NATURAL RESOURCES CONSERVATION SERVICE
MONTANA CONSERVATION PRACTICE STANDARD

WASTE FACILITY COVER (NUMBER)

CODE 367

DEFINITION

A fabricated rigid, semi-rigid, or flexible membrane over a waste treatment or storage facility.

PURPOSE

To cover a waste facility for:

- water quality improvement
- air quality improvement
- capture of biogas for energy production.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where:

- Exclusion of precipitation from an animal waste storage or treatment facility will improve management of an existing or planned system.
- Capture and controlled release or flaring of emissions from an existing or planned agricultural waste storage will improve air quality.
- Bio-treatment of emissions from an existing or planned waste storage or treatment facility will improve air quality.
- Biogas production and capture for energy are components of an existing or planned animal waste system.

CRITERIA

General Criteria Applicable to All Purposes

Laws and Regulations. Cover systems for animal waste facilities must be planned, designed, and constructed to meet all federal, state and local regulations.

Service Life. The cover and appurtenances shall be designed to provide a service life of not less than 10 years.

Materials. The type, thickness and material properties of the cover and any supporting members shall account for all loads and stresses due to operational, environmental, and climatic conditions.

Flexible membrane materials, used for fabrication of inflated and floating covers, shall be certified by the manufacturer as suitable for the intended application.

Loads. Where applicable, the membrane cover and support system shall be designed to resist snow and wind loads as specified in ASAE EP288.5, Agricultural Building Snow and Wind Loads. **An alternative Code is ASCE 7, Minimum Design Loads for Buildings and Other Structures. Ground snow loads shall be as specified in "Snow Loads for Structural Design in Montana", CE Department, Montana State University, 2004 (http://mt.gov/dli/bsd/bc/snow_load.asp). Flexible membrane cover and support system shall also be designed to resist uplift as a result of wind. In Montana, a minimum wind speed of 90 mph shall be used in the analysis for uplift.**

Biogas Emissions. The cover system shall provide for capture and control of biogas, bio-reduction and direct release of gaseous emissions, or contain and release of gaseous emissions, as appropriate.

Capture and Control

The cover system shall be designed to capture biogas emissions and transfer to point of discharge without mixing with air. The point of

NOTE: This type of font **(AaBbCcDdEe 123..)** indicates NRCS National Standards.
This type of font (AaBbCcDdEe 123..) indicates Montana Supplement.

discharge shall be equipped with a flare or utilization equipment as appropriate.

Bio-reduction and Direct Release

The cover shall be fabricated of a permeable composite membrane designed to promote biological treatment of gaseous emissions. Gaseous emissions pass through the membrane for direct release to the atmosphere.

Contain and Release

The cover system is designed for rainfall exclusion and not to specifically capture biogas. Therefore special handling or treatment of biogas emissions is not required except as necessary to prevent undue safety hazards.

Anchorage. The cover anchorage system shall be designed in a manner to resist internal gas pressures, corrosive environment, wind loads or other forces as appropriate to the cover system.

Repair. New and aged flexible cover materials shall be readily repairable by solvent, adhesive, or thermoplastic welding. Semi-rigid cover material shall be repairable by sectional replacement.

Precipitation. Impermeable covers shall direct precipitation to collection points for removal by pumping or by controlled release to suitable grassed or otherwise stabilized areas for discharge.

Access. Covers shall be removable or otherwise provided with suitable equipment access as necessary for normal operation and maintenance of the waste facility.

Safety. The cover shall include safety features, including fences and warning signs as appropriate to prevent undue hazards.

As a minimum all covers shall include the following:

- "Warning Flammable Gas" and "No Smoking" signs shall be posted.

Where human entry is possible, additional warning signs stating "Do Not Enter – Possible Hazardous Gases" shall also be posted.

Where biogas is captured, the gas collection and control system shall be designed in accordance with standard engineering practice for safely handling a flammable gas.

Flares shall be grounded or otherwise protected to minimize the chance of lightening strikes. **Flares shall be located a minimum distance of 95 feet from the biogas source.**

A flame trap device shall be provided in the gas line between the flare **or any flame source** and the waste facility. **This device shall be located within 15 feet of the flame source.**

The location of underground gas lines shall be marked with signs to prevent accidental disturbance or rupture.

Additional Criteria for Rigid Covers

Rigid covers **and associated support and/or foundation systems** shall meet the structural requirements of Practice Standard**,** Waste Storage Facility **(Code** 313**)**.

The cover or cover vessel design shall include provisions for fail safe pressure relief. Maximum pressure shall not exceed 12 inches water column.

Additional Criteria for Inflated Covers

Covers inflated and supported by forced air from mechanical means shall be:

- Equipped with a warning system to notify operator of blower failure.
- Provided with a support system to limit cover collapse in the event the blower fails and for access of equipment.
- Provided with a suitable access port for normal maintenance equipment.

Additional Criteria for Floating Covers

Floating membrane covers shall be supplemented with floatation materials as necessary for proper function, operation, and maintenance.

Minimum membrane or composite membrane thickness shall be 40 mils.

Floating covers shall be designed to fluctuate with the water level as necessary to manage the storage facility.

Impermeable floating covers shall be designed with a biogas collection, transfer and control system to control ballooning of the cover and convey biogas to a flare or release point.

Additional Criteria for Energy Production

The cover materials and all appurtenances such as weights and floats shall be designed to capture and convey biogas to the gas collection system.

The cover design shall provide for the following:

1. Air Infiltration. The cover system and appurtenances, including perimeter soil slopes above the water line for in-ground digesters, shall be designed to exclude the entrance of air under all operating conditions.

2. Material. The minimum material thickness for flexible geomembrane covers shall be:

   - 40 mils for non reinforced material
   - 36 mils for reinforced materials.

3. Gas Collection, Control, and Utilization. The collection of biogas and flaring or other end use shall meet appropriate criteria in Practice Standard, Anaerobic Digester – Ambient Temperature **(Code** 365**)**.

CONSIDERATIONS

Animal waste storage facilities can release large amounts of biogas at certain times of the year. The cover and gas collection system should be designed for release of this **peak** gas **production rate.**

Storage of biogas should be considered when installing flexible covers over storage impoundments (lagoons) to attenuate gas supply for end use or controlled release.

PLANS AND SPECIFICATIONS

Plans and specifications shall be prepared in accordance with the criteria of this standard and shall describe the requirements for applying the practice to achieve its intended use.

OPERATION AND MAINTENANCE

An operation and maintenance plan shall be developed that is consistent with the purposes of the practice, its intended life, safety requirements, and the criteria used for its design.

When gas storage is included in the system design, the plan shall contain instructions as to limits of cover ballooning and emergency procedures if control equipment fails.

Warranties. The cover manufacturer and or installer shall warrant the cover for the intended use and design life, provide maintenance instructions, and certify that the cover is properly installed.