.

- "Collection Systems" could be excluded from BEMS scope if justified.
- Goals for the biosolids program could more specifically state KUB's intended direction for public acceptance, environmental stewardship, use of best practices and regulatory compliance.
- Biosolids objectives could have broader measurability (such as % decrease in greenhouse gas over 3 years) rather than singular measures (such as "one method to reduce methane emission").
- SOPs could include or reference risks associated with environmental impacts, quality, regulatory compliance and relations with interested parties (and perhaps other considerations) that KUB wants to control.
- SOPs developed by contractors for KUB equipment / processes could be reviewed / approved by KUB.
- An interested party list could be developed and used for proactive communication about the biosolids program.
- Management reviews could be developed as a process involving various levels of review, including performance metrics (and improvement) for system processes.
- The description of the CAPA process could explain the inputs to the process and the steps used to identify and correct the problem, identify causes and take corrective action and verify the effectiveness of the corrective / preventive action.

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## 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
John Gresham	Plant Manager
Renee Henderson	Technical Writer
Josh Johnson	Engineer
Kelly Lane	Communications Team Lead
Joseph Lunsford	Regulatory Specialist
Tiffany Martin	HR Analyst
David Oberschain	Program Technician
Adonia Phillips	Plant Supervisor
Stephanie Pickens	Operations Manager (Synagro)
Ted Tyree	Senior Engineer

#### Interested parties

Peg Beute	Citizen (Ijam, Pace10)
Luke Greene	farmer, biosolids user)

### List of Documents & Records Reviewed

BEMS Communication Plan 10/5/12	General record - status of goals & objectives (11/22/11)
Biosolids beneficial use brochure	Incident investigation & report 9/18/12
Biosolids EMS Manual & procedures (various)	Internal audit reports 11/30/12, 1/18/11
Biosolids information sheet 8/18/11	Key Performance Indicator tracking 2012
Biosolids Management Goals & Objectives 2011 / 2012	Learning Content System
Biosolids Management Policy	Management review follow-up 4/12
Biosolids Management Report 2011	Management review records 3/29/12, 10/3/12
Contractor performance procedures	MSDS (various)
CPARs (various)	Notice & necessary information form
Digester sampling SOP	Operational control points 10/25/11
Emergency exercise event 4/24/12	Quick reference guide (communication Plan)
EMS record of public input & requests for information	SOPs (various)
Feedback on biosolids from interested parties 4/7/11	Synagro contract amendment 9/13/12
Flottweg Manual FC6059	Wet weather checklist 9/18/12

**END OF REPORT**