



MISSOURI

BIOSOLIDS MANAGEMENT 2018 – SUMMARY

This summary, a dashboard of statistics, & further data are at www.biosolidsdata.org

In Missouri...

- *Abundant agriculture makes land application of biosolids an efficient management option for all but the largest of the state’s water resource recovery facilities (WRRFs). Incineration has been the dominant mode of solids management for the largest cities.*
- *Biosolids management was changing in 2018 - and continues to change, with incineration diminishing and land application increasing, led by Kansas City’s major investment in the new Blue River Biosolids Facility.*
- *For this report, the National Biosolids Data Project (NBDP) has compiled the most comprehensive set of Missouri data ever presented, thanks to the participation of most of the larger WRRFs in the NBDP survey. The first national biosolids data compilation – reporting 2004 data – only guesstimated solids totals based on estimated statewide wastewater flow.*

Biosolids Management in Missouri

Missouri’s largest industry is agriculture, which makes land applying biosolids a practical and efficient management option. The majority of water resource recovery facilities (WRRFs) in the state land apply. But, by quantity, the majority of MO’s biosolids are incinerated.

Within its expansive rural areas, the state also has several major metropolitan areas, the largest of which are Kansas City and St. Louis. These two cities, plus the Little Blue Valley Sewer District in Independence, all operated sewage sludge incinerators (SSIs) at some of their facilities in 2018: Bissell Point (St. Louis MSD), Lemay (St. Louis MSD), Blue River (KC Water), and Atherton (LBVSD, just east of Kansas City). Altogether, these four WRRFs incinerated solids from at least 11 WRRFs in the state’s two largest metropolitan areas, approximately 80,000 dry tons, roughly 61% of the state’s wastewater solids. Since 2018, some SSIs have been shut down or mothballed with plans to replace old technologies with new, more sustainable systems (more on that below).

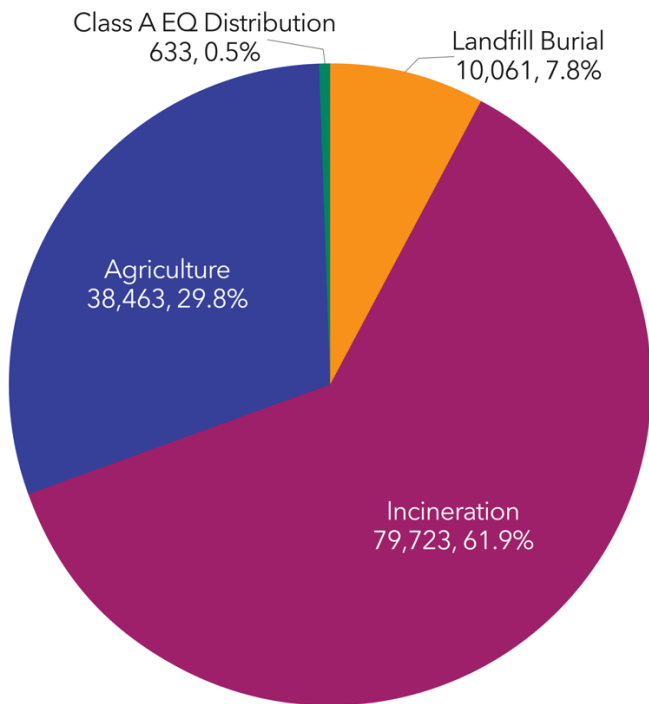
WRRFs in Missouri are required to treat to a minimum of Class B standards in order to land apply their biosolids, including hundreds of small package plants around the state. Facilities with lagoon systems in rural areas or small to mid-sized cities may only land apply every 5 - 20 years, when the lagoons are cleaned out. Springfield and Columbia, the third and fourth largest cities in the state, both land apply their biosolids. Land

application of Class B Biosolids requires a permit from the Missouri Department of Natural Resources (MDNR). Prior to 2019, WRRFs were restricted to land application within 20 miles of the facility unless authorized by MDNR, but that restriction was removed from permits starting in August 2019. Biosolids are a desirable fertilizer, and there is high demand by Missouri farmers

Landfilling is not a big part of biosolids management in MO, but it does happen. St. Louis and Kansas City both own monofills in which they dispose of SSI ash.

A handful of municipalities and separate preparers produce Class A EQ biosolids. Sedalia, MO has three WRRFs, the solids from which are composted at a city-owned facility. There's one biosolids drying facility near Branson, MO, that takes in solids from several area WRRFs (more on that below). Cape Girardeau's WRRF has implemented a Class A program since 2018. But the accessibility of land application sites for Class B biosolids means there is not much incentive to treat to Class A. The exception to that is in larger cities, where landfill restrictions or other pressures are driving some facilities to move toward producing lower-volume Class A biosolids.

Missouri Biosolids Use & Disposal 2018 (dry US tons, %) Total: 128,900



Agency/Department Oversight

U. S. EPA is the delegating authority for 40 CFR Part 503 in Missouri. MDNR is delegated to administer the Clean Water and Clean Air regulations. MDNR regulates biosolids management in the state through individual wastewater treatment plant NPDES permits, but there are no state regulations beyond Part 503. Compliance with solids management is managed on a site-specific basis, during routine compliance inspections, or if MDNR receives a complaint or notice of an environmental concern. MDNR Water Protection Program enforces land application practices and the MDNR Air Pollution Control Program regulates sewage sludge incinerators.

State Regulations and Permitting

State rules for the design of solids handling and disposal operations are located in 10 CSR 20-8.170. Missouri adopted the federal biosolids rule, 40 CFR Part 503, essentially verbatim. No additional monitoring, testing, or reporting is required by the state. Specific and general NPDES-type permits include requirements for solids management.

Annual reporting is required from all major and minor facilities that handle sludge or biosolids. The state reviews and files those reports, but only follows up if there is an issue. The annual report (Form S) describes how much solids/sludge is produced and where it goes (land application, incineration, landfill, etc.). It is quite thorough with the data it collects, but it is submitted on paper, and the data reported is never compiled in a centralized location. Therefore, the biosolids data for Missouri was compiled by the National Biosolids Data Project (NBDP) and reviewed by experts in the state.

Class B biosolids from more than one WRRF can be applied on the same site in the same crop year as long as agronomic and loading rates are not exceeded for the field, but this doesn't actually happen. Land appliers or land owners can hold legal liability for biosolids end use (not just generators). The basis for MO's agronomic loading rate is nitrogen - just as required by Part 503. In 2018, there were no restrictions on phosphorus (P), but as of 2021, a newly-adopted nutrient management plan will require WRRFs within certain lakes' watersheds to remove P. The requirement is being worked into permits as they are renewed, and facilities will have one permit term to reach compliance. This may affect the P levels in the state's biosolids and possible nutrient management requirements.

The most recent change to the state's biosolids rules was in 2019, when redundancies were removed. That rule revision made no substantive changes.

Pressures on Biosolids and Land Application

Pressures on biosolids management in Missouri as of 2018, as identified by the state biosolids coordinator, include:

1. COST – rising costs generally
2. NUISANCE ISSUES – odors, truck traffic, dust, etc.
3. ENVIRONMENTAL ISSUES – impacts on solids, organisms, public health, contaminants (pathogens, metals, organic chemicals, etc.)
4. COST – disposal options are least expensive
5. ENVIRONMENTAL ISSUES – nutrient management, phosphorus (P), nitrogen (N)

Land application in Missouri is routine and stable. MO’s public water supplies have been tested for PFAS and nothing of concern was found. There is some concern about private drinking water supplies around land application sites, but not much data has been collected so far.

In 2018, Missouri experienced historic flooding along the Missouri and Mississippi Rivers and other major waterways. Because many farm fields are on floodplains, biosolids land application was impossible in some places due to sites being saturated or under water. Some WRRFs were forced to store biosolids until fields dried out (mostly in following years), and they required special variances from MDNR for that longer-term storage. (Note: WRRFs that were unable to land apply in 2018, reported 2017 data to NBDP in order to provide a more typical picture of solids management.)

Septage Management

Land application of septage is overseen by MDNR’s Water Protection Program’s Domestic Permitting Unit. Septage can be land applied if 40 CFR Part 503 requirements are met and a permit is obtained.

Missouri Septage Management

Quality of state septage data	None
Septage haulers based in state:	no data
In-state separate preparers (not WRRFs) taking septage:	no data
WRRFs required to take septage?	no
WRRFs that accept septage:	no data
Septage received at WRRFs in 2018 (gallons):	NBDP estimates 22,000,000 gal./yr. of septage, most disposed at WWTPs
Other outside wastes accepted at WRRFs:	some
Is fats/oil/grease (FOG) a significant issue?	no data
Is it regulated?	
How?	

Is there a proactive program to collect FOG?	no data
Can septage be land applied in state?	yes
If yes, what treatment is required?	follow Part 503 regulations
Most recent septage regulations update:	no data
Full-time equivalent (FTE) at state agency for septage:	no data
Notes:	See: https://dnr.mo.gov/env/wpp/Wastewater-SepticSystems.htm http://www.mosmallflows.org/

Economics

Missouri, like many states, does not actively track biosolids-related costs and revenues. Below are a few examples of biosolids-related costs and product pricing that help give a sense of the economics of biosolids in MO.

In calculating potential management options for biosolids, one city came up with these numbers, per wet ton of biosolids:

Land application (including labor, equipment, fuel, etc.)	\$134.24 per wet ton
Landfill (including labor, tipping fees, etc.)	\$146.71 per wet ton
Dryer (including labor and equipment)	\$70.24 per wet ton

The city of Springfield pays \$50/wet ton for landfill disposal of wastewater solids.

The city of St. Peters has a biosolids composting program at the St. Peters Earth Center, where yard waste can also be dropped off for processing. The final compost, Gold Grow, is available in three different soil blends, all of which are available for bulk purchase at the Earth Centre. St. Peters residents get a reduced fee: up to 10 cubic yards per year per household for \$6, \$7, or \$9.50 per cubic yard depending on the compost blend, whereas a non-resident pays \$9.50, \$12, or \$16 per yard, respectively. Commercial account holders get resident pricing for biosolids compost, but they must purchase at least 15 cubic yards at a time. Anyone can fill a 5-gallon bucket for \$1.

Major WRRFs, Separate Preparers, and Notable Projects

- The Metropolitan St. Louis Sewer District (MSD) owns and operates seven WRRFs, including the largest in Missouri. The two largest, Bissell Point and Lemay, have SSIs - multiple hearth incinerators (MHIs) that will be replaced with more efficient fluidized bed incinerators (FBIs). Construction is planned for

2024-2026 - a \$500 million capital improvement project. In 2018, the solids from six of the MSD facilities were incinerated. Ash from the two SSIs goes to an ash-only monofill in an old quarry owned by the District. One MSD WRRF has anaerobic digesters and sends solids to a commercial landfill.

- St. Joseph’s Water Protection Facility (WPF) began upgrading their biosolids treatment process in the 2010s, in light of new nutrient management restrictions and limits on the amount of biosolids accepted at the municipal landfill. St. Joe’s WPF now has a system for enhanced ammonia removal, and has begun plans for phosphorus and nitrogen removal. The WPF installed a belt dryer to turn anaerobically digested biosolids into a pelletized fertilizer. The dryer became fully operational in 2019. The final fertilizer is land applied on city-owned and private farm fields. St. Joseph plans to sell the fertilizer to the general public in a two-year trial once the testing phase is completed, presumably in 2021.
- Columbia is Missouri’s fourth-largest city and home to the University of Missouri, which has been involved in biosolids research, especially around land application, for decades. At the city’s wastewater treatment plant, solids are thickened and anaerobically digested. Methane from the digesters is captured and used as fuel. The final Class B biosolids are land applied on city-owned and private farm fields. Treated effluent runs through a series of wetland treatment units, and finally into a wildlife conservation area.

KCMO Water

Kansas City is the largest city in Missouri and presents a fine example of the complexity of wastewater and biosolids flow and the ways in which even large systems can adapt and improve. KC Water owns and operates six WRRFs in the metro service area of about 320 square miles, as well as a 1350-acre land application site (LAS), which is on the same property as one of the WRRFs (and shares its name and NPDES ID number). The largest KC Water facility is the Blue River Wastewater Treatment Plant (WWTP). Up until about 2017, three of KC Water’s six WRRFs handled their solids separately or through various agreements with other facilities and contractors; two facilities sent their waste sludge via force mains to Blue River. To make oversight, tracking, and treatment more efficient, KC Water switched to transporting waste sludge from the three WRRFs managing their solids separately (two facilities with aerobic digesters, one with sludge lagoons) to Blue River. So since 2018, as KC Water’s wastewater treatment manager, Brent Herring, explains, “Blue River has two input waste sludge streams, *external* and *internal*. The secondary waste sludge (external) from Rocky Branch, Todd Creek, Fishing River, Westside, and Birmingham goes to Blue River either by truck or by force main. At Blue River (internal) there are waste solids from primary and secondary, so the external waste sludge ends up being mostly Blue River primary waste sludge.” This arrangement varied somewhat while systems were established. For instance, in 2018, all solids generated at Todd Creek WWTP were temporarily stored on site and land applied in the area.

- The Little Blue Valley Sewer District serves a large populated area east of Kansas City, including the cities of Independence and Lee’s Summit. The District has a fluidized bed incinerator at its main Atherton plant where thickened solids are burned. Incinerator ash is landfilled or used as agricultural fertilizer.
- The Tri-Lakes Biosolids Coalition was formed by eight municipalities in the southwest Missouri Ozarks in the early 2000s. Interested in better management of nutrients from land-applied biosolids, the Coalition opted to build a regional biosolids drying facility to treat solids from WRRFs in Taney and Stone Counties. As part of the project, centrifuges were installed at two WRRFs in Branson and one in Hollister to dewater solids before transport to the new drying facility at Cooper Creek WWTP (Branson). The Tri-Lakes Biosolids Regional Drying Facility came on line in 2015, featuring a natural-gas powered thermal dryer. In 2020, a joint utility commission was approved by Branson officials and the other municipalities involved. Ownership and operation of the biosolids drying facility will transfer from Taney County to the newly-formed commission – an innovative example of a “unified service,” where municipalities share utility infrastructures and associated costs and revenues. The final Class A biosolids fertilizer is sold to local farmers.

While rearranging its solids treatment systems, KC Water was also thinking toward a more sustainable future. In 2018, Blue River incinerated approximately half its solids and treated the other half in anaerobic digesters. Ash from the multiple hearth incinerators went to KC Water’s ash-only landfill, which was established for that sole purpose when the incinerators were built in the 1960s. In 2017, KC Water started planning for a replacement of the remaining aging incinerator. A new biosolids facility featuring a thermal hydrolysis process (THP) was ultimately selected using a quadruple bottom line approach and to provide a solution that would be consistent with the City’s sustainability objectives. To bridge the time until the THP project is completed and to provide a backup in the event the remaining incinerator fails, KC Water contracted with Synagro to manage some biosolids from Blue River. Synagro lime stabilizes and then land applies the biosolids on farmland in the area. KC Water uses an existing belt filter press operation to generate thickened solids to send to Synagro and will continue to do so with a temporary facility until THP comes online.

In 2020, nearly 50% of the biosolids generated at Blue River (from the internal and external waste sludge streams) was lime stabilized and land applied. Another almost 50% was anaerobically digested and sent to holding cells at the LAS, to be land applied later. Blue River used to rely on a landfill in Kansas to dispose of any solids not land applied or incinerated, but the need does not exist now that the lime stabilization is available. The last of Blue River’s incineration system went into standby in March 2020 and was shut down permanently in July 2020.

- Sedalia, in central MO, built a composting facility in 2010. Biosolids from three municipal WRRFs are mixed with chipped yard waste and composted through an aerated static pile system. The final Class A biosolids compost is available for pickup at the compost facility for \$10 per cubic yard (the price decreases as quantity increases, starting at 50 cubic yards).

After a year-long process, a contractor team was selected for the THP installation and a notice to proceed was issued in January 2021. Work on the \$150 million Blue River Biosolids Facility project is now in progress. Old digesters and other tanks and systems are being retrofitted. Electrical and other utility systems are being updated for the THP system, alongside other facility improvements. KC Water plans to issue a request for letters of interest for a public-private partnership for reuse options including biogas. The resulting Class A biosolids will likely be used as agricultural soil conditioner by nearby farms. The new Blue River Biosolids Facility is expected to be operational in 2024.

References

The information in this summary report came from contacts at the Missouri Water Environment Association and the Missouri Department of Natural Resources, and from WRRF operators across the state. Data were compiled by the National Biosolids Data Project. Additional information was obtained from:

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