NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

WASTE FACILITY COVER

(No.)

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 / treatment facility, or open lot 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.

Loads. The cover and support system shall be designed to resist snow and wind loads as specified in the current version of ASCE 7, Minimum Design Loads for Buildings & Other Structures, as appropriate. Snow and wind load analyses shall be as specified in the current version of ASCE 7, Minimum Design Loads for Buildings & Other Structures. Use exposure Category C, Occupancy Category I, and the ground snow load (P_g) shall be as shown in Appendix A of this standard. If applicable, local building codes (such as in lake effect locations) may require more stringent loads and take precedence.

Fabricated roof systems for manure storage facilities or feedlots shall meet the design criteria in this standard. Construction drawings provided by others shall be stamped by a Professional Engineer or Registered Architect, and certified to meet this standard.

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 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. Impermeable covers shall include safety features, including fencing 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 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 lightning strikes.
- A flame trap device shall be provided in the gas line between the flare and the waste facility.
- The location of underground gas lines shall be marked with signs to prevent accidental disturbance or rupture.

Additional Criteria for Rigid Covers

The minimum design and material quality requirements for fabricated rigid structures are as follows:

- *Steel.* Manual of Steel Construction, American Institute of Steel Construction.
- *Timber.* National Design Specification for Wood Construction, American Forest and Paper Association. Timber used as foundation members, such as posts, shall contain a minimum of 0.6 lbs/cubic foot of MCQ, CCA or ACQ preservative, or equivalent. All other timber or lumber exposed to weather or manure contact shall contain a minimum of 0.4 lbs/cubic foot of CCA or ACQ, or MCQ @ 0.34 lbs/cubic foot preservative, or equivalent.
- Timber shown on the construction drawings that is specified to meet quality standards must be delivered to the site with the appropriate grade stamped on the timber at the mill. Grading information for Southern Yellow Pine is available from the Southern Pine Inspection Bureau: http://www.spib.org/grademarks.shtml?/lumberservices.

  Engineered timber products (such as glue laminated timber, laminated veneer lumber (LVL), and nail laminated timber) are to be grade stamped, or the manufacturer must provide documentation upon product delivery showing that the material properties conform to the structural requirements shown on the drawings.

- Trusses delivered to job site shall be accompanied with a certification stamped by a professional engineer or architect showing that the truss design conforms to this standard for the building dimensions shown on the drawings.
- *Timber Posts.* Structures with timber post foundations are to be designed using ANSI/ASAE EP486.1, Shallow Post Foundation Design

Additional Criteria for Fabricated "Hoop" Covers

- The hoops are to be trussed bows (not single bows).
- The distributor (or private engineer / Technical Service Provider (TSP) hired by the landowner) is to provide stamped design /drawings including the following:
  - design wind and snow loads conforming to this standard
  - load transfer from hoop truss to foundation, regardless of whether the foundation is timber or concrete
    - if timber is used; the species of timber, size, grade, and embedment details of the truss support posts
    - if concrete wall is used; wall and footing dimensions, steel details, and wall backfill details
    - base plate details of the truss-wall/post connection
  - manure load-resistance design details when any truss support post or wall is also used for support of the manure load
- Following construction, the distributor is to provide the landowner documentation that the structure has been properly installed, and the warranty is in effect. A copy of this document is to be attached to the as-built drawings for the roof structure.

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.

Additional Criteria for Floating Covers

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

Minimum membrane or composite membrane thickness shall be 40 mils.

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

CONSIDERATIONS

Planning must include provisions for fluctuating surface levels and manure agitation/ removal when a flexible membrane is considered for covering a manure storage pond

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 gas.

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.

Appendix A - Ohio Ground Snow Loads, (Pg)

Adapted from ASCE 7

County	Lb/ft^2	County	Lb/ft^2
Adams	20	Licking	20
Allen	20	Logan	20
Ashland	20	Lorain	20
Ashtabula	30	Lucas	20
Athens	25	Madison	20
Auglaize	20	Mahoning	20
Belmont	20	Marion	20
Brown	20	Medina	20
Butler	20	Meigs	25
Carroll	25	Mercer	20
Champaign	20	Miami	20
Clark	20	Monroe	20
Clermont	20	Montgomery	20
Clinton	20	Morgan	25
Columbiana	25	Morrow	20
Coshocton	20	Muskingum	25
Crawford	20	Noble	20
Cuyahoga	30	Ottawa	20
Darke	20	Paulding	20
Defiance	20	Perry	25
Delaware	20	Pickaway	20
Erie	20	Pike	20
Fairfield	25	Portage	20
Fayette	20	Preble	20
Franklin	20	Putnam	20
Fulton	20	Richland	20
Gallia	20	Ross	20
Geauga	30	Sandusky	20
Greene	20	Scioto	20
Guernsey	25	Seneca	20
Hamilton	20	Shelby	20
Hancock	20	Stark	20
Hardin	20	Summit	20
Harrison	20	Trumbull	25
Henry	20	Tuscarawas	25
Highland	20	Union	20
Hocking	25	Van Wert	20
Holmes	20	Vinton	25
Huron	20	Warren	20
Jackson	20	Washington	20
Jefferson	25	Wayne	20
Knox	20	Williams	20
Lake	30	Wood	20
Lawrence	20	Wyandot	20