



**City of Fort Collins  
Water Reclamation  
And Biosolids**

**2017 Biosolids  
Management  
Performance Report**



**National Biosolids Partnership**

The National Biosolids Partnership (NBP) is operated through the Water Environment Federation (WEF) and the National Association of Clean Water Agencies (NACWA) along with local and regional biosolids management organizations receiving support from the U.S. Environmental Protection Agency (EPA).

The Water Reclamation & Biosolids (WR&B) is participating in the NBP Biosolids Management Program (BMP) which is a comprehensive program that aligns with the ISO 14001 program that is already in place for the Drake and Mulberry Water Reclamation facilities. Both the BMP and ISO 14001 programs require and track continuous improvement in the areas of environmental stewardship and regulatory compliance.

The mission of the BMP is to advance the understanding and adoption of effective practices in biosolids management by offering an EMS based certification program requiring participating organizations to go beyond regulatory requirements. The NBP

program has four recognition levels, or tiers, for organizations to complete: bronze, silver, gold and ends with platinum with each level building on the previous. On April 7, 2014, The City of Fort Collins WR&B signed a Letter of Understanding with the National Biosolids Partnership (NBP) in which the WR&B agreed to become an NBP participant with the intent to improve its existing biosolids program to achieve national recognition; committed to implement an NBP Biosolids Management Program (BMP); and committed to the NBP *National Code of Good Practice*. By signing the Letter of Understanding WR&B entered the program at the bronze level. November of 2015, we moved from bronze to silver. Our goals are set considering each of the following-- environmental performance, regulatory compliance, quality management practices and relations with interested parties. The WR&B is currently in the process of a Third Party Audit to achieve Gold level.

## Meadow Springs Ranch History



Meadow Springs Ranch (MSR) was purchased by the City of Fort Collins Utilites in 1990 for beneficial land application of biosolids. Funds for the purchase came from Water Reclamation and Biosolids (WRB) reserves. As part of the purchase agreement, the previous landowners, Meadow Springs Grazing Association, reincorporated as Natural Fort Grazing Association (NFGA) retained first right of refusal in perpetuity on any grazing lease awarded for the property. NFGA has been the only lessee since the City's purchase of MSR.

In 1993, the City purchased 7,550 acres leased from the Colorado State Land Board. With this acquisition, MSR now covered 25,680 acres. In 2000, forty acres of MSR was sold to the U.S. Department of the Interior for use as a black-footed ferret breeding facility. Since 2000, the City has added another 950 acres to MSR through the purchase of lands interior to ranch boundaries. Currently, the total acreage of MSR is approximately 26,600 acres.

## Studies

In 1991, studies began at MSR to determine best practices for applying biosolids to rangeland. At the time, rangeland biosolids application was a unique idea. The City hired RBD Inc., and with the help of the Environmental Protection Agency, Colorado Department of Public Health & Environment, Colorado State University, and New Mexico State University a scope was developed for a three-year program of studies. The studies included plants, wildlife, habitat for wildlife, loading rates for biosolids, and operational practices for biosolids application.

Plant and wildlife surveys were completed. Range conditions were assessed and used to reduce the number of animal units grazed. Rainfall simulations were conducted on biosolids application test plots and runoff samples were collected and analyzed. Uptake rates of nitrogen and the role of grazing in the nitrogen cycle were investigated. Wellhead protection programs were put into place to ensure the quality of local groundwater supplies. A recommended range of 2 to 5 dry tons per acre for biosolids application was determined using these test plots. The studies concluded in 1993, and a MSR management plan was developed. Results for many of the studies are available and cited in current Master Plans. In 1994, three biosolids application demonstration plots ranging in size from 269 to 720 acres were established to evaluate operational and environmental issues on a large scale. Sites for the demonstration plots were selected to represent different types of watersheds found at MSR. Each plot was

monitored for weather, surface water runoff quality, and groundwater quality.

Monitoring and research on the demonstration plots was conducted for six years. During this time, each plot received two biosolids applications at approximately 2 dry tons per acre per application. The demonstration phase did not identify any significant problems for rangeland biosolids application at MSR. Results for the demonstration study are available in *Demonstration Phase Final Report, July 27, 2001*. Based upon supporting results from approximately ten years of studies, full scale “routine” biosolids operations began at MSR in 2001.

Currently, the City produces approximately 2300 dry tons of biosolids per year. All of the biosolids are transported to MSR; this is approximately 450 semi loads per year. The biosolids operations, including trucking and application, is completely managed by City of Fort Collins staff. Each semi load is about 4.15 dry tons that is approximately 21% total solids. At MSR, the biosolids are staged and applied directly to MSR or air dried on a concrete pad to about 90% solids. The dried biosolids are picked up using a specific implement designed and fabricated in house called ‘the pick-up machine’ then kept in a storage building until land applied.



Drying is practiced during the warm summer months when drying conditions are optimal. There is a 30-day grazing prohibition on areas where biosolids have been applied. Air drying minimizes or eliminates any interference from biosolids application during the May 15 to November 15 grazing season. Drying also provides material that is more efficiently transported for land application in remote areas.



At the typical biosolids application rate of approximately 2-5 dry tons per acre, it is typically eight years or more before biosolids have been reapplied to an area.

Based upon current regulations, MSR has an unlimited site life for application of biosolids.

### **Grazing**



Immediately after purchasing MSR, WRB reduced the number of animal units grazed from 1400 to 1100 and set the grazing season from May 15 to November 15. These practices are still followed but are modified as drought conditions dictate. The 10-year grazing lease requires consultation with a qualified range specialist to set grazing rotations and provide guidance for acceptable grazing pressure based upon each year's range conditions. WRB staff, the range specialist, and members of the grazing association meet to discuss grazing schedules and range conditions. The frequency of meetings increases when there is uncertainty due to drought conditions.

The lease rates at MSR were developed using grazing lease survey data from Colorado AG Services and CSU.

### **Research and Conservation Partnerships**

In 1993, MSR was entered into a conservation agreement with U.S Fish and Wildlife to preserve habitat for a threatened species, the Colorado Butterfly Plant, *Gaura neomexicana ssp. coloradensis*.

MSR has provided research opportunities to CSU in range science, archeology, and biosolids. Colorado Parks and Wildlife (CPW) is currently using MSR for a four-year research project to develop an oral vaccine to control sylvatic plague in prairie dogs. This research is critical for recovery in the wild of endangered black-footed ferrets. CPW has also conducted bird and fish surveys at MSR. EPA has conducted biosolids endotoxin research at MSR.

### **Meadow Springs Ranch (MSR) Biosolids Application Summary for 2017**

The State of Colorado Notices of Authorization have been issued for biosolids application at MSR: BMP #1337, 4,205 acres; BMP #1462, 6,760 acres; BMP 2123, 2,960 acres.

A total of 1523.8 dry tons (1382.08dmt) biosolids were applied to 396 acres (160.26 hectares). The biosolids application rate was 3.9 dry tons/acre (8.62 dmt/ha).

The nitrogen loading rate for MSR was determined by a site specific vegetative response study that was conducted by Colorado State University from 1991 through 1993. The study determined that a biosolids application rate of two to five dry tons per acre would increase vegetative growth without promoting growth of undesirable annuals. The study assumed a three year reapplication cycle. In practice, the biosolids reapplication cycle at MSR ranges from three to ten or more years. This year had an application rate slightly higher due to reclamation on a burn area on the ranch.

The WRB continues to stay in compliance with regulatory requirements.

Lab analysis for Biosolids quality and soils reporting can be found in the Biosolids Annual Report. Also, kept internally and available upon request.

Colorado Biosolids Regulation 64		
Table 3 – Pollutant Concentration Limits		
Pollutant	Mg/kg, dry weight basis	WRB Results Monthly Ave
Arsenic	41	4.27
Cadmium	39	1.16
Copper	1500	486
Lead	300	15.51
Mercury	17	0.4
Molybdenum	NA	10.5
Nickel	420	21.69
Selenium	100	8.79
Zinc	2800	585

### Biosolids Storage

Approximately, one-third of the City’s annual biosolids production is air dried (~ 90% Total Solids (TS)) at MSR on a five-acre concrete pad. The dried biosolids are placed in a covered storage building for later application on MSR or the permitted Hardwick Site.

Drying and storing the biosolids allows flexibility in the scheduling of biosolids hauling and application. This flexibility is helpful while cattle are grazed on MSR from May 15 through November 15. Interference with the grazing rotation is minimized by drying and storing biosolids during the grazing season. Drying also reduces weight and volume and allows efficient stockpiling. The biosolids dried in summer are stored until transportation to the permitted Hardwick site each January through March of the following year.



On December 31, 2017, there were approximately 710 dry tons of air-dried biosolids in storage at MSR. This weight was determined when the biosolids were loaded for transportation, and a manifest was completed for each load. The dried biosolids are stored for less than one year. During the cooler months, biosolids drying is not efficient, so the City does not air dry biosolids but instead directly land applies undried biosolids (~ 21% TS) at MSR. On December 31, 2017, there were no undried biosolids on the concrete staging pad at MSR. Stormwater runoff from the staging pad flows to a lined retention area.

The BMP team is working on findings from the Third Party Preassessment audit performed Oct 3-5, 2017 by creating Corrective Action Reports (CAR’s). Some positives that came from the audit was realizing the Biosolids Value Chain encompassed the whole waste water process, water and Biosolids.

The ranch goal of maintaining the amount of Biosolids stored on the pad to three windrows or less was accomplished by drying during the summer when the cows were on the ranch and spreading when a predetermined area was soil sampled and applied on.