

KUB's Successful Biosolids Program

Biosolids are an inherent part of wastewater treatment, and KUB is proud to provide biosolids free to local farmers to avoid sending it to a landfill. In an average year, KUB provides biosolids as fertilizer to between 15 and 20 local farms. There is consistently a higher demand for KUB biosolids than what is produced, which means KUB does not have a holding facility for excess biosolids. KUB relies on the strong relationships with local farmers to haul directly to their site and stockpile biosolids when conditions require it. Because KUB is unable to provide biosolids to every permitted farm each year, KUB works with its dewatering contractor, Synagro, to ensure biosolids are distributed fairly amongst the farms in our program. KUB receives positive feedback from farmers, both verbally and on a Post Land Application Questionnaire that is provided after biosolids have been applied. KUB also conducts site inspections where one-on-one communication occurs between the farmer and KUB. In addition, farmers are encouraged to contact KUB with questions anytime.

KUB's Biosolids Program Maintains Platinum Level Certification

For over 30 years, KUB has produced high-quality Class B biosolids, the nutrient-rich product of the wastewater treatment process. KUB's wastewater treatment plant separates solid materials from liquid waste and sends the solids to digesters where the material is heated and mixed with helpful bacteria to destroy harmful pathogens and reduce odor. After treatment and dewatering, the biosolids can be applied to soil like fertilizer, recycling essential nutrients like phosphorus and nitrogen. KUB's biosolids are registered as a fertilizer with the Tennessee Department of Agriculture and are 100 percent land-applied to area farms.

KUB's Biosolids Beneficial Reuse Program has been Platinum Certified with the National Biosolids Partnership (NBP) since 2011. The NBP helps advance biosolids management practices and programs across the United States so that they are effective and environmentally sound. As part of KUB's NBP certification, the biosolids program undergoes annual external and internal audits. In December 2022, KUB passed a two-day biosolids program interim audit and maintained its Platinum status through the National Biosolids Partnership. One minor nonconformance was identified during the audit relating to KUB's management review process. The minor nonconformance was addressed by KUB and approved by the third-party auditor. The 2022 external audit was held virtually for the third time.



KUB Biosolids Internal Audit Results

KUB completes an internal audit on the Biosolids Environmental Management System (BEMS). The internal audit follows the same schedule as the external audit, so interim and reverification years always reflect the same review. The purpose of this audit is to evaluate the effectiveness of the BEMS. The objective of the review is to identify system problems, improvement opportunities, and adherence to both KUB and NBP requirements. The 2022 internal audit resulted in no findings and two opportunities for improvement. Progress on these opportunities is ongoing.

Digester Cleanings at Kuwahee

Kuwahee's Anaerobic Digesters are used to digest or, break down, sludge that will eventually become a useful biosolid product. The breakdown of sludge is important because it reduces odors and pathogens, while also providing a stable product that make it beneficial to KUB's farmers. In the fall of 2022, Kuwahee and Synagro personnel cleaned one of the five digesters. Digester cleanings are important for two reasons. First, the removal of debris from inside the digester not only allows more capacity, but also it removes debris from the final biosolids product that ends up on farmers' fields. Second, it provides the opportunity for repairs inside the digester, which improves efficiency.

At approximately 2 million gallons each, Kuwahee's digesters will continue to produce a valuable product for years to come with proper maintenance.



KUB Committed to Community Outreach

KUB uses the following methods to inform customers, the community, and interested groups about the KUB BEMS:

Community Events

Biosolids staff and/or materials are made available at various community events. Staff members are also available to speak at schools, special events, or meetings.

Customer Communications

KUB houses biosolids content on its website at www.kub.org/biosolids, which includes a program overview, audit reports and more. KUB shares various communications materials with customers throughout the year that direct customers to this website. These materials include a biosolids brochure, newsletters, annual Environmental, Social, and Governance Report, employee training, and a new video highlighting biosolids used as a local television commercial and posted to social media.

Interested Farmer Relations

KUB’s website (www.kub.org/biosolids) offers a wealth of information about the biosolids program for farmers or other interested parties, including links to more information from the NBP, the National Association of Clean Water Agencies, the Water Environment Federation, and the EPA. In addition to the website material, KUB employees perform field evaluations every quarter, which promotes stronger relationships with our farmers.

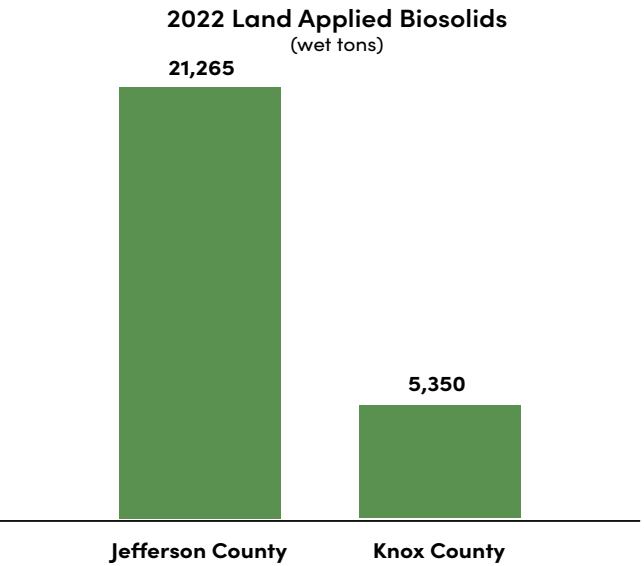
Farmers may call KUB’s Customer Information Center (865-524-2911) or e-mail the KUB Biosolids Mailbox at biosolids@kub.org if they have specific questions or are interested in scheduling a farm visit to determine eligibility for biosolids application.



East Tennessee Farmers Benefit from KUB Biosolids

KUB beneficially reuses 100% of its biosolids. KUB contracts with Synagro Technologies for dewatering, transportation, and land application. Synagro’s highly trained staff ensures that the company’s work maintains compliance with applicable federal, state, and local regulatory requirements. KUB performs site visits and inspections when Synagro is land applying to ensure that the relationship between the farmers, Synagro, and KUB is maintained. In addition, Synagro works with the Environmental Protection Agency, Tennessee Department of Environment and Conservation, the National Biosolids Partnership, and applicable regulatory agencies to be proactive in meeting changing rules and regulations. KUB is extremely grateful for the service Synagro provides.

In 2022, 19 farms received 26,615 wet tons of biosolids, spread over 1,526 acres of land. As shown in the figure, Jefferson County received the largest amount of biosolids. There are currently 52 farms approved for KUB Biosolids and permitted by the Tennessee Department of Environment and Conservation.



2022 Goals Achieved, Continuous Improvement in 2023

The KUB BEMS goals and objectives were developed to seek continual process improvement and enhance biosolids quality. Each year, KUB develops these goals and objectives as part of the NBP requirements. These goals are recorded and assessed throughout each year and at an annual third-party audit of KUB’s BEMS. The program goals reinforce KUB’s commitment to environmental performance, regulatory compliance, relations with interested parties and quality biosolids management practices.

In 2022, KUB achieved the following:

- Maintained average fecal coliform levels under 200,000 Most Probable Number (MPN) in all reporting periods except two.
 - 200,000 MPN is one tenth of the regulatory limit.
- Maintained volatile solids reduction above 50 percent in all reporting periods except three.
- Continued improvement through the use of the capital project close-out process and the asset management program.
- Trained plant operators on the new Biologically Enhanced High Rate Clarifier (BEHRC) at KUB’s Kuwahee Wastewater Treatment Plant and created applicable Standard Operating Procedures (SOPs) and checklists for the new process.



Some of KUB’S 2023 goals and objectives include:

- Participate in TVA’s Demand Response Program to reduce pressure on the region’s electric grid during periods of peak demand.
- Maintain fecal coliform under 200,000 MPN and volatile solids reduction of 50 percent or higher throughout the year.
- Update the hardware and software that operate the dewatering centrifuges.
- Continue education on the BEHRC and optimize the process area.
- Continue to partner with industrial customers to enhance KUB’s understanding of treatment.



KUB Verifies Quality

Parameter	EPA Ceiling Limits	2021 KUB Data
Arsenic (ppm**)	75	10.8
Cadmium (ppm)	85	1.3
Copper (ppm)	4,300	282
Lead (ppm)	840	24.7
Mercury (ppm)	57	1.2
Molybdenum (ppm)	75	21.6
Nickel (ppm)	420	20.5
Selenium (ppm)	100	9.2
Zinc (ppm)	7,500	792

** ppm: parts per million. One part per million is equivalent to a single penny in \$10,000.



KUB Ensures Excellence

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 Reduction requirements are met by anaerobically digesting sludge and reducing colony forming units by at least 2,000,000 per gram. Vector Attraction Reduction requirements are met by reducing volatile solids by at least 38 percent. As illustrated in the table below, KUB monitors its biosolids much more frequently than industry regulators require.

Monitoring Category	EPA Part 503 Monitoring Frequency	KUB Monitoring Frequency
Pathogen Reduction	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.

Fast Facts

- 100 percent of KUB’s biosolids produced in 2022 were land-applied.
- KUB provides approximately 25,000 wet tons of Class B biosolids to local farmers as a fertilizer annually.
- KUB’s biosolids are certified as fertilizer by the Tennessee Department of Agriculture.
- KUB has operated a biosolids beneficial reuse program for over 30 years.



Emerging Topics in Biosolids

The world of science is constantly evolving, and researchers are now able to gather more data than ever before. This has led to more information gathering in the fields of water, wastewater, and biosolids. Throughout 2020 – 2022, KUB has taken a proactive approach in establishing an interdepartmental team focused on emerging regulations and technologies. The team has been charged with observing the regulatory and technological landscape, developing science-based communications for the community to stay informed, and keeping KUB leadership up-to-date on upcoming regulatory changes. The team is closely watching both state and federal decision-making and keeps open communication with regulators. KUB follows guidance set forth by the United States Environmental Protection Agency (EPA) and Tennessee Department of Environment and Conservation (TDEC).

