

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

WASTE UTILIZATION

(Acres)
CODE 633

DEFINITION

Using agricultural wastes such as manure and wastewater or other organic residues.

PURPOSES

- Protect water quality
- Protect air quality
- Provide fertility for crop, forage, fiber production and forest products
- Improve or maintain soil structure Provide feedstock for livestock
- Provide a source of energy

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where agricultural wastes including animal manure and contaminated water from livestock and poultry operations; solids and wastewater from municipal treatment plants; and agricultural processing residues are generated and utilized.

CRITERIA

General Criteria Applicable To All Purposes

All federal, state and local laws, rules and regulations governing waste management, pollution abatement, health and safety shall be strictly adhered to. The owner or operator shall be responsible for securing all required permits or approvals related to waste utilization, and for operating and maintaining all components. This includes all restrictions on sensitive sites subject to flooding, high water tables, and setback requirements next to streams/other waterways. Records of the use of wastes shall be kept a minimum of five years.

Use of municipal wastes and agricultural wastes (if applied to cropland and irrigated pasture and hayland) shall be based on at least one analysis of the material during the time it is to be used and a current soil test that is no older than five years. In the case of daily spreading, the waste shall be sampled and analyzed at least once each year. As a minimum, the waste analysis shall identify Total Nitrogen, Organic Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Soluble Salts (mmho/cm), and moisture/dry matter percent. Tests for Sulfur, Zinc Iron and other nutrients will be taken when appropriate. Representative waste samples will be taken according to recommendations from the University of Wyoming. Results from these tests are recommended to be on an "as-is" basis. A Phosphorous Index Rating (WY Agronomy Technical Note #15) of low or medium will be required.

Municipal waste loading rates and concentrations of heavy metals will be monitored including; Arsenic, Cadmium, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, and Zinc in accordance with the US Code, Reference 40 CFR, Parts 403 and 503, and all applicable state and local laws or regulations. Refer to Table 1 and Table 2 for allowable limits of biosolids from municipal waste sources, and allowable land application options including regulations requiring grazing and crop use restrictions.

Where agricultural wastes are to be spread on land not owned or controlled by the producer, the waste management plan, as a minimum, shall document the amount of waste to be transferred and who will be responsible for the environmentally acceptable use of the waste.

Table 1. Allowable limits for pollutant concentrations of municipal biosolids for land application.

Pollutant	Ceiling Concentration Limit for Land application	Pollutant Concentration Limit for EQ and PC Biosolids	Cumulative Pollutant Loading Rate Limit	Annual Pollutant Loading Rate
	--- ppm on a dry weight basis---		----- lb/Acre -----	
Arsenic	75	41	37	1.8
Cadmium	85	39	35	1.7
Copper	4,300	1,500	1340	67
Lead	840	300	270	13
Mercury	57	17	15	0.76
Molybdenum	75	-	-	-
Nickel	420	420	375	19
Selenium	100	36	89	4.5
Zinc	7,500	2,800	2500	125

Table 2. Summary of options available to meet land application of municipal biosolids regulations¹.

Biosolids Options for meeting 503 regulation	Pathogen Class ⁴	Meet Pollutant Concentration Limits	VAR options ²	Type of Land	Site Restrictions	Tracking Required
Exceptional Quality	A	Yes	1-8	Any	No	No
Pollutant Concentration (PC)	A	Yes	9-10	Not Lawns or Home Gardens	No	No
	B	Yes	1-10	Not Lawns or Home Gardens	Yes	No
CPLR ³	A	No	1-10	Not Lawns or Home Gardens	No	Yes
	B	No	1-10	Not Lawns or Home Gardens	Yes	Yes
APLR ³	A	No	1-8	Any	No	Yes

Source: A Plain English Guide to the EPA Part 503 Biosolids Rule. EPA/832/R-93/003. 1994.

¹Land applied biosolids must meet the Ceiling Concentration Limits for Pollutants (Table 2).

²VAR=Vector attraction reduction. Options 1-8 are treatments done at the wastewater treatment facility such as reducing the amount of volatile solids, raising the pH under specified conditions, composting etc. Option 9 is injection of liquid biosolids into the soil during application. Option 10 is incorporation of biosolids into the soil.

³ CPLR and APLR is the cumulative pollutant loading rate and the annual pollutant loading rate options for land application of biosolids.

⁴ Class A biosolids have pathogen levels below detectable limits and has no site application or use restrictions. Class B biosolids contain a low pathogen level and have some application restrictions (Table 2). These can only be handled in bulk. Crops whose edible parts do not touch the ground can be harvested 30 days after application, but harvest of edible parts that touch the ground or are underground is restricted to 14 and 20 months, respectively. Class B biosolids have a 30-day grazing restriction and a one-year restriction on public access to public contact lands.

Additional Criteria To Protect Water Quality

All agricultural/municipal waste shall be utilized in a manner that minimizes the opportunity for contamination of surface and ground water.

Agricultural/municipal waste shall not be land-applied on soils that are frequently flooded or have a water table within 3 feet of the surface during the growing season. This will be based on actual site conditions or as defined in the Field Office Technical Guide (FOTG) Section II Engineering Interpretations "Water Features" and/or by the County Soil Survey, during the period when flooding and where high water tables are expected.

When liquid wastes are applied, the application rate shall follow the practice standard Nutrient Management (590) in the FOTG. Application rate will not exceed infiltration rate of the soil, and the amount of liquid waste applied shall not exceed the available water holding capacity of the soil profile at the time of application. Liquid wastes shall not be applied to frozen, snow-covered, or saturated soil if the potential for runoff exists. The basis for the decision on whether or not to apply waste and the maximum application rate under these conditions shall be documented in the waste management plan.

When all relevant quality criteria is met primarily by relocating or reorganizing an animal feeding operation (AFO), and waste utilization on cropland is not a practicable option, we will consider the following criteria for meeting the waste utilization standard. Solid agricultural wastes shall be applied as uniformly as possible to rangeland or pasture and hayland that has a minimum soil depth of 20 inches, less than 6% slope, permanent vegetative cover, and has received no other fertilizer application for the past 3 years. Solid waste applications will not be made on frozen or snow-covered ground, within 150 feet of any draw, waterway or water body, or any areas which may be subject to excessive flooding, or where seasonal ground water occurs within 3 feet of the surface. The application rate will not exceed 10 tons per acre. Application areas will be rotated so no other fertilizer application will be in the application area within a 3 year period. Soil and manure testing are encouraged to monitor nutrients and salt buildup in the soils, but not required for the waste utilization from these animal feeding

(calving facilities, working corrals, etc.) operations.

Additional Criteria To Protect Air Quality

Where protecting air quality is a purpose for this practice, incorporate surface applications of solid forms of manure or other organic by-products into the soil with 24 hours of application to minimize emissions and to reduce odors.

When applying liquid forms of manure with irrigation equipment, select application conditions where there is high humidity, little/no wind blowing, a forthcoming rainfall event, and/or other conditions that will minimize volatilization losses into the atmosphere. The basis for applying manure under these conditions shall be documented in the nutrient management plan.

Handle and apply poultry litter or dry types of animal manure or other organic by-products when weather conditions are calm and there is less potential for blowing and emissions of particulates in the atmosphere. The basis for applying manure under these conditions shall be documented in the nutrient management plan.

When sub-surface applied using an injection system, waste shall be placed at a depth and applied at a rate that minimizes leaks onto the soil surface, while minimizing disturbance to the soil surface and plant community.

All materials shall be handled in a manner to minimize the generation of particulate matter, odors, and greenhouse gases.

Additional Criteria For Providing Fertility For Crop, Forage And Fiber Production And Forest Products

Where agricultural/municipal wastes are utilized to provide fertility for crop, forage, fiber production, and forest products, the practice standard Nutrient Management (590) in the FOTG shall be followed. A Phosphorous Index Rating (WY Agronomy Technical Note #15) and Nitrogen- or Phosphorus-based application rate will be documented in the plan.

The concentration of salts shall not exceed the level that will impair seed germination or plant growth. Refer to Chapter 5 of the Agricultural Waste Management Field Handbook for

guidance on salinity and sodium adsorption limits in soils and Chapter 6 for guidance on salt tolerance for various field forages and vegetable crops, or the Agricultural Salinity Assessment and Management ASCE Handbook No. 71. Also see Agronomy Technical Note #21.

Where municipal wastewater and solids are applied to agricultural lands as a nutrient source, the single application or lifetime limits of heavy metals shall not be exceeded. Refer to Table 6-2 of the Agricultural Waste Management Field Handbook for general guidance on the recommended cumulative limits for metals of major concern by EPA when wastes are applied to agricultural land.

Additional Criteria For Improving Or Maintaining Soil Structure

Wastes shall be applied at rates not to exceed the crop nutrient requirements, heavy metal loading rates, or salt concentrations as stated above. Wastes shall be applied at times when soil compaction is not likely to occur, and when waste material can be incorporated by appropriate means into the soil within 72 hours of application. The physical condition of the soil will be such that it meets quality criteria requirements in FOTG Section III Quality Criteria for Soil Condition-Tilth. Approved methods for determining when this criterion is met include the Soil Conditioning Index, and the Aggregate Stability Test in the Soil Quality Test Kit. The Soil Quality Scorecard utilized in conjunction with the soil quality test kit may provide an indication of overall soil quality.

Additional Criteria For Providing Feedstock For Livestock

Agricultural wastes to be used for feedstock shall be handled in a manner to prevent livestock disease from feeding waste, and preserve its feed value. Poultry litter stored for this purpose shall be covered. State Land Grant University animal nutrition recommendations or those of a qualified animal nutritionist shall be followed when developing procedures for storage, disease prevention and developing rations that are safe and economical

Additional Criteria For Providing A Source Of Energy

Use of agricultural/municipal waste for energy production should be an integral part of the overall waste management system design for this purpose.

All energy producing components of the system shall be included in the waste management plan and provisions for utilization of residues of energy production identified. Refer to Chapter 10 of the AWMFH for guidance on Biogas (methane gas) production by anaerobic digestion.

Where waste is utilized in an anaerobic digestion process, all Nitrogen and Phosphorus is conserved. Where waste is utilized for energy in combustion or gasification processes Nitrogen is lost but Phosphorus is conserved. When these residues are to be land-applied for crop nutrient use or soil conditioning, sufficient land for utilizing conserved nutrients must be available based on the appropriate criteria listed above.

CONSIDERATIONS

Considerations for Land Application:

The effect of Waste Utilization on the water budget should be considered, particularly where a shallow ground water table is present or in areas prone to runoff. Limit waste application to the volume of liquid that can be stored in the root zone.

Minimize the impact of odors of land-applied wastes by making applications when temperatures are cool, winds are minimal or in a wind direction is away from neighbors, inject or incorporate waste immediately, apply waste in thin layers that will dry quickly, treat waste prior to application in lagoons or by composting, avoid applications when people are home and typically outdoors, (weekends, holidays) and evening when odors can be confined to low lying areas, and provide application setbacks near residences, highways or other highly visible locations.,

Agricultural/municipal wastes contain pathogens and other disease-causing organisms. Wastes should be utilized in a manner that minimizes runoff from a land application site or contamination of drainage water from tile drains,

and from direct connections to ground water such as Karst areas, drainage wells, etc. Appropriate safeguards should be taken where waste is applied on sites which humans will directly consume foods.

Priority areas for land application of wastes should be on gentle slopes (<6%) located with a 100 feet setback from ponds, lakes, wells, sinkholes, land subject to flooding, streams and other waterways. When wastes are applied on the most sloping land or land adjacent to streams/other waterways, and other areas where there is high probability of water pollution from runoff, appropriate conservation practices should be installed to reduce the potential for offsite transport of waste.

To avoid damage to vegetation from surface applied waste on pasture and haylands, it is preferable to apply wastes that do not contain large pieces and soon after cutting or grazing before re-growth has occurred.

Reduce ammonium-nitrogen volatilization losses associated with the land application of some waste on cropland by injection/incorporation within 24 hours.

Considerations for Alternative Uses:

Consider marketing/utilizing composted waste for providing topsoil, fertilizer, or improving soil tilth in urban or industrial development sites. Composting waste will make handling easier and reduce bulk for all uses. Refer to Composting Facility Practice Code 317 and Chapter 10 of the AWMFH for composting methods and Chapter 12 of the AWMFH for equipment guidelines.

PLANS AND SPECIFICATIONS

Plans and specifications for Waste Utilization shall be in keeping with this standard and all state/local laws, ordinances and regulations. Plans and specifications shall describe the requirements for applying the practice to achieve its intended purpose. The waste management plan is to account for the utilization or other disposal of all animal wastes produced, and all waste application areas shall be clearly indicated on a plan map. Plans and specifications for waste utilization for providing fertility for crop/forage production will follow

guidelines in practice standard Nutrient Management (590) in the FOTG.

OPERATION AND MAINTENANCE

The operation and maintenance plan shall comply with all state/local laws, ordinances and regulations, including a schedule of periodic inspections and maintenance of equipment and facilities used in waste utilization. The plan should include what is to be inspected or maintained, and a general time frame for making necessary repairs.

Records shall be kept for a period of five years or longer, and include when appropriate:

- All records required by state/local laws, ordinances and regulations will be kept and maintained
- Quantity of manure and other waste produced and their nutrient content
- Soil test results
- Waste test results
- Dates, locations and amounts of waste land applied
- Dates, destination and amounts of waste removed from the system due to feeding, energy production, or export from the operation
- Waste application methods
- Crops grown and yields (both yield goals and measured yield)
- Other tests/methods used for monitoring nutrient status of crop or soil including plant tissue analysis, in-season soil nitrate tests, chlorophyll meter readings, yield and other GPS maps, remote sensing photography, post-season stalk nitrate tests, and tests to determine the nutrient content after crops/forages are harvested.
- Calibration of application equipment
- All records required in practice standard Nutrient Management (590) will be kept for waste utilized for fertility in crop and forage production
- Records of periodic inspections shall include dates and result of inspections
- Records of maintenance shall include date and description of maintenance or repair

REFERENCES

National Engineering Handbook, Agricultural Waste Management Field Handbook, USDA-Natural Resource Conservation Service, April 1992

A Plain English Guide to the EPA Part 503 Biosolids Rule. EPA/832/R-93/003. 1994.

NebGuide "Sewage Sludge Biosolids for Crop Production", Charles S. Wortmann, Nutrient Management Specialist, and Darren L. Binder, Research Specialist, University of Nebraska Department of Agronomy and Horticulture. 2002

Agricultural Salinity Assessment and Management ASCE Handbook No. 71.

USDA – Natural Resources Conservation Service, Wyoming eFOTG (Electronic Field Office Technical Guide), Section IV, Conservation Practice Standard 590 Nutrient Management, 2005.

USDA – Natural Resources Conservation Service, Wyoming eFOTG (Electronic Field Office Technical Guide), Section IV, Conservation Practice Standard 449 Irrigation Water Management, February 2003.