



2015 Biosolids Performance Report

June 2016

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Our Mission:

Our mission is to act as good stewards of our communities' resources: utility assets, customer dollars, and the environment. We work to safeguard those resources and enhance their value for the people of the communities we serve and generations to come.

National Biosolids Partnership Recertifies KUB Program at Platinum Level

KUB's biosolids program first received NBP Platinum certification in December 2011 after a rigorous review process and third-party audit. To maintain certification, the program must continue to pass interim audits and meet the high standards required by the NBP. After a third-party audit in December 2015, NBP again gave KUB's program its highest Platinum level certification.

KUB's program is one of only 34 nationwide and two in Tennessee to achieve NBP certification. That recognition demonstrates a high level of commitment to industry best practices and rigorous quality control.

Biosolids are nutrient-rich organic matter produced by wastewater treatment. Annually, KUB produces nearly 30,000 tons of biosolids. Rather than send biosolids to landfills, KUB recycles 100 percent of the material through regional farmers as a fertilizer registered with the Tennessee Department of Agriculture.

For more information, go to www.kub.org, Hot Topics Index, and follow the Biosolids link.



KUB Plants Qualify for NACWA, WEA Awards

KUB's wastewater treatment plants have a history of excellent performance with multiple awards from the National Association of Clean Water Agencies and the Kentucky-Tennessee Water Environment Association. KUB submitted 2015 performance data showing we meet the criteria for these awards:

KUB's four plants had a total of 1 violation from approximately 17,824 compliance checks.

Eastbridge: 0 violations; 4,299 compliance checks; treats 0.526 million gallons a day (MGD). NACWA Platinum 10, WEA Operational Excellence [5 or fewer violations]

Eastbridge first qualified for Platinum (no violations for 5 successive years) in 2010 and has remained violation free ever since.

Loves Creek: 0 violations; 4,439 compliance checks; 2.45 MGD. NACWA Gold, WEA Operational Excellence

Kuwahee: 0 violations in 4,787 compliance checks; 28.17 MGD—three times total of other plants. NACWA Gold, WEA Operational Excellence

Fourth Creek: 1 violation; 4,299 compliance checks; 5.16 MGD. NACWA Silver, WEA Operational Excellence



Kuwahee Gravity Belt Thickener

Thank the Lord for Biosolids!

That comment from a farmer was a first for the third-party auditor who audited KUB's biosolids program December 7–8, 2015. It was also a factor in his favorable report and the decision by the National Biosolids Partnership (NBP) to continue to certify KUB's program at its highest platinum level.

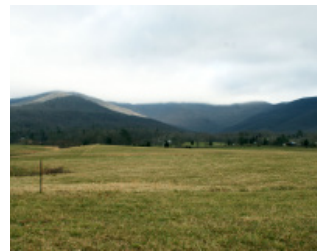
The auditor reported that many farmers across the country are happy with the soil enrichment benefits of biosolids, a product of the wastewater treatment process. The farmer quoted above, however, was the first so passionate on the topic. The same farmer also said, "Before I had a rock farm, now I have a real farm."

In addition to talking to farmers, the auditor met with employees from KUB and Synagro (KUB's biosolids contractor). He looked at a variety of factors (record keeping, processes, dewatering, etc.) to determine if KUB's program meets NBP standards.

Overall, he was pleased with KUB's program. He had three minor comments, which KUB has already addressed in a corrective action plan, to help KUB continue to improve.

- Better define the process for developing goals and objectives, with inputs and outputs
- Include appropriate preventive maintenance under process control points and operational controls
- Expand corrective action plans for internal/external audits to include how KUB will prevent any such issues in the future

"We are proud of our platinum NBP status," said Adonia Phillips, KUB Biosolids Program coordinator. "We work hard to maintain it and to deliver a product farmers are happy to use. Audit comments like these help us improve our program and our product. Beneficial land application helps farmers and our environment—and keeps biosolids out of landfills."



KUB Biosolids Program Participant Named Farmer of the Year

In 2016, Mike Clark received the 2015 Farmer of the Year Award from the Tennessee Association of Conservation Districts. The award recognized his efforts in cultivating the natural resources he manages at Green Acres Farm in Mascot, Tennessee.

Green Acres has been a beef or dairy farm since 1803. Today, it has about 210 acres, with about 90 acres in pastures. With Clark's management, the farm produces forage for more than 80 head of cattle.

When Clark began managing the farm in 2006, he was dedicated to improving the farm's natural resources. His efforts included implementing a Certified Nutrient Management Plan to account for the nutrients from KUB biosolids Synagro began applying at the farm in the summer of 2011.

Since then, the Clarks have been able to increase soil organic matter in some fields to as high as 7.5 percent. The increase shows that biosolids can be a great "green" alternative to chemical fertilizers. [Note: KUB's biosolids product is certified as a fertilizer by the Tennessee Department of Agriculture.]

"Green Acres Farm is a great example of the benefits of beneficial reuse of biosolids," said Adonia Phillips, KUB Biosolids Program coordinator. "Reuse helps farmers and the environment, and we are happy to see one of our farmers win this award."

2015 Goals, Objectives, and Performance

The KUB Biosolids Environmental Management System (EMS) goals and objectives were developed to seek continual process improvement and enhance biosolids quality. Keeping this end in mind, KUB set performance goals to achieve a biosolids product of exceptional quality. The goals set continue to reinforce KUB's commitment to being environmentally responsible and supporting the sustainability of our communities' natural resources.

KUB achieved the following:

- Completed a facility plan for long-range planning for the future.
- Developed educational materials for the public on the impact of hygiene wipes to the collection and treatment process.
- Evaluated the performance of the Return Activated Sludge Pumps and other plant equipment to increase efficiency.
- Completed a solids process control manual that provided a State Point Analysis tool, which will aid in sludge inventory controls and final clarification monitoring. The initial study was completed to further optimize operational strategies for solids management.
- New process was added to the facility in 2014, gravity belt thickening (GBT). Operations further evaluated the process in 2015, developing upper and lower quality limits for percent solids for the GBT effluent quality. The control limits were included in the Work Instruction Document (WID) as a tool for the Operators and to document the processes to achieve quality performance of the system.

KUB's Internal Audit Process

KUB conducted internal audits of its Biosolids Environmental Management System (BEMS) in May and October 2015. The audit team included representatives from Safety, Security, and Technical Services, Customer Service, Key Accounts, and Plant Operations. The semi-annual audits determine if KUB is complying with National Biosolids Partnership (NBP) standards and the current KUB BEMS Manual. Audit methods included interviews with subject matter experts, tours of biosolids production facilities and application sites, record review, observations of work practices and systems, and review of past audits.

The processes reviewed in May 2015 included biosolids dewatering, biosolids land application, control of contractors, corrective and preventive action, document control and record keeping, and goals and objectives. This audit found that the biosolids dewatering, land application, and contractor control processes are effective. Other findings indicated that the CAPA system, document control, and goals and objective processes would benefit from more frequent reviews and updates.

The October 2015 audit included competency, awareness, and training; critical control points and operational controls; EMS documentation; internal EMS audits; and management involvement. This audit found that the EMS documentation, management involvement, and critical control points and operational controls processes are functioning effectively. The competency, awareness and training and internal EMS audit processes were also operating effectively, but several opportunities for improvement were identified.

KUB developed the Corrective and Preventive Action Process (CAPA) as a tracking mechanism for action items that result from internal audits, third party audits, management reviews, and root cause analyses. Appropriate action is decided and then tracked within the system. After the action item is completed, it is reviewed and closed by a third party, usually an employee outside of Plant Operations. Ultimately, the system exists as a way to continually improve BEMS related activities.

In summary, based on results from the internal audits, KUB is complying with its Biosolids Management Policy and the National Biosolids Partnership Code of Good Practice.

Application of KUB's Biosolids

KUB contracts with Synagro Technologies for land application of its biosolids.

Synagro is the largest recycler of organic residuals for water and wastewater systems.

Synagro's highly trained staff ensures that the company's work maintains compliance with applicable federal, state, regional, and local regulatory requirements. In addition to working to meet current standards, Synagro works with the EPA, NBP, biosolids associations, and applicable regulatory agencies to be proactive in meeting changing regulatory requirements.

Sixty-one farms, comprising 5,352 acres, are approved for free biosolids land application by the Tennessee Department of Environment and Conservation. In 2015, Synagro applied 22,883 tons of KUB biosolids to 1,343 acres on 19 farms in Jefferson, Knox, and Sevier counties.

What Are the Nutrients in KUB's Free Biosolids Worth?

KUB compared the nutrients in our biosolids to three well-known chemical fertilizers. The list below shows the annual cost for fertilizer to match the nutrients in KUB's free biosolids.

Nutrient (Fertilizer)	Annual Cost
Nitrogen (Urea)	\$301,309
Phosphorous (Phosphate)	\$522,539
Potassium (Potassium Nitrate)	\$76,047

EMS/Biosolids Community Outreach

KUB uses these methods to inform customers, the community, and interest groups about the KUB Biosolids Beneficial Reuse Program and EMS:

Customer Communications

KUB shares biosolids information with the public through its website. The site provides an overview of the program, a whitepaper, goals, and objectives.

Other means of public communication include a biosolids brochure, a newsletter that mails to all customers, KUB's semi-annual report to the City of Knoxville, an annual Environmental Report, and a general handout that KUB executive staff use at speaking engagements.

KUB's Customer Information Center also is a resource for answering questions and providing materials to customers who call in.

Community Events

Biosolids staff and/or materials are available at various community events. Staff members also are available to speak at schools, special events or meetings. Some of the events where information was available in 2015 included EarthFest and WaterFest.



Fast Facts

100 percent of KUB's biosolids are beneficially reused.

KUB's biosolids are certified as a fertilizer by the Tennessee Department of Agriculture.

KUB nutrient-rich biosolids are a free, environmentally friendly alternative to chemical fertilizers.

KUB has operated a Biosolids Beneficial Reuse Program for over 20 years.

KUB provides approximately 30,000 tons of material to local farmers as a fertilizer and soil conditioner annually.

Land application of biosolids takes place in all 50 states.

Biosolids Monitoring Requirements

Biosolids produced in Tennessee are monitored for compliance based on the EPA Part 503 Biosolids Rule (40 CFR Part 503). KUB produces Class B Biosolids. Pathogen requirements are met by anaerobic digestion and monitoring the density of indicator organisms. Vector attraction reduction requirements are met by meeting a reduction of at least 38 percent volatile solids reduction.

Monitoring Category	EPA Part 503 Monitoring Frequency	KUB Monitoring Frequency
Pathogen Requirements	Once every 60 days	Monthly
Vector Attraction Requirements	Once every 60 days	Monthly
Regulated pollutant limits (metals)	Once every 60 days	Monthly
Total solids, pH	N/A	Monthly
Nutrients	N/A	Monthly

Note: Based on biosolids production of equal to or greater than 1,500 dry metric tons but less than 15,000 dry metric tons.

Knowledge Management Initiative

KUB has implemented a Knowledge Management Initiative (KMI) to establish documentation and resources to help Plant employees in their work, whether it is during normal working conditions or abnormal or emergency conditions.

"I think KMI is critical for our future success, particularly as we have folks retire and have need for knowledge transfer," said Derwin Hagood, KUB's VP of Operations. "We have assigned operators to be 'owners'

of specific process areas to be the resident expert and caretaker of their area."

The goals of KMI are to gather information for each Plant process area, provide that information in an easily accessible location, and ensure the information provided is current and relevant. This includes identifying and updating work instruction documents, such as standard operating procedures, guides, checklists, and operation and

maintenance manuals. It also includes the mapping of large assets within Plant properties in GIS and confirming Plant assets are assigned the appropriate preventative maintenance activities for optimal operation.