Knoxville Utilities Board
2023 Biosolids Performance Report
July 2024

Contents

About KUB Biosolids

For over 30 years, KUB has produced high-quality Class B biosolids, the nutrient-rich product of the wastewater treatment process. KUB's Kuwahee Wastewater Treatment Plant separates solid materials from liquid waste. From there, solids are sent 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. This saves farmers approximately $1 million in fertilizer costs annually and provides environmental benefits including less chemicals applied to the land and less waste sent to landfills.

KUB's Biosolids Program was Platinum Certified with the National Biosolids Partnership (NBP) from 2011 to 2022. In 2023, KUB became Diamond Certified with NBP. Diamond certification is a new, advanced level of the program.

2023 Goals Achieved

The KUB Biosolids Program annual goals and objectives were developed to seek continual process improvement and enhance biosolids quality. Program goals reinforce KUB's commitment to environmental performance, regulatory compliance, interested party relations, and quality management practices.

In 2023, KUB achieved the following:

- Maintained average fecal coliform levels under 200,000 Most Probable Number (MPN) in all reporting periods.
    - 200,000 MPN is one tenth of the regulatory limit.
- Maintained volatile solids reduction above 50 percent in all reporting periods.
- Continued improvement using the capital project close-out process and the asset management program.
- Continued to partner with our industrial customers to ensure the highest quality of treatment is provided and customer needs are met.

2024 Goals

KUB'S 2024 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.
- Install Total Suspended Solids (TSS) probes on both centrifuges.
- Ensure all dewatering O&M manuals are on KUB's internal SharePoint site.

Regulatory Compliance

KUB beneficially reuses 100% of its Biosolids. KUB has a residuals management contractor that manages dewatering, transportation, and land application. Highly trained staff ensure that the contractor's work complies with applicable federal, state, and local regulatory requirements. KUB performs site visits and inspections to ensure that the relationship between the farmers, the contractor, and KUB is maintained. In addition, the contractor works with the Environmental Protection Agency (EPA), Tennessee Department of Environment and Conservation (TDEC), and any other applicable regulatory agencies to be proactive in meeting changing rules and regulations.

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

KUB's findings for 2023 are outlined in the table below.

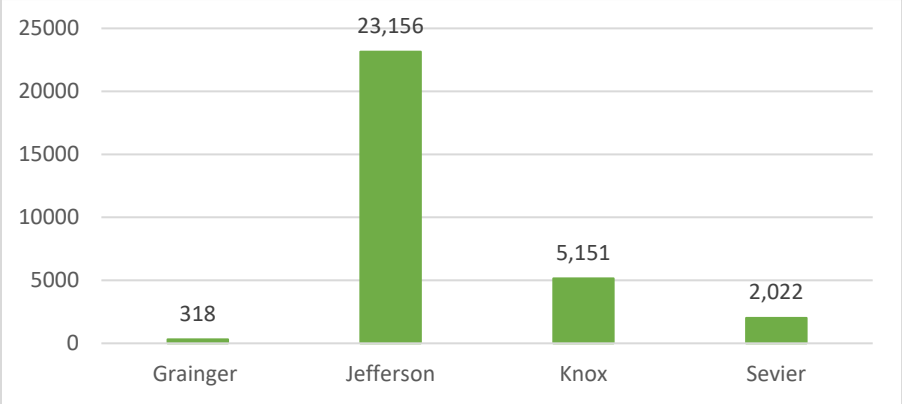
Parameter	EPA Ceiling Limits	2023 KUB Data
Arsenic (ppm**)	75	8.6
Cadmium (ppm)	85	1.9
Copper (ppm)	4,300	220
Lead (ppm)	840	18.1
Mercury (ppm)	57	0.4
Molybdenum (ppm)	75	11.8
Nickel (ppm)	420	17.3
Selenium (ppm)	100	8.4
Zinc (ppm)	7,500	743

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

KUB completes an internal audit on the Biosolids Program with the purpose of evaluating program effectiveness. The objective of the review is to identify system problems and improvement opportunities, and ensure adherence to state and federal regulations. The 2023 internal audit resulted in no findings or opportunities for improvement.

Community Benefits & Outreach

KUB is proud to provide its biosolids free to local farmers as a nutrient-rich fertilizer. In 2023, 23 farms received 30,647 wet tons of biosolids, spread over 1,789 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.



Not only does this save farmers approximately $1 million in fertilizer costs each year, but it also provides environmental benefits to the community. Since biosolids are used in lieu of traditional fertilizer, less chemicals are applied to the land. The biosolids program also prevents solid waste from being sent to a landfill.

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

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 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.

Process Investments & Improvements

In 2023, KUB cleaned one of its five anaerobic digesters at its Kuwahee Wastewater Treatment Plant. These digesters are used to digest, or break down, sludge that will eventually become a useful biosolid product. This process reduces odors and pathogens, while providing a stable product that is beneficial to farmers. Regular digester cleaning is an important step in KUB's equipment maintenance, as cleanings ensure removal of debris from inside of the digester to increase capacity and efficiency. Cleanings also provide the opportunity for repairs inside the digester. At approximately 2 million gallons each, proper maintenance ensures Kuwahee's digesters will continue to produce a valuable product for years to come.

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. Since 2020, KUB has taken a proactive approach in establishing an interdepartmental team focused on emerging regulations and technologies. The team monitors the regulatory and technological landscape, developing science-based communications for the community to stay informed, and keeping KUB leadership informed of 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).

Closing Performance Statement

As outlined in this report, KUB's Biosolids Program successfully met its 2023 goals. KUB remains dedicated to excellence in environmental stewardship and community service, and the biosolids program exemplifies this.