

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
ARIZONA**

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 *may be applied as part of an agricultural waste management system* 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 for All Lagoons

Waste facility covers shall be designed on an individual basis to meet site conditions and functional requirements. They shall be part of an approved and overall engineering plan for irrigation, drainage, wildlife, recreation, channel improvement, or similar purposes.

Design and implementation of subsidiary components and/or structures shall meet all applicable Natural Resource Conservation Service (NRCS) standards. The criteria for the design of any components not specifically addressed in NRCS practice standards or specifications shall be consistent with sound engineering principles and/or manufacturer recommendations.

Laws and Regulations. Cover systems for animal waste facilities must be planned, designed, and constructed to meet all federal, state and local regulations. *Laws and regulations of particular concern include those involving water rights, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species. State water quality standards for seepage loss shall be followed.*

The owner is responsible for securing necessary permits and water rights, complying with all laws and regulations, and meeting legal requirements applicable to the installation, operation, and maintenance of this practice and associated structures.

Cultural Resources and Wildlife Habitat. *Impact to cultural resources, wetlands and Federal and state protected species shall be evaluated and avoided or minimized to the extent practicable during planning, design and implementation of this conservation practice in accordance with established National policy, General Manual (GM) Title 420-Part 401; Title 450-Part 401, Title 190-Parts 410.22 and 410.26, National Planning Procedures Handbook (NPPH), National Cultural Resources Procedures Handbook (NCRPH), National Food Security Act Manual (NFSAM),*

and the National Environmental Compliance Handbook (NECH).

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.

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. 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 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. Rigid covers shall meet the structural requirements of Practice Standard 313, Waste Storage Facility.

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.

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 365, Anaerobic Digester – Ambient Temperature.

Investigations, Surveys and Design

Criteria. Waste facility covers include practice components required for the complete management of waste. Documentation requirements will be as outlined below, in addition to the documentation requirements of the practice components used in the system.

Make a preliminary site assessment, investigation or reconnaissance to determine the need and feasibility of a waste facility cover considering the waste management system component and may include:

1. *Inventory of system- method of operation, number of livestock, waste disposal methods, type of equipment, future expansion plans, crop rotations on planned areas, component locations, structure requirements, quantities and costs.*
2. *Verify appropriate state or local laws for permitting and approval requirements and notify landowner of his/her responsibilities.*
3. *Verification or certification of used materials (if any).*

To adequately plan and layout this practice, a detailed topographic survey is required, that adequately details:

1. *An accurate topographic survey of the proposed location shall be taken and shall extend a minimum of 50 feet beyond the limits of the proposed waste facility cover and in sufficient detail to determine drainage patterns in the vicinity of the proposed facility. The proposed location of the waste storage facility cover shall be reference to that it may be staked in the field;*
2. *The survey shall show the location of any existing buildings, wells, buried pipelines, ditches, channels, etc.;*
3. *Location of underground or overhead utilities or markers;*
4. *A permanent benchmark(s) shall be set and described. Preferably, the elevations and coordinates should be based on a local (assumed) or coordinate system (State or grid) and clearly stated on the plan. Datum may be in the form of Northing and Easting coordinates, or Longitude and Latitude.*

Where applicable, USGS 7.5-minute topographic Quadrangles may be used, provided hydraulic analysis verifies minimum criteria are met at all locations.

The design of a practice is the application of Field Office Technical Guide practice

standards, NEH Part 651, AWMFH, using experience and judgment in the development of a solution to the problem or the objective. All computations and decisions made during the design of a practice are to be checked by another qualified individual and appropriate notations made. Design computations, calculations or analysis shall meet the following criteria:

- 1. Determine the size and type of cover. The dimensions of the waste facility cover shall be designed to resist anticipated wind loads.*
- 2. Construction material estimates (material volume computations), includes estimates of earthwork, pipe, concrete, rock, vegetative components, geotextile and erosion control fabrics, or other appurtenances.*
- 3. Subsidiary and applicable components shall be designed in accordance with applicable conservation practice standards (i.e., structures shall meet the requirements of Conservation Practice 587, Structure for Water Control, etc.).*

Installation and Basis of Acceptance. *For construction that does not meet State, OSHA, or Tribal criteria or requirements where deficient construction materials were used, NRCS may consider a waiver request for approval of construction after it has received a signed and sealed construction and/or material exemption from a licensed engineer. Required exemption shall be for installation of materials that do not meet minimum quality criteria as found in applicable Standards, Specifications, ASTM's, AWWA standards, etc.*

Contractors performing work under this practice shall abide by all Federal, State or Tribal laws or criteria, and must be licensed by the state board of technical registers where the work is being implemented.

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 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

Use Arizona standard drawings to the extent possible. These may be supplemented by additional drawings or specification notes on the drawings to provide full installation instructions.

Construction plans shall include all components needed for the safe operation of the proposed improvements such as railing, fencing, or warning signs as appropriate. The plans shall address operations near existing utilities, trench excavations and any other items related to construction of the structure that may pose a safety risk to those involved.

Development of plans and specifications for waste storage facilities will be guided by the National Engineering Handbook, Part 650, the Engineering Field Handbook, Chapter 5, and shall be in accordance with the National Engineering Manual, Parts 541 and 542, shall be prepared for specific field site, 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. Plans and specifications shall include such drawings, specifications, material requirements, quantities, construction requirements, equipment requirements, and other documents as are necessary to describe the work to be done. As a minimum, the plans and specifications shall provide the following:

- Project location map, including section, township and range, North arrow, cooperator/owner acknowledgement and certification signature blocks, engineering job class (cover sheet);*
- References that the owner/cooperator are responsible for all permits, rights-of-way, easements and the contact, coordination and location determination of any existing utilities or clearances (buried utility disclaimer);*

- *If applicable, a map showing the location of the practice(s) or system in reference to a known or established benchmark or reference point with the location, description and elevation clearly shown. Topographical features and/or controls shall be shown, showing tie in with existing or other planned practices;*
- *Field surveys and notes, soil investigations or geologic soil boring locations and soil classifications, earthwork or material estimates/quantities (foundation or subgrade preparation and requirements);*
- *Overall system or plan view (i.e., complete waste system layout or location, waste distribution system, facility plan layout; structural alignment, sizes, stationing, elevations, reference points, cultural features, and other details of the facility; cover type, material, thickness, etc.; plan view and cross section of waste facility cover; details showing anchoring requirements and/or method; vegetative, fence and signage requirements, if required; construction/installation criteria, State and Federal [OSHA] safety requirements, etc.), type, quality and quantity as necessary;*
- *Sufficient sectional, dimension or detail views of all system components and appurtenances (i.e., floats, weights; details of removing water from cover; profile and cross section of all inlet and outlet pipes; etc.) as required, for proper system functionality;*
- *Construction notes to clarify a component and furnish directions for installation by supplementing standard or general specifications as needed.*
- *Use Arizona Construction and Material Specifications for each item of work and material, as applicable and available. Additional specifications may need to be written to provide full material and installation instructions. Fill in blanks and add or delete items from the specifications to make them fit the job as needed.*

All designs completed by non-NRCS personal shall meet minimum State licensing board requirements and NRCS requirements and criteria as outlined in the General Manual, the National Engineering Manual (including

Arizona Supplements), and the National Engineering Handbook.

ONCE ALL PARTIES HAVE ACCEPTED AND SIGNED THE PLANS AND SPECIFICATIONS, NO CHANGES SHALL BE MADE TO THE DRAWINGS OR SPECIFICATIONS WITHOUT PRIOR APPROVAL OF NRCS.

OPERATION AND MAINTENANCE

An operation and maintenance (O&M) plan, specific to each site, shall be developed and reviewed with the landowner, cooperators or individual responsible for operation and maintenance and shall be commensurate with the size and complexity of the project. The plan shall be consistent with the purposes of the practice, its intended life, safety requirements and the criteria for its design. It shall document needed actions, including reference to periodic inspections and the prompt repair or replacement of damaged components, and should provide specific instructions for operating and maintaining facilities to ensure they function properly. This includes, but is not limited to:

- *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.*
- *Do not allow human entry to any enclosed structure without safety equipment that includes ladders and breathing apparatus.*
- *Appurtenances such as trash racks, outlet structures, and valves shall be kept free of trash, debris, foreign materials or blockage and replaced when needed to prevent clogging of outlet and overflow pipes*
- *Repair spalls, cracks, and weathered areas in concrete surfaces and repair or replace rusted or damaged metal and paint.*
- *Apply insecticides, as needed, for insect control per manufacturer's recommendations and precautions.*
- *Eradicate or otherwise remove all rodents or burrowing animals that have or may potentially damage any part of the delivery or application facilities. Immediately repair any damage caused by their activity.*

- *The practice should be inspected periodically and especially after storm events to determine whether it is functioning properly or if repairs are needed.*
- *All fences, railings, and/or warning signs shall be maintained to prevent unauthorized human or livestock entry.*
- *Immediately repair any damage resulting from vandalism, vehicles, or livestock.*

- *General Manual, Title 420-Part 401, Title 450-Part 401, Title 190-Parts 410.22 and 410.26*
- *National Environmental Compliance Handbook*
- *National Planning Procedures Handbook*
- *USDA NRCS, Engineering Design Standards – Far West States*
- *National Cultural Resources Handbook*

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

REFERENCE

- *ASAE, 1984. D384 – Manure Production and Characteristics. ASAE. St. Joseph, MI.*
- *Midwest Plan Service. 1985. Livestock Waste Facilities Handbook. MWPS, Department of Agricultural and Bio-systems Engineering, Iowa State University, Ames, IA.*
- *Midwest Plan Service. 1985. Livestock Waste Management Systems. Department of Agricultural and Bio-systems Engineering, Iowa State University, Ames, IA.*
- *Quality Assurance and Quality Control for Waste Containment Facilities, EPA/1600/R-93/182, September 1993.*
- *NRCS, “Agricultural Waste Management Field Handbook”, National Engineering Handbook, Part 651.*
- *National Engineering Handbook - Part 650, Engineering Field Handbook, Chapter 1 – Engineering Surveys; Chapter 3 –Hydraulics; Chapter 4 – Elementary Soils Engineering; Chapter 5 – Preparation of Engineering Plans; Chapter 6 – Structures; Chapter 10 – Agricultural Waste, and Chapter 17 – Construction & Construction Materials*
- *National Engineering Manual, Part 531 Geology 531.31, USDA, Natural Resources Conservation Service*
- *USDA-NRCS, TR-62 Engineering Layout, Notes, Staking and Calculations;*