



COLORADO

BIOSOLIDS MANAGEMENT 2018 – SUMMARY

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

In Colorado...

- *With abundant agriculture in eastern Colorado, not far from the Front Range population centers, Colorado has land applied 80% or more of its biosolids for decades, much of it on farmland owned by the public water resource recovery facilities (WRRFs) utilities that generate the biosolids.*
- *Colorado State University and the USGS have conducted leading research on biosolids land application, advancing understanding of their use for dryland wheat and other crops in the unique climate and soils of the state. Other research has included mine reclamation.*
- *Most CO biosolids are managed by WRRF staff, but much is also land applied by one major contractor that has operated land application programs since the early 1990s, including biosolids from New York City successfully for a while (but no longer).*
- *Colorado WRRFs have been pioneers in proactive wastewater solids management, including a notable land applier training and certification program, production of biogas and renewable natural gas (RNG), participation in the National Biosolids Partnership’s Biosolids Management Program, and funding of the state’s biosolids regulatory program through a fee paid by WRRFs for each ton of biosolids they apply to soils.*

Biosolids Management in Colorado

Colorado’s biosolids recycling program has been highly successful and stable for many years. The vast majority of biosolids in Colorado go to beneficial use: over 68,000 dry metric tons in 2018. Most of that was applied on agricultural land as fertilizer, but about one fifth of it was treated to Class A EQ quality for public distribution, mostly as compost. Colorado farms were also the recipients of New York City biosolids from 1992 to 2012, with up to 10,000 acres fertilized per year and the demand exceeding supply.

Colorado’s most densely-populated area is the Front Range, along the east side of the Rocky Mountains, where Denver, Colorado Springs, Pueblo, Littleton, Englewood, Boulder, Fort Collins, and other communities are located. Much of the eastern part of the state is open range and agricultural land. Most of the large cities land apply their biosolids, managing their programs in-house or contracting with a land application company.

An estimated 33% of biosolids in CO are managed by private contractors. In 2018, the major land applier was Veris Environmental, which was the latest name of the company that was formed when Parker Ag and Liquid Waste Management merged. As of 2021, Denali Water Solutions had bought out Veris, but most of the same experienced local staff have continued operations under the new company name.

There are nine biosolids separate preparers in CO, mostly composting operations, many of which are located at landfills. A1 Organics is an exception - a big private composting operation. Other composting facilities are located on-site at water resource recovery facilities (WRRFs) and operated by facility staff.

The Colorado Department of Public Health and Environment (CDPHE) requires annual reporting from all WRRFs rated over 2,000 gal/day – about 455 WRRFs in total. But only

Renewable Natural Gas and Pipeline Injection

Across the U.S., renewable natural gas (RNG) is making headlines in biosolids and waste management. As communities and utilities shift toward green energy production and consumption, RNG provides options for energy sustainability and economic benefits.

Renewable natural gas is chemically identical to conventional natural gas (NG): mostly composed of methane, it can be utilized in compressed (CNG) or liquid (LNG) forms through existing NG infrastructure to fuel vehicles, heat homes and buildings, etc. But unlike conventional natural gas, a fossil fuel that's extracted through drilling or hydraulic fracturing, RNG is produced through biological processes. Biogas (the raw form of RNG) can be captured from landfills, agricultural waste management, and wastewater solids. Bacteria in anaerobic digesters break down wastes (biosolids, food scraps, fats, oils and grease, and more), emitting methane and other gasses. That biogas can be captured and used onsite to fuel the AD process, generate electricity, run combined heat and power (CHP) systems, or fuel a municipal vehicle fleet. This energy recovery can reduce costs and greenhouse gas emissions for the facility and the local community/municipality.

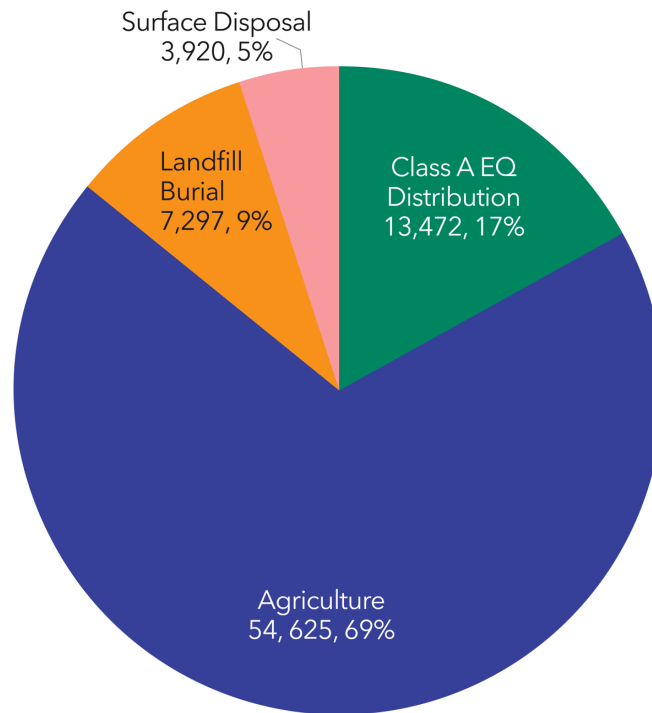
An emerging option for biogas generators is to clean the gas to RNG quality (removing excess CO₂, water, hydrogen sulfide, volatile organic compounds, and other non-methane ingredients) and inject it directly into existing natural gas pipelines. The RNG producer, e.g. a wastewater treatment plant, can benefit economically from pipeline injection in a couple of ways: ongoing sales of the fuel to the gas utility that owns the pipeline and/or sales of renewable energy credits (tracked using RINs) to fossil fuel producers, who are required to produce a certain percentage of renewable energy per year.

Colorado has some RNG systems. The largest is South Platte Renew (SPR), which runs the third largest WRRF in the state, treating 50 MGD for Englewood, Littleton, and surrounding communities. In 2019, a \$7.8 million project came online at the facility: biogas is recovered from anaerobic digestion, converted to renewable natural gas, and injected into a nearby pipeline. This was the first pipeline injection project in Colorado. It required buy-in from the community, the utility holding company Xcel Energy, and its subsidiary that owns the natural gas pipeline. Carollo Engineers designed the facility, which is expected to greatly reduce CO₂ emissions (by an estimated 5,000 metric tons of fossil-fuel-based CO₂ per year) and to generate significant revenue for SPR. In 2020, this project won the Water Environment Federation's Project Excellence Award.

about 150 of those actually generate biosolids in a given year. As with other states, CO has many lagoon systems that only clean out solids (sludge) every 10-30 years - approximately 3-4 each year.

Most biosolids that are not recycled go to landfills. There is only one surface disposal site in CO, which is Colorado Springs. Colorado Springs accounts for roughly one third of the solids disposed of in the state.

Colorado Biosolids Use & Disposal 2018
(dry metric tons, %)
Total: 79,300



Agency/Department Oversight

Biosolids in Colorado are overseen by the Colorado Department of Public Health and Environment (CDPHE). The Water Quality Control Division in CDPHE oversees the beneficial use of biosolids under 5 CCR 1002-64 (Regulation 64), and the solid waste program regulates surface disposal and landfill disposal.

Colorado plans to seek delegation for the biosolids program from U.S. EPA sometime in the future, but it is not a pressing priority. Throughout the 2000s, U.S. EPA Region 8 had a very active biosolids expert, Robert Brobst; he had a significant role in guiding and overseeing Colorado’s biosolids programs. Since he retired from EPA, there has been renewed discussion at CDPHE about taking on delegation for the biosolids program. The state needs funding to make this happen: CDPHE currently charges biosolids

generators whose biosolids are used for beneficial purposes \$2.40/dry ton to fund their biosolids regulatory program, which brings in about \$180,000 per year; that amount would have to increase in order to fund more staff positions to run the delegated program.

In addition to the one FTE – the state’s biosolids coordinator – who oversees biosolids management statewide, CDPHE contracts with three county health departments to perform site inspections.

State Regulations and Permitting

The Colorado Biosolids Regulation (Regulation 64) requires that Letters of Intent (LOIs) for the Use and Distribution of Biosolids be submitted to the State. LOI’s must be submitted for land application sites and if a facility or entity wants to produce a Class A biosolids for unrestricted use. CDPHE evaluates the LOI and will either issue or deny a Notice of Authorization (Certification) for each one.

Colorado has additional management practices and soil monitoring requirements for biosolids beyond Part 503. These include setback requirements for surface waters and public and private wells, public access restrictions, slope restrictions, depth to groundwater restrictions, soil conditions, winter land application restrictions, and nutrient restrictions.

For Class B land application, additional soils monitoring is required as follows:

Collection and analysis of soils for the parameters identified in Table 9 [in Regulation 64] shall be accomplished prior to the initial biosolids application and on a once per application basis thereafter. Sampling conducted subsequent to the initial sampling event shall occur after completion of the cropping cycle, i.e. after harvest, but prior to any additional application. For purposes of this section biosolids application shall be considered as one or more individual application of biosolids which are intended to supply the agronomic nitrogen requirement for the crop for a single cropping cycle. Table 9 soils parameters = pH, conductivity, ammonium as N, organic matter, nitrate as N, available phosphorus, total phosphorus. (Reg. 64)

Nitrogen is the basis of Colorado’s agronomic loading rate. Phosphorus is managed based on testing of available P in soil and use of a P Index as needed. If certain levels of P are reached, there’s a checklist for the land applier to work through, to determine whether the use of a P Index or any additional management practices are necessary to minimize potential issues.

Additional monitoring, including but not limited to monitoring of additional biosolids or soils parameters, monitoring of biosolids or soils parameters more frequently than otherwise specified, deep soil monitoring, monitoring of groundwater, monitoring surface water, or monitoring of plant tissue may be required by [CDPHE]. (Reg. 64)

Certification of biosolids land appliers (land application contractors or WRRF operators) who manage or implement land application programs is not required, but occurs voluntarily. Colorado’s training and

certification program is unique and notable, helping ensure professionalism and quality in the management of land application programs.

CDPHE requires reporting from major and minor WRRFs, sludge-only processing facilities, and private companies that land apply biosolids for beneficial use. In-state Class A EQ biosolids have labeling requirements. Out-of-state EQ biosolids products must be registered and reported.

Pressures on Biosolids Management and Land Application

Pressures on biosolids in Colorado as of 2018, as identified by the state biosolids coordinator, include...

1. AGRICULTURAL ISSUES – declining farmland due to less agriculture or due to development, sprawl, seasonal restrictions, or competition with manures, etc.
2. NUISANCE ISSUES – odors, truck traffic, dust, etc.
3. TRADITION – WRRF management doesn't pay attention to where it goes, just contracts to make it go away
4. ENVIRONMENTAL ISSUES – impacts to soils, organisms, public health, contaminants (pathogens, metals, organic chemicals, etc.)

Some land application sites are being lost due to development and sprawl. Dry conditions lessen the need for nitrogen on some agricultural land, spurring the need for new application sites, especially along the Front Range. Western Slope land application sites tend to get permitted only when lagoons are cleaned out and a contractor treats/stabilizes and land applies the biosolids. In general though, fewer new acres/sites have been permitted for land application in recent years.

Normally, CDPHE receives one or two biosolids-related odor complaints in a year. In 2018, the one complaint came from a homeowner who was trying to sell their house in a valley with multiple entities land applying biosolids nearby.

The biosolids coordinator expects PFAS to be looked at more closely in Colorado, but for now the state is focusing its PFAS efforts on drinking water and looking for the science to catch up.

Septage Management

Septage is not regulated by the state. Mostly it falls to U.S. EPA regulations (Part 503), with some regulation by Colorado counties. One estimate says that much of CO's septage goes to land application. Some is hauled to WRRFs, but many WRRFs have stopped accepting septage in recent years, and many landfills won't take it.

Colorado Septage Management

Quality of state septage data	None
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Septage haulers based in state:	no data
In-state separate preparers (not WRRFs) taking septage:	0
WRRFs required to take septage?	no; some WRRFs & landfills do not accept septage
WRRFs that accept septage:	no data
Septage received at WRRFs in 2018 (gallons):	no data
Other outside wastes accepted at WRRFs:	no data
Is fats/oil/grease (FOG) a significant issue?	no data
Is it regulated?	no
Is there a proactive program to collect FOG?	0
Can septage be land applied in state?	yes
If yes, what treatment is required?	follow federal Part 503 requirements
Most recent septage regulations update:	there are no state septage regulations; some counties have had rules
Full-time equivalent (FTE) at state agency for septage:	0
Notes:	NBDP estimates that about 2.2 million gallons of septage are generated in CO each year, assuming 20% of households are on septic systems (a guess) and 5% of those are pumped out each year.

Major WRRFs, Separate Preparers, and Notable Projects

- The Metro Wastewater Reclamation District (MWRD) in Denver serves the Denver metropolitan area and portions of surrounding counties. It owns and operates two treatment facilities and the 52,000 acre METROGRO Farm east of the city. The Robert W. Hite Treatment Facility is the largest WRRF in the Rocky Mountain West, treating approximately 130 MGD. As noted in a 2018 *Colorado Sun* article, “the Hite plant produces 10,000 to 12,000 wet tons of biosolids a month (or about 2,200 to 2,600 dry tons), and there’s a waitlist of farmers who want to buy them. Biosolids are priced based on their nitrogen content – more nitrogen, which plants need to grow, means a higher price.” MWRD manages all of its biosolids in-house, from wastewater to the harvest and sale of crops grown at METROGRO Farm. Anaerobic digestion (AD) is used to treat biosolids to Class B quality, and biogas from the digesters is used to generate electricity for the facility. About 65% of the biosolids, branded as METROGRO and registered as a fertilizer with the CO Department of Agriculture, are sold to local privately-owned farms as soil amendment. The other 35% goes to the METROGRO Farm. METROGRO biosolids are used to fertilize winter wheat, sorghum/sudan grass, and feed corn grown at the Farm; they are also land applied on pasture/rangeland for sheep and cattle. Over the past 25 years, Denver Metro

has invested significantly in research and public outreach around biosolids land application, and the METROGRO Farm has been the site of extensive USGS soil and groundwater testing and monitoring.

- Other notable research on biosolids land application has been centered for more than three decades at Colorado State University in Fort Collins, led by Dr. Ken Barbarick and Dr. Jim Ippolito. This research has ensured best management of biosolids in local conditions, with local soils, crops, and climate. And interesting proactive research has been conducted in central Colorado, including at Leadville by Dr. Rufus Chaney (USDA, retired), Dr. Sally Brown (now Univ. of Washington), Harry Compton (U.S. EPA, retired), and others on land reclamation and ecosystem restoration of mine waste sites, showing excellent results and helping lead to mine reclamation with biosolids in many other places around the country.
- Big Dry Creek Wastewater Treatment Facility (WWTF) in Westminster manages its own biosolids through the entire process, land applying on a city-owned 3,000 acre farm. The Strasburg Natural Resource Farm is used for crop production and cattle grazing. In 2020, a new biosolids dewatering facility was completed at Big Dry Creek, reducing total solids produced and therefore truck traffic from the facility to land application sites.
- The Drake Water Reclamation Facility (WRF) in Fort Collins treats (using AD) and dewateres biosolids generated onsite and at the city's second WRF (Mulberry). Biogas is reclaimed to fuel the digesters and heat facility buildings. All of the Class B biosolids are land applied at Meadow Springs Ranch, a 26,000-acre working cattle ranch owned by the city, 30 miles from the WRF. The biosolids from Drake are about 19% solids and are applied at a typical rate of 3-4 dry tons per acre. The city owns the trucks that haul the biosolids and all of the spreading equipment, managing everything in-house. Meadow Springs staff coordinate with local and national organizations to develop grazing plans. The ranch houses the National Black-Footed Ferret (a relative of the weasel, on the endangered species list) Conservation Center. In 2019, Fort Collins became Platinum Certified under the National Biosolids Partnership (NBP) Biosolids Management Program (BMP).
- Another Colorado biosolids management program that has achieved recognition under the NBP BMP is South Platte Renew (SPR). SPR achieved Platinum Certification in the mid-2010s. Continuing its progressive achievements, the facility has, more recently, built its renewable energy program and now generates 500,000 cubic feet of biogas daily, much of which is converted to renewable natural gas (RNG) and injected into an existing natural gas pipeline and market, as discussed above. SPR biosolids are used as fertilizer on local feed corn and wheat fields.

- A1 Organics has been producing compost, soil, and mulch since the 1970s. They have recycling locations throughout the Front Range and a composting facility in northern CO. A1's Biocomp compost is made from biosolids, food waste, wood waste, and brewery residuals.
- Veris Environmental is a biosolids management company located in Colorado. Founded as Parker Ag Services in the 1980s, it first specialized in farm management, then added in biosolids recycling when, beginning in 1992, it helped to manage heat-dried biosolids from New York City that arrived in CO by train to be land applied. In 2015, Parker Ag merged with Liquid Waste Management to form Veris Environmental; the company now works in over a dozen states throughout the western U.S., handling land application, dredging, dewatering, biosolids transportation, and more. In January 2021, Denali Water Solutions invested heavily in Veris Environmental, taking over some of its operations in Colorado.

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