MARYLAND NUTRIENT MANAGEMENT MANUAL

Incorporated by reference into **COMAR 15.20.07.02**

Supplement No. 10 Instructions

(July 2024)

The instructions below pertaining to Supplement No. 10 should be followed carefully.

General Instructions:

1) Replace the entire Table of Contents, removing pages i-ii and inserting new pages i-ii;
2) In Section 1 ("Nutrient Recommendations"), Subsection D ("Nutrient Application Requirements"), remove pages 1-D1-1 through 6 and insert new pages 1-D1-1 through 9; and
3) In Section III ("Animal Manure and Waste Management"), insert new subsection G ("USDA-NRCS Field office Technical Guide - Maryland/ D.C. Area - Waste Storage Structure - 313").

Specific Instructions (specifying the pages in the Nutrient Mgt. Manual to be removed and inserted):

ALL PAGES ARE INCLUSIVE

Nutrient Mgt. Manual	*Remove Pages*	*Insert Pages*
1) Table of Contents	i - ii	i - ii
2) Section 1 - (Nutrient Recommendations) Subsection D - Nutrient Application Requirements	I-D1-1 through 6	I-D-1 through 9
3) Section III - (Animal Manure and Waste Management) Subsection G (USDA-NRCS Field Office Technical Guide - Maryland/ D.C. Area - Waste Storage Structure - 313)	N/A	(New) Divider - Manual III-G
Chapter 1 - Conservation Practice Standard - Waste Storage Facility - Code 313 (2024)	N/A	(New) III-G1-1 through 19
Chapter 2 - Operation and Maintenance Plan - Waste Storage Facility - 313 (2021)	N/A	(New) III-G2-1 through 4
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SECTION I

NUTRIENT RECOMMENDATIONS

SUBSECTION D

NUTRIENT APPLICATION REQUIREMENTS

NUTRIENT APPLICATION REQUIREMENTS

Maryland Department of Agriculture July 2024

Authority: Agriculture Article, §§ 8-801—8-806; §§ 8-8A-01 *et seq.*; COMAR 15.20.07.02 and 15.20.13

CHAPTER I. GENERAL GUIDELINES

A. This document addresses (1) Setbacks for Nutrient Application, (2) Application Timing for all nutrients, organic and chemical, and (3) Temporary Field Stockpiling (staging) of Organic Materials. Application of nutrients may vary depending on the crop, season, nutrient source, and weather conditions. A person applying nutrients shall use best management practices, including following these "Nutrient Application Requirements," to maximize plant utilization efficiency as described in Section I-B of the Maryland Nutrient Management Manual, and minimize the potential for nutrient movement to sensitive areas and losses to surrounding water bodies, including surface and groundwater.

B. This document does not supersede Maryland Department of the Environment (MDE) Animal Feeding Operations regulations in COMAR 26.08.01 and 26.08.03.09, or the MDE Sewage Sludge Management regulations in COMAR 26.04.06 regarding the requirements for sewage sludge (biosolids) storage, buffer zones, and the incorporation of biosolids into the soil by the end of each working day.

C. All materials that provide primary crop nutrients shall be included in, and managed by, a Nutrient Management Plan. These materials include chemical fertilizer, organic materials such as animal manure, biosolids, food processing residuals, spent mushroom substrate, spray irrigation from wastewater treatment plants, composts, other waste streams containing nutrients, and soil conditioners as defined.

D. Imported organic fertilizer materials that provide primary nutrients such as food processing residuals, spent mushroom substrate, spray irrigation from wastewater treatment plants, composted wastes, other waste streams containing nutrients shall have a current registration with the Maryland Department of Agriculture (MDA) State Chemist as required by COMAR 15.18.03.02 and COMAR15.18.03.04. All materials registered shall be identified and labeled from the source that the material was generated.

E. These Nutrient Application Requirements shall be followed by certified consultants in the development of nutrient management plans, and by operators and applicators during plan implementation in order to comply with COMAR 15.20.07 and 15.20.08.05H-I.

CHAPTER II. DEFINITIONS

A. "Cover crop" means a cereal grain or cereal grain mix that:

1. Is planted:

a. Following the harvest of summer crops for the purpose of the seasonal protection of soil, the assimilation of residual nitrogen left from a previous crop, and the continued mineralization of nitrogen; and

b. In accordance with the "Maryland Winter Cover Crop Program Requirement" for seeding rate, planting dates, and planting methods as published on the Department's website.; and

c. Has germinated and attained at least 70 percent surface coverage on the field as measured by the standard line-transect method.

B.1. "Food processing residuals" or "FPRs" means an organic material that is:

a. Generated by processing agricultural commodities for human or animal consumption and includes:

i. Food residuals;

ii Food coproducts;

iii. Food processing wastes;

iv. Food processing sludges;

v. Organic material that is mixed or otherwise commingled with food residuals, food coproducts, food processing wastes, food processing sludges; or

vi. Any other incidental material whose characteristics are derived from processing agricultural products for human consumption or animal consumption; and

b. Registered with the State Chemist as a soil conditioner.

2. "Food processing residuals" do not include:

a. Digester digestate that has not been mixed or commingled with food processing residuals;

b. Animal and poultry manures that have not been mixed of commingled with food processing residuals;

c. Biosolids (i.e., Class A or Class B sewage sludge), as defined by the Maryland Department of the Environment in COMAR 26.04.06.03B(7);

d. Compost, that is, the product of composting in accordance with the standards established by the Secretary of Agriculture under Agriculture Article, § 6-221, Annotated Code of Maryland, including food residuals:

i. Diverted from final disposal in a refuse disposal system for composting under COMAR 226.04.13; or

ii. Obtained from residential curbside or drop-off programs, including pre-consumer and post-consumer food scraps, transported to a composting facility in accordance with COMAR 26.04.11;

e. Spent Mushroom Soil; or

f. Water treatment plant residuals.

C. Composting facility.

a. "Composting facility" means a facility where composting takes place.

b. "Composting facility" does not include a facility that is required to obtain:

i. A Natural Wood Waste Recycling Facility Permit under COMAR 26.04.09;

ii. A Sewage Sludge Utilization Permit under COMAR 26.04.06; or

iii. A Refuse Disposal Permit under COMAR 26.04.07.

D. 1. "Soil Conditioner" means any substance or mixture of substances, except a commercial fertilizer, unmanipulated animal and vegetable manures, agricultural liming material, or gypsum, intended for sale, offered for sale, or sold for:

a. Manurial, soil enriching, or soil corrective purposes;

b. Promoting or stimulating the growth of plants;

c. Increasing the productivity of plants;

d. Improving the quality of crops; or

e. Producing any chemical or physical change in the soil.

2. "Soil conditioner" includes, but is not limited to, microorganisms and materials such as compost, peat, vermiculite, perlite, or digestate produced by anaerobic digestion that are incorporated into the soil.

CHAPTER III. SETBACKS FOR NUTRIENT APPLICATION

A. "Nutrient Application Setback" means a vegetated area of a prescribed width where nutrient-containing material may not be applied, as measured from the edge of surface water, including perennial and intermittent streams. An intermittent stream means a stream or the reach of a stream that is below the local water table for at least some part of the year and obtains its flow from both surface runoff and groundwater discharge. Surface water does not include:

1. Ephemeral streams (defined as streams which flow only in direct response to precipitation in the immediate watershed and which have a channel bottom that is always above the local water table);

2. Irrigation and treatment ditches, as defined under "waters" in COMAR 15.20.08.03(B)(39), and

3. Field ditches, which, for purposes of this exception, are defined as channelized waterways that, as provided in the USDA-NRCS National Cooperative Soil Survey, are not within:

a. A floodplain soil mapping unit;

b. A hydric soil unit and mapped as a narrow, elongated feature in a fluvial/floodplain position; or

c. A soil mapping unit that has a "B" slope class or steeper.

B. Effective January 1, 2014, a person who uses nutrients shall implement the following nutrient application setback requirements:

1. An application of crop nutrients using a broadcast method (e.g., spinners, splashers) either with or without incorporation requires a 35-foot setback.

2. A directed spray application or the injection of crop nutrients requires a 10-foot setback.

3. Excepting perennial forage crops grown for hay or pasture, vegetation in the 10-foot setback area may not include plants that would be considered part of the crop grown in the field.

4. Pastures and hayfields are subject to a 10-foot nutrient application setback.

5. Nutrients may not be applied mechanically within the setback. Except as provided in subsection III.B.6, livestock shall be excluded from the setback to prevent direct deposition of nutrients within the setback.

6. As an alternative to fencing livestock from the setback area, a person shall work with the soil conservation district to develop and implement a Soil Conservation and Water Quality Plan. The plan shall include Best Management Practices (BMPs) such as stream crossings, alternative watering facilities, pasture management or other MDA-approved BMPs that are considered to be equally protective of water quality and stream health.

7. As an alternative to a nutrient application setback, MDA may approve other BMPs that it finds equally protective of water quality and stream health.

8. Sacrifice lots (less than 75% grass or grass legume mix) shall maintain a 35-foot setback.

C. Operators are responsible for sediment and erosion control of stream crossing areas. Operators shall move livestock from one side of the stream to the other side only through stream crossings designed to prevent erosion and sediment loss. Operators shall gate crossing areas wider than 12 feet. Operators may allow livestock controlled-access to streams for watering in accordance with USDA-NRCS Field Office Technical Guide standards and specifications.

CHAPTER IV. NUTRIENT APPLICATION TIMING (Except Food Processing Residuals)

A. Excepting food processing residuals, this chapter covers the application of all nutrients. The application of food processing residuals is covered in Chapter VI.

B. The consultant, applicator, operator, and the certified farm operator shall comply with the following management requirements when recommending or applying nutrients throughout the year. These requirements separately address the use of (1) chemical fertilizers and (2) organic fertilizers. An organic fertilizer is derived from either a plant or animal product, and contains carbon, and one or more elements other than hydrogen and oxygen that are essential for plant growth. The consultant, applicator, operator, and certified farm operator shall follow the nutrient application recommendations for crops as specified in the Maryland Nutrient Management Manual Section I-B. Nutrients shall be applied as close to plant nutrient uptake period as possible.

C. Spring (March 1 through June 30)

1. A person may make a nutrient application during the spring time period (March 1 through June 30) for an existing crop or a crop to be planted during this time period in accordance with recommendations found in Section I-B of the Maryland Nutrient Management Manual.

2. Nutrient application is prohibited when the soil is saturated.

a. A person may not apply nutrients in areas of fields that have standing water because the water holding capacity of the soil has been exceeded.

b. A person may apply nutrients after the standing water has been absorbed by the soil.

3. Frozen or Snow-Covered Ground. A person may not make a nutrient application if the ground is covered with snow greater than one inch, or when the ground is hard-frozen greater than two inches.

4. Organic Nutrient Sources other than Food Processing Residuals. Unless the farm operation is a no-till operation, a person shall directly inject the organic nutrient source into the soil or incorporate the material into the soil as soon as possible,

but no later than 48 hours after application. If the farm is a no-till operation, MDA may direct the operation to incorporate the material into the soil dependent on such factors as weather, wind, and the severity of the odor caused by the material.

5. Pastures and Hay Fields. If a pasture or hay field has a minimum of 75% vegetation predominantly in grass or grass legume mix and legumes, a person may make a nutrient management application in accordance with recommendations found in Section I-B of the Maryland Nutrient Management Manual.

6. Emergency Situations. If a person faces an emergency situation due to an imminent overflow of a storage facility, the person shall manage the emergency in consultation with MDA. In these situations, the person shall contact the MDA regional nutrient management representative for guidance before nutrient application.

D. Summer (July 1 through September 9)

1. A person may make a nutrient application during the summertime (July 1 through September 9) period for an existing crop or a crop to be planted during this time period in accordance with recommendations found in Section I-B of the Maryland Nutrient Management Manual.

2. Nutrient application is prohibited when the soil is saturated.

a. A person may not apply nutrients in areas of fields that have standing water because the water holding capacity of the soil has been exceeded.

b. A person may apply nutrients after the standing water has been absorbed by the soil.

3. Organic Nutrient Sources other than Food Processing Residuals. Unless the farm operation is a no-till operation, a person shall directly inject the organic nutrient source into the soil or incorporate the material into the soil as soon as possible, but no later than 48 hours after application. If the farm is a no-till operation, MDA may direct the operation to incorporate the material into the soil dependent on such factors as weather, wind, and the severity of the odor caused by the material.

4. Pastures and Hay Fields. If a pasture or hay field has a minimum of 75% vegetation predominantly in grass or grass legume mix and legumes, a person may make a nutrient management application in accordance with recommendations found in Section I-B of the Maryland Nutrient Management Manual.

5. Emergency Situations. If a person faces an emergency situation due to an imminent overflow of a storage facility, the person shall manage the emergency in consultation with MDA. Operators in such situations shall contact the MDA regional nutrient management representative for guidance before nutrient application.

E. Fall Application (September 10 through December 15)

1. Chemical Fertilizers. A person may make a fall application of a chemical fertilizer for an existing crop or a crop to be planted during this time period (September 10 through December 15) in accordance with recommendations found in Section I-B of the Maryland Nutrient Management Manual.

2. General Rules for Application of Organic Nutrient Sources.

a. Application of Organic Nutrient Sources other than Poultry Litter. A person may make a fall application of an organic nutrient source other than poultry litter for an existing crop or a crop to be planted either during this time period (September 10 through December 15) or the following spring (no later than June 1) provided that, for each such crop, the rates and applications are made in accordance with Section E.3 of this chapter and the recommendations found in Section I-B of the Maryland Nutrient Management Manual.

b. Application of Poultry Litter. A person may make a fall application of poultry litter for an existing crop or a crop to be planted during this time period (September 10 through December 15) provided that, for each such crop, the rates and applications are made in accordance with Section E.3 of this chapter and the recommendations found in Section I-B of the Maryland Nutrient Management Manual.

3. General Conditions for Application of Organic Nutrient Sources.

a. Nutrient application is prohibited when the soil is saturated.

(i) A person may not apply nutrients in areas of fields that have standing water because the water holding capacity of the soil has been exceeded.

(ii) A person may apply nutrients after the standing water has been absorbed by the soil.

b. Frozen or Snow-Covered Ground. A person may not make a nutrient application if the ground is covered with snow greater than one inch, or when the ground is hard-frozen greater than two inches.

c. Organic Nutrient Sources other than Food Processing Residuals. Unless the farm operation is a no-till operation, a person shall directly inject the organic nutrient source into the soil or incorporate the material into the soil as soon as possible, but no later than 48 hours after application. If the farm is a no-till operation, MDA may direct the operation to incorporate the material into the soil dependent on such factors as weather, wind, and the severity of the odor caused by the material.

d. Fallow Cropland. A person making a fall-application of an organic nutrient source to fallow cropland shall plant a cover crop as soon as possible after application, following the recommendations found in Section I-B of the Maryland Nutrient Management Manual. The cover crop planting shall occur no later than November 15 and be maintained until March 1

e. The rate of nutrient application shall be determined based on recommendations outlined in Section 1-B of the Maryland Nutrient Management Manual using either nitrogen or phosphorus–based criteria.

f. If the application is phosphorus-based, the phosphorus application rate:

(i) For a fall-seeded crop, shall be based on the phosphorus recommendations for that crop;

(ii) For crops to be planted the following spring (no later than June 1), may not exceed the one-year crop removal rate of phosphorus for the spring-planted crop;

(iii) Shall follow the provisions of the Phosphorus Management Tool, as they may otherwise apply; and

(iv) Shall result in an application rate of plant available nitrogen not exceeding 50 lbs. per acre.

g. If the application is nitrogen-based, the rate of application for a fall-seeded crop shall be based on recommendations for plant available nitrogen as outlined in Section I-B of the Maryland Nutrient Management Manual. If the application is related to a crop that is to be planted the following spring (no later than June 1), the application of nitrogen may not exceed 50 lbs. of plant available nitrogen per acre.

4. Emergency Situations. If a person faces an emergency situation due to an imminent overflow of a storage facility, the person shall manage the emergency in consultation with MDA. Operators in such situations shall contact the MDA regional nutrient management representative for guidance before nutrient application.

F. Winter Application (December 16 through the last calendar day of February of the following year)

1. Chemical Fertilizers. A person may not make a winter application of a chemical fertilizer for an existing crop or to cropland. However, for small grains and perennial forage crops, a person may apply nitrogen at green-up when tillering begins as recommended in the Maryland Nutrient Management Manual Section I-B. In addition, a person may apply certain nutrients for greenhouse production and for other vegetable and small fruit crops listed in the Maryland Nutrient Management Manual Section I-B. The restriction on the application of chemical fertilizers during winter also does not apply to potash or liming materials.

2. Organic Nutrient Sources. Except as provided in §F.4 below, a person may not make a winter application of an organic nutrient source for an existing crop or to cropland. Instead, operators and generators of organic nutrient sources shall make plans for adequate storage to eliminate the need for a winter application.

3. Imported Organic Nutrient Sources.

A person may not make a winter application of an imported organic nutrient source to an existing crop or to cropland. This prohibition includes an organic nutrient source combined from on-farm generated organic fertilizers and imported organic fertilizers. In emergency situations, MDA may allow relocation of manure/organics to the best available options.

4. Emergency Situations pertaining to imminent overflow of on-farm generated nutrient sources.

a. A person may make a winter application of an organic nutrient source to an existing crop or cropland only if:

(i) The operation has inadequate storage for on-farm generated organic nutrient source (i.e., the liquid storage capacity will be exceeded before the March 1 winter application restriction);

(ii) The nutrient source is non-stackable (greater than 75% moisture content); and

(iii) There is no other reasonable option to manage it.

b. Applications required in emergency situations due to an imminent overflow of a storage facility from on-farm generated organic nutrient source(s) shall be managed in consultation with MDA before nutrient application.

c. Operators in such situations shall contact the MDA regional office for guidance and verification of the necessary application.

d. Any such application shall be made in accordance with Section I-B of the Maryland Nutrient Management Manual.

e. The following restrictions apply to any such winter application:

(i) Nutrient application is prohibited during the winter if the organic nutrient source is stackable (equal to or less than 75% moisture content, such as poultry litter) or adequate storage is available.

(ii) Nutrient application is prohibited when the soil is saturated.

(aa) A person may not apply nutrients in areas of fields that have standing water because the water holding capacity of the soil has been exceeded.

(bb) A person may apply nutrients after the standing water has been absorbed by the soil.

(iii) Frozen or snow-covered ground. A person may not make a nutrient application if the ground is covered with snow greater than one inch or when the ground is hard-frozen greater than two inches.

(iv) Nutrient application is prohibited to land with a slope greater than 7 percent.

(v) Rates of application shall be minimized, and available acreage used to the greatest extent practical. In no case shall the application rate per acre exceed the one-year phosphorus removal rate or 50# of plant available nitrogen per acre for the next harvested crop. Any winter applied nutrients will be deducted from the recommendations of the next harvested crop.

(vi) Winter applications shall be made on existing vegetative cover, small grain crops, or established hay fields and pastures and maintained as such until March 1st.

(vii) A setback of at least 100 feet from all surface waters shall be maintained, unless best management practices providing water quality protection equivalent to such a setback are in place. (Surface water is defined as any permanent or intermittent, continuous, physical conduit for transporting water. Shovel ditches and water leads are not included as surface waters for purposes of this policy).

CHAPTER V. TEMPORARY FIELD STOCKPILING (STAGING) FOR STACKABLE ORGANIC NUTRIENT SOURCE MATERIALS (EQUAL TO OR LESS THAN 75% MOISTURE CONTENT)

A. General Provisions

1. When other immediate use options and alternatives are not available, temporary field stockpiling (staging) of organic nutrient source-materials (equal to or less than 75% moisture content) is allowed. Temporary field stockpiling (staging) provides greater environmental protection than a fall or winter application of nutrients or applying nutrients too far ahead of normal planting time and crop uptake.
2. To minimize the duration of temporary field stockpiling (staging), operators shall coordinate with integrators to schedule cleanouts as close to spring planting as possible, thereby providing a source of nutrients that is in phase with crop nutrient needs.
3. Existing storage shall be fully used prior to stockpiling material in the field.
4. Any material staged in a temporary field stockpile shall be land applied in the first spring season (no later than June 30) following the placement of the stockpile.

B. The temporary field stockpiling (staging) shall be located:

1. If a vegetated buffer is not in place, at least 100 feet from any surface water as defined in COMAR 15.20.08.03(B)(39) and any irrigation or treatment ditches; and if a vegetated buffer is in place, at least 35 feet from any such water;
2. At least 100 feet from wells, springs, and wetlands; however, if the well is located down gradient from the temporary field stockpiling (staging) area, at least 300 feet from the well;
3. At least 200 feet from any residence outside the operator's property;
4. Outside flood prone areas and areas subject to ponding;
5. If located on more than a 3% grade slope and no diversion installed, no farther than 150 feet from the top of the slope.

C. All organic nutrient source materials shall be stacked at least 6 feet high and peaked to prevent precipitation from soaking into the pile.

D. Materials shall be field stockpiled (staged) temporarily in a manner that prevents nutrient runoff.
Temporary field stockpiling (staging) locations for subsequent piles should stay at the same location, rather than be moved from place to place.

F. All organic nutrient source materials shall be removed from the temporary field (staged) stockpile and the ground area thoroughly scraped or cleaned when the application of the materials takes place.

G. Temporary field stockpile (staged) areas shall be restored to its original condition and, if necessary, reseeded with grass or an agronomic crop to facilitate nutrient uptake.

CHAPTER VI. FOOD PROCESSING RESIDUALS UTILIZATION

A. The consultant, applicator, operator, and the certified farm operator shall comply with the following management requirements when recommending or applying food processing residuals (FPRs) throughout the year. The consultant, applicator, operator, and certified farm operator shall follow the nutrient application recommendations for crops as specified in the Maryland Nutrient Management Manual Section I-B. Nutrients, including FPRs, shall be applied as close to plant nutrient uptake period as possible in accordance with good agronomic practices.

B. **Spring (March 1 through June 30)**

1. A person may make a nutrient application utilizing FPRs during the Spring time period (March 1 through June 30) for an existing crop or a crop to be planted during this time period in accordance with recommendations found in Section I-B of the Maryland Nutrient Management Manual.

2. Application of FPRs is prohibited when the soil is saturated.

a. A person may not apply nutrients, including FPRs, in areas of fields that have standing water because the water holding capacity of the soil has been exceeded.

b. A person may apply nutrients, including FPRs, after the standing water has been absorbed by the soil.

3. Frozen or Snow-Covered Ground. A person may not make a nutrient application, including an application of FPRs, if the ground is covered with snow greater than one inch, or when the ground is hard-frozen greater than two inches.

4. For all crops, a person applying FPRs to a field shall:

a. Either:

(i) Directly inject liquid (> 90% moisture content) material into the soil; or

(ii) Incorporate solid (<75% semisolid 75.1% - 90% moisture content) material into the soil as soon as possible, but no later than the end of the day that the application is made;

b. If incorporating the material, ensure that the incorporation results in 95% soil coverage of the material via heavy discing, chisel plowing, or use of other primary tillage equipment (vertical tillage equipment may not be used to incorporate this material);

c. If injecting the material, ensure that the injection likewise results in 95% soil coverage of the material;

d. Make only one nutrient application utilizing FPRs to the field (multiple applications utilizing FPRs to the same field during this time period is prohibited regardless of the nutrient analysis of the material); and

e. Plant a harvestable crop within 40 days from the date that the FPRs application began.

5. MDA may direct the operation to further incorporate FPRs into the soil dependent on such factors as weather, wind, and the severity of the odor caused by the material.

6. Pastures and Hay Fields. A person may not make a surface application of FPRs to pasture and hay fields.

7. Emergency Situations. If a person faces an emergency due to an imminent overflow of a storage facility, the person shall manage the emergency in consultation with MDA. In these situations, the person shall contact the MDA regional nutrient management representative for guidance before nutrient application.

C. **Summer (July 1 through September 9)**

1. A person may make a nutrient application utilizing FPRs during the Summer time period (July 1 through September 9) for an existing crop or a crop to be planted during this time period in accordance with recommendations found in Section I-B of the Maryland Nutrient Management Manual.

2. Application of FPRs is prohibited when the soil is saturated.

a. A person may not apply nutrients, including FPRs, in areas of fields that have standing water because the water holding capacity of the soil has been exceeded.

b. A person may apply nutrients, including FPRs, after the standing water has been absorbed by the soil.

3. For all crops, a person applying FPRs to a field shall:

a. Either:

(i) Directly inject liquid (> 90% moisture content) material into the soil; or

(ii) Incorporate solid (<75% semisolid 75.1% - 90% moisture content) material into the soil as soon as possible, but no later than the end of the day that the application is made;

b. If incorporating the material, ensure that the incorporation results in 95% soil coverage of the material via heavy discing, chisel plowing, or use of other primary tillage equipment (vertical tillage equipment may not be used to incorporate this material);

c. If injecting the material, ensure that the injection likewise results in 95% soil coverage of the material;

d. Make only one nutrient application utilizing FPRs to the field (multiple applications utilizing FPRs to the same field during this time period is prohibited regardless of the nutrient analysis of the material); and

e. Plant a harvestable crop within twenty-one 21 days from the date that the FPRs application began.

4. MDA may direct the operation to further incorporate FPRs into the soil dependent on such factors as weather, wind, and the severity of the odor caused by the material.

5. Pastures and Hay Fields. A person may not make a surface application of FPRs to pasture and hay fields.

6. Emergency Situations. If a person faces an emergency due to an imminent overflow of a storage facility, the person shall manage the emergency in consultation with MDA. In these situations, the person shall contact the MDA regional nutrient management representative for guidance before nutrient application.

D. **Fall Application (September 10 through December 15)**

1. General Rules for Application of Food Processing Residuals.

A person may make a fall application of FPRs for an existing crop or a crop to be planted either during this time period (September 10 through December 15) or the following spring (no later than June 1) provided that, for each such crop, the rates and applications are made in accordance with Section D.2 of this chapter and the recommendations found in Section I-B of the Maryland Nutrient Management Manual.

2. General Conditions for Application of Food Processing Residuals.

a. Application of FPRs is prohibited when the soil is saturated.

(i) A person may not apply nutrients, including FPRs, in areas of fields that have standing water because the water holding capacity of the soil has been exceeded.

(ii) A person may apply nutrients, including FPRs, after the standing water has been absorbed by the soil.

b. Frozen or Snow-Covered Ground. A person may not make a nutrient application, including an application of FPRs, if the ground is covered with snow greater than one inch, or when the ground is hard-frozen greater than two inches.

c. September 10 through October 31 Time Period.

(i) During the September 10 through October 31 time period, for all crops, a person applying FPRs to a field shall:

(aa) Either:

(I) Directly inject liquid (> 90% moisture content) material into the soil; or

(II) Incorporate solid (<75% semisolid 75.1% - 90% moisture content) material into the soil as soon as possible, but no later than the end of the day that the application is made;

(bb) If incorporating the material, ensure that the incorporation results in 95% soil coverage of the material via heavy discing, chisel plowing, or use of other primary tillage equipment (vertical tillage equipment may not be used to incorporate this material);

(cc) If injecting the material, ensure that the injection likewise results in 95% soil coverage of the material;

(dd) Make only one nutrient application utilizing FPRs to the field (multiple applications utilizing FPRs to the same field during this time period is prohibited regardless of the nutrient analysis of the material); and

(ee) Plant a harvestable crop within 21 days from the date that the FPRs application began.

(ii) MDA may direct the operation to further incorporate FPRs into the soil dependent on such factors as weather, wind, and the severity of the odor caused by the material.

d. November 1 through the end of February Time Period.

(i) Non-Injectable Food Processing Residuals. From November 1 through the last calendar day of February of the following year, a person may not apply non-injectable FPRs to land but instead, must properly store this material.

(ii) Injectable Food Processing Residuals. From November 1 through December 15, a person:

(aa) May only inject FPRs that are injectable into soil growing an existing crop or cover crop planted no later than October 15th; and

(bb) May make only one nutrient application utilizing FPRs to the field (multiple applications utilizing FPRs to the same field during this time period is prohibited regardless of the nutrient analysis of the material); and

(cc) Shall ensure that the injection results in 95% soil coverage of the material;

(iii) Application Rates.

(aa) The rate of nutrient application shall be determined based on recommendations outlined in Section 1-B of the Maryland Nutrient Management Manual using either nitrogen or phosphorus–based criteria.

(bb) If the application is phosphorus-based, the phosphorus application rate:

1. For a fall-seeded crop, shall be based on the phosphorus recommendations for that crop;

2. For crops to be planted the following spring (no later than June 1), may not exceed the one-year crop removal rate of phosphorus for the spring-planted crop;

3. Shall follow the provisions of the Phosphorus Management Tool, as they may otherwise apply; and

4. Shall result in an application rate of plant available nitrogen not exceeding 50 lbs. per acre.

(cc) If the application is nitrogen-based, the rate of application for a fall-seeded crop shall be based on recommendations for plant available nitrogen as outlined in Section I-B of the Maryland Nutrient Management Manual. If the application is related to a crop that is to be planted the following spring (no later than June 1), the application of nitrogen may not exceed 50 lbs. of plant available nitrogen per acre.

(iv) From December 16 through the last calendar day of February of the following year, a person must properly store this material.

3. Emergency Situations. If a person faces an emergency due to an imminent overflow of a storage facility, the person shall manage the emergency in consultation with MDA. Operators in such situations shall contact the MDA regional nutrient management representative for guidance before nutrient application.

E. Winter Application (December 16 through the last calendar day of February of the following year)

A person may not make a winter application of FPRs to an existing crop or to cropland. This prohibition includes an organic nutrient source combined from on-farm generated organic fertilizers and FPRs. In emergency situations, MDA may allow relocation of FPRs to the best available options.

SECTION III

ANIMAL MANURE AND WASTE MANAGEMENT

SUBSECTION G

USDA-NRCS FIELD OFFICE TECHNICAL GUIDE

MARYLAND/D.C. AREA

WASTE STORAGE STRUCTURE 313 – MARYLAND

(2024)

Chapter 1

Conservation Practice Standard
Waste Storage Facility - Code 313 (2024)

Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

WASTE STORAGE FACILITY

CODE 313

(no)

DEFINITION

An agricultural waste storage impoundment or containment structure.

PURPOSE

This practice is used to accomplish one or more of the following purposes–

- Minimize or eliminate the impacts on surface water.
- Minimize or eliminate the impacts on groundwater resources.
- Minimize emissions such as greenhouse gases to improve air quality.

CONDITIONS WHERE PRACTICE APPLIES

Use where storage is needed for wastes generated by agricultural production or processing and where soils, geology, and topography are suitable for construction of the facility. For reception pits, use NRCS Maryland Conservation Practice Standard (CPS) Waste Transfer (Code 634).

For liquid waste storage facilities with an embankment, this practice applies only to low hazard structures. A low hazard structure is defined as a dam in a rural or agricultural area where failure may damage farm buildings, agricultural land, or township and country roads (Title 210, National Engineering Manual (NEM), Part 520, Section 520.21,"Definition and Classes").

This practice applies to waste storage structures such as tanks, stacking facilities, and pond appurtences that are fabricated. This practice does not apply to Waste Treatment Lagoons (Code 359), even though they may have paved ramps or linings.

This practice does not apply to the temporary stacking of wastes in the field without a stacking pad. See the NRCS Maryland CPS Waste Recycling (Code 633) for these requirements.

This practice does not apply to the storage of human waste or to a facility used exclusively for routine animal mortality. Use NRCS Maryland CPS Animal Mortality Facility (Code 316), for routine animal mortality.

CRITERIA

General Criteria Applicable to All Purposes

Laws and Regulations

Plan, design, and construct the waste storage facility to meet all Federal, Tribal, State and local laws and regulations. The owner or operator is responsible for securing all required permits and approvals and for performance in accordance with appropriate laws, rules, and regulations.

The storage facility must be a planned component of a Comprehensive Nutrient Management Plan (CNMP) or a Waste Management System (WMS).

Location
Evaluate and implement the following factors in the design of the waste storage facility:

- Proximity of the structure to the source of wastes;
- Access to other facilities;
- Overhead and underground utilities;
- Applicable health regulations;
- Location of floodplains;
- Direction of prevailing winds to minimize odors; and,
- Location relative to wells, milking centers, and nearby homes.

Locate the waste storage facility outside the 100-year floodplain, unless site restrictions require locating it within the floodplain. Protect the facility from inundation from a 25-year flood event and structural damage from the 100-year flood event, if located within the floodplain. Additionally, follow the policy found in Title 190 General Manual, Ecological Sciences, Part 410, Subpart B, Section 410.25 Flood Plain Management, which may require additional protection, planning, or operating measures. Construction activity within the 100-year floodplain requires permits or authorizations from the Maryland Department of the Environment and/or the U.S. Army Corps of Engineers. Obtain all applicable permits and authorizations prior to the start of construction.

Locate facilities at least 100 feet from wells. When practical, locate facilities at least 100 feet from springs, wetlands, drainage ditches, streams, and ponds.

Locate any facility where it can be constructed, operated, and maintained without polluting air or water resources.

Foundation
Perform surface and subsurface investigations for all waste storage facilities sufficient in detail and analysis to support the design in accordance with Title 210, National Engineering Manual, Part -531, "Geology" (210-NEM-531). Document the soil material encountered, the location of any seeps, the depth to water table, the depth to bedrock, the presence of sink holes, karst topography, the description and location to nearest water well(s), and other conditions that might affect the suitability of the site. Additional foundation criteria are listed specific to Criteria for Liquid Waste Storage Impoundments and Additional Criteria for Fabricated Structures.

Storage Period
The storage period is the maximum length of time anticipated between emptying events. Base the storage period on the timing required for environmentally safe utilization considering climate, crops, soils, equipment, and local, State, and Federal regulations and in accordance with the CNMP and/or the Agricultural Waste Management Plan.

Design Storage Volume
Size the facility to store the following volumes:

Operational Volume

- Manure, wastewater, bedding, and other wastes accumulated during the storage period.
- Include normal monthly precipitation less evaporation, where appropriate, during the storage period for liquid or slurry storage facilities.
- Normal runoff from the facility's drainage area during the storage period.
- Planned maximum residual solids. Provide a minimum of 6 inches for residual solids in tanks unless provisions that allow for complete emptying are included.

- Additional storage to meet management goals or regulatory requirements.

Emergency Volume (liquid storages only)

- 25-year, 24-hour precipitation on the surface of the liquid or slurry storage facility.
- 25-year, 24-hour runoff from the facility's drainage area.

Waste production by livestock and poultry varies widely and should be based on actual production for individual farm operations. Variations are due to climate, type of feed, and livestock production methods.

Table 1 provides a general guide to manure production for various animals and is to be used as a minimum. Additional guidance may be found in the Agricultural Waste Management Field Handbook. Use of bedding at the rate of 4 pounds per cubic foot of manure can be expected to increase the volume of manure by about 30 percent. Use actual records for bedding amounts when available.

Table 1 - Daily Manure Production (not including bedding, wash water, or dilution water)

Animal	Cubic feet per day per 1000 lbs. of animal weight
Dairy Cattle*	1.60
Beef Cattle	1.00
Horses	0.80
Feeder Swine	1.10
Breeder Swine	0.80
Sheep	0.60
Poultry - Layers, Broilers	1.25

**The daily manure production (dmp) shown is based on a heard average of 20,000 lbs./cow-cow year. Actual manure production can be calculated as follows; dmp = (0.00004(MP) + 0.8) where MP = average yearly milk production in lbs./cow. The estimated daily manure production used should represent that actually used.*

For milking center wastes, the volume of was water should be determined by actual measurement, estimated by Table 2, or based on estimated quantities of the operator.

Table 2 - Volume of Milking Center Wastes

Washing Operation	Water Volume
Bulk Tank	
Automatic	50-60 gal/wash
Manual	30-40 gal/wash
Pipeline	
In Parlor*	75-125 gal/wash
Pail Milker	30-40 gal/wash
Misc. Equipment	30 gal/day
Cow Preparation	
Automatic	1/4-1/2 gal/wash per cow
Estimated Average	2 gal/wash per cow
Manual	1/4-1/2 gal/wash per cow
Parlor Floor	40-75 gal/day
Milkhouse Floor	10-20 gal/day

**Volume increases for long lines in a large stanchion barn*

Ref: MWPS-1, Structures and Environment Handbook, 11th Ed.

Freeboard Volume (for liquid or slurry waste storage exposed to precipitation)

- Minimum of 6 inches for vertical walled facilities.
- Minimum of 12 inches for all other facilities and under-floor storages that require pit ventilation.

Freeboard is not required for roofed facilities that do not receive runoff unless required for ventilation.

Exclude non-polluted runoff from the structure where practical except where inclusion is advantageous to the operation of the facility.

Inlet Structures
Design inlet to resist corrosion, plugging, freeze damage, and ultraviolet deterioration. Design must incorporate erosion protection. Provide a water-sealed trap and vent or similar devices to control gas entry into the buildings or other confined spaces on all inlets in enclosed buildings. For inlet structures, use NRCS Maryland CPS Waste Transfer (Code 634).

Waste Removal Components
Design components for removing waste such as gates, pipes, docks, wet wells, pumping platforms, retaining walls, or ramps in accordance with the applicable CPS, including but not limited to NRCS Maryland CPS Heavy Use Area (Code 561), Pumping Plant (Code 533) or Waste Transfer (Code 634). Account for all items that will influence the performance of the component including loading, durability, serviceability, material properties, and construction quality. Incorporate features to protect against erosion, tampering, and accidental release of stored waste. Design ramp slopes to accommodate anticipated equipment and traction. Ramps used to empty liquids will be no steeper than 4 horizontal to 1 vertical. Those used to empty slurry, semi-solid, or solid waste will be no steeper than 10 horizontal to 1 vertical. Steeper slopes up to 6 horizontal to 1 vertical may be used if special traction surfaces and/or equipment

are provided. Components must be compatible with the land application methods specified in the nutrient management plan, NRCS Maryland CPS Nutrient Management (Code 590).

Accumulated Solids Removal
Preserve storage volume by including a provision for periodic removal of accumulated solids. Design the facility to accommodate the anticipated method of removing accumulated solids. This is important for determining the configuration of impoundments and the liner to be used.

Maximum Operating Level
The maximum operating level for liquid storage structures is the level that provides the operational volume.

Staff Gauge
Locate and specify the requirements for a staff gauge or other permanent marker in the liquid storage facility to clearly indicate the following elevations:

- Maximum operating level (top of the operational volume).
- Top of emergency volume.

Identify the method for the operator to measure the depth of accumulated waste in the Operation and Maintenance Plan, for facilities where the contents are not visible and a staff gauge would not be visible, such as below a slatted floor.

Safety
Include appropriate safety features to minimize the hazards of the facility (refer to American Society of Agricultural Engineers (ASAE) Standard EP470, Manure Storage Safety for guidance, as needed). Provide adequate maneuvering space for operating loading and unloading equipment. Push-offs must be structurally sound and have railings, safety bars, or other devices to prevent humans, animals, and equipment from falling into the facility.

Provide appropriate warning signs, ladders, ropes bars, rails, and other safety devices to ensure the safety of humans and livestock.Include type, number, location, and details for installation of required safety features.

Provide ventilation and use warning signs for covered waste holding structures, to prevent and identify the potential for explosion, poisoning, or asphyxiation.

Design covers and gratings over openings such that livestock or humans cannot accidentally displace them and fall into the facility. Design covers and gratings to handle expected operation loads.

Design pipelines with a water-sealed trap and vent, or similar device, if there is a potential for gases from the pipe to accumulate in confined spaces.

A fence is required around impoundments, excavated ponds, and uncovered tanks which have exposed walls less than 5 feet above the ground surface. Use NRCS Maryland CPS Fence (Code 382) to design a fence that will prevent accidental entry by people or animals. Post universal warning signs to prevent entry into liquid waste storage structures.

Roofs and Covers
Use NRCS Maryland CPS Roofs and Covers (Code 367) to design waste storage facility covers or roofs, as needed.

Treated Wood
Use criteria from NRCS CPS Maryland Roof and Covers (Code 367) for treated wood and fasteners.

Karst Areas
Karst (limestone) areas are characterized by sinkholes, caves, and rapid subsurface drainage making them particularly susceptible to groundwater contamination. Locating animal waste storage facilities in Karst regions creates particular concern due to the potential for sinkholes to develop beneath the structure.

In Karst areas, provide one of the following:

- A flexible membrane liner over a fine grain material with low permeability rate. A minimum of two feet of (fine grained) material is required;
- A geo-synthetic clay liner (GCL) flexible membrane liner over a minimum of two feet of fine grain material with a low permeability rate;
- A concrete liner designed in accordane with slabs on grade criteria for fabricated structures requiring water tightness. A minimum of two feet of fine grain material with low permeability is required underneath the concrete liner.

In addition to the above, provide subsurface drainage on all waste storage facilities constructed below grade and divert surface drainage away from the facility.

Differential Settlement
Foundations that are partially on rock and partially on earth are unacceptable due to the possibility of differential settlement. When bedrock or rock ledges are encountered during excavation, over-excavate the rock area a minimum of two feet and replace with compacted fill.

Openings
Size, shape, and location of openings in covered holding tanks must accomodate the characteristics of scrapers, conveyors, tractors, or other equipment used to place or push wastes into the tank as well as equipment for agitating and emptying.

Protection
Protect against and control erosion around embankments and all disturbed areas surrounding the facility.

Service Life and Durability
Ensure that the structure is sound and of durable materials commensurate with the anticipated service life, initial and replacement costs, maintenance and operation costs, and safety and environmental considerations.

Additional Criteria for Liquid Waste Storage Impoundments
A liquid waste storage impoundment is a waste storage facility where the stored material does not consistently stack and is either a natural topographic depression, manmade excavation, or diked area formed primarily of earthen materials (although the facility may be lined with manmade materials).

Foundation
Locate the impoundment in soils with a permeability that meets all applicable regulations or line the impoundment with suitable material. Use liners which meet or exceed NRCS Maryland CPS Pond Sealing or Lining, Compacted Soil Treatment (Code 520), Pond Sealing or Lining, Geomembrane or Geosynthetic Clay Liner (Code 521), or Pond Sealing or Lining, Concrete (Code 522). Install an engineered pond liner or ensure foundation materials meet the maximum specific discharge rate as recommended by NRCS in AWMFH Appendix 10D or meets State or local regulations, whichever is more restrictive.

Provide one of the following:

- A clay liner designed in accordane with procedures of AWMFH, Appendix 10D, with a thickness and coefficient of permeability so that specific discharge is less than 1×10^{6} cm/sec. See NEH Part 650, Figure 4-14, for soil permeability rates. See Maryland Conservation Practice Standard for Pond Sealing or Lining, Compacted Soil (Code 520);

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- A flexible membrane or geo-synthetic clay liner (GCL) flexible membrane liner meeting the requirements of the Maryland Conservation Practice Standard for Pond Sealing or Lining, Geomembrane or Geosynthetic Clay Liner (Code 521);
- A concrete liner designed in accordance with slabs on grade criteria for fabricated structures requiring water tightness meeting the requirements of the Maryland Conservation Practice Standard for Pond Sealing or Lining, Concrete (Code 522).

Perform subsurface investigations for all lwaste storage impoundments sufficient in detail and analysis to support the design in accordance with NRCS NEM, Part 531, Geology. Describe the soil material encountered, location of any seeps, depth-to-high-water table, depth to bedrock, and presence of sink holes in karst topography.

Include an evaluation in the liner design of all buoyant uplift forces on the liner for sites located in a floodplain or where there is potential for uplift. Limit projected uplift head under clay liners to a gradient of less than 0.5 ft/ft in the clay liner. The gradient is determined as the difference in total head between the top and the bottom of a clay liner when buoyant forces exist (such as when the floodplain is flooded) divided by the thickness of the clay liner.

Design Bottom Elevation
Locate the bottom elevation a minimum of 2 feet above the seasonal high-water table, to protect the integrity of the liner, unless special design features are incorporated that address buoyant forces, impoundment seepage rate and non-encroachment of the water table by contaminants. The water table may be lowered by use of drains to meet this requirement.

Outlet
Do not use an outlet that can automatically release stored material except for septic tanks that feed a treatment system such as a vegetated treatement area or leaching field, or outlets leading to another storage facility with adequate capacity. Design a permanent outlet that will resist corrosion and plugging. Provide a backflow prevention measure for an outlet that pumps wastewater to secondary storage located at a higher elevation. This section does not apply to an auxiliary spillway.

A dual valve system or backflow preventer is required on all transfer systems where pipelines are used to convey wastes by gravity or by pumping and failure of the containment valve may result in accidental release or discharge.

Equip pipelines with a water-sealed trap and vent or similar devices, if there is a potential, based on design configuration, for gases to enter buildings or other confined spaces.

Incorporate erosion protection for inlets and outlets as necessary.

Embankments
Design embankments to withstand loads associated with the waste storage structure. Increase embankment height by a minimum of 5% to allow for settling. Stabilize all embankments to prevent erosion or deterioration. Raise the embankment height where wave action may be a concern and protect the slope from wave action. In all cases, the top of the settled embankment will be a minimum of one foot above the required design storage volume. If the embankment needs to be crossed periodically by vehicles, the minimum top width is 10 feet. Guardrails or other safety measures are to be used where necessary.

- Top width: Design minimum embankment top widths according to table 1.
- Side slopes: Design the combined side slopes of the settled embankment no steeper than 5-to-1. Design both side slopes no steeper than a 2-to-1 ratio, unless provisions are made for stability.
- Effective height: The difference between the bottom of the spillway crest (or the settled top of the embankment if there is no auxiliary spillway) and the lowest point on the existing ground along the embankment. For this standard, the maximum effective height of the embankment is 35 feet.

- Total embankment height is the difference between the settled top of the embankment and the lowest point on the existing ground along the embankment.

Table 3. Minimum Top Widths

Total embankment height (ft)	Top width, (ft)
Less than 15	8
15–19.9	10
20–24.9	12
25–30	14
30-35	15

When effective height exceeds 20 feet, provide embankment protection by:

- Including an auxiliary spillway with the capacity to route the 25-year, 24-hour storm runoff from the facility drainage plus the 25-year, 24-hour precipitation volume on the surface of the liquid or slurry storage facility or a minimum of two feet of elevation difference between the crest of the auxiliary spillway and the top of the settled embankment, whichever is greater.

- For embankments without an auxilliary spillway raise the embankment above the design storage volume an additional 25-year, 24-hour storm runoff from the facility drainage plus the 25-year, 24-hour precipitation volume on the surface of the liquid or slurry storage facility or one foot of freeboard whichever is greater.

Excavations
Specify excavated side slopes to meet the requirements of the type of liner selected, see NRCS Maryland CPS Pond Sealing or Lining, Compacted Soil Treatment (Code 520), Pond Sealing or Lining, Geomembrane or Geosynthetic Clay Liner (Code 521) or Pond Sealing or Lining, Concrete (Code 522).

Additional Criteria for Fabricated Structures
Storage tanks are used for liquid and slurry wastes and may be open roofed or covered, within or outside an enclosed housing, or beneath slotted floors.

Foundation
Provide a foundation for fabricated waste storage structures to safely support all superimposed loads without excessive movement or settlement, based on the subsurface investigation (210-NEM-531). Perform subsurface investigations for all fabricated structures sufficient in detail and anlaysis to support the design. Describe the soil material encountered, location of any seeps, depth to high water table, depth to bedrock, and presence of sink holes in karst topography.

Calculate settlement based upon site-specific soil test data, where a nonuniform foundation cannot be avoided or where applied loads may create highly variable foundation loads. Index tests of site soil may allow correlation with similar soils for which test data is available. Use presumptive bearing strength values for assessing actual bearing pressures obtained from table 4 or another nationally recognized building code when site-specific soil test data is not available. Provide adequate detailing and articulation to avoid distressing movements in the structure when using presumptive bearing values.

Table 4. Presumptive Allowable Foundation and Lateral Pressure[1]

Class of Materials	Vertical Foundation Pressure (psf)	Lateral Bearing Pressure (psf/ft below natural grade)	Coefficient of Friction[a]	Cohesion (psf)[b]
Crystalline bedrock	12,000	1,200	0.70	-
Sedimentary and foliated rock	4,000	400	0.35	-
Sandy gravel or gravel (GW and GP)	3,000	200	0.35	-
Sand, silty sand, clayey sand, silty gravel, clayey gravel (SW, SP, SM, SC, GM and GC)	2,000	150	0.25	-
Clay, sandy clay, silty clay, clayey silt, silt and sandy silt (CL, ML, MH and CH)	1,500	100	-	130

[1] International Building Code (IBC), 2018, International Code Council (ICC)

[a] Coefficient to be multiplied by the dead load.

[b] Cohesion value to be multiplied by the contact area, as limited by Section 1806.3.2 Lateral sliding resistance limit. For clay, sandy clay, silty clay, clayey silt, silt and sandy silt, the lateral sliding resistance shall not exceed one-half the dead load.

For bedrock foundations, separate the floor slab and the bedrock by:

- A minimum of 2 feet of soil or,
- A liner that meets or exceeds NRCS Maryland CPS Pond Sealing or Lining, Compacted Soil Treatment (Code 520), Pond Sealing or Lining, Geomembrane or Geosynthetic Clay Liner (Code 521), or Pond Sealing or Lining, Concrete (Code 522) or,
- Other appropriate method or alternative that achieves equal protection.

Structural Loadings
Design the waste storage structure to withstand all anticipated loads in accordance with the requirements in Title 210, National Engineering Manual, Part 536, "Structural Design" (210-NEM-536), including, as applicable, internal and external loads, hydrostatic uplift pressure, concentrated surface and impact loads, and water pressure due to seasonal high-water table, frost or ice.

Calculate loading from lateral earth pressures using soil strength values determined from the results of appropriate soil tests and procedures described in Technical Release 210-74, "Lateral Earth Pressures". ASCE or ACI criteria may be used where appropriate. Table 5 provides minimum lateral earth pressure

values when soil strength tests are not available. Use an additional soil surcharge or an additional internal lateral pressure in the wall analysis when equipment will operate near the wall.

Use a minimum internal lateral pressure of 65 lb/ft²/ft of depth for stored waste that is not protected from precipitation. Use a minimum internal lateral pressure of 60 lb/ft²/ft of depth for stored waste protected from precipitation and not likely to become saturated. Use a minimum internal lateral pressure of 72 lb/ft²/ft of depth for sand-laden manure storage if the percentage of sand exceeds 20%. Designers may use lesser values if supported by measurement of actual pressures of the waste to be stored.

Design tank covers to withstand both dead and live loads. As a minimum, use the live load values for covers contained in ASAE EP378.3, Floor and Suspended Loads on Agricultural Structure Due to Use, and in ASAE EP 393.2, Manure Storages. Use the actual axle load for tank wagons having more than a 2,000 gallon capacity.

If the facility is to have a roof, snow and wind loads shall be specified in ASCE 7 Minimum Design Loads for Buildings and Other Structures, Agricultural Building Snow and Wind Loads. If the facility is to serve as part of a foundation or support for a building, use the total load in the structural design.

Table 5. Minimum Lateral Earth Pressure Values[1]

Description of Backfill Material [c]	Unified Soil Classification	Design Lateral Soil Load (lb/ft²/ft of depth) [a]	
		Active pressure	At-rest pressure
Well-graded, clean gravels; gravel-sand mixes	GW	30	60
Poorly graded clean gravels; gravel-sand mixes	GP	30	60
Silty gravels, poorly graded gravel-sand mixes	GM	40	60
Clayey gravels, poorly graded gravel-sand mixes	GC	45	60
Well-graded, clean sands; gravely sand mixes	SW	30	60
Poorly graded clean sands; sand-gravel mixes	SP	30	60
Silty sands,poorly graded sand-silt mixes	SM	45	60
Sand-silt clay mix with plastic fines	SM-SC	45	100
Clayey sands, poorly graded sand-clay mixes	SC	60	100
Inorganic silts and clayey silts	ML	45	100
Mixture of inorganic silt and clay	ML-CL	60	100
Inorganic clays of low to medium plasticity	CL	60	100
Organic silts and silt clays, low plasticity	OL	Note [b]	Note [b]

Description of Backfill Material [c]	Unified Soil Classification	Design Lateral Soil Load (lb/ft²/ft of depth) [a]	
		Active pressure	At-rest pressure
Inorganic clayey silts, elastic silts	MH	Note [b]	Note [b]
Inorganic clays of high plasticity	CH	Note [b]	Note [b]
Organic clays and silty clays	OH	Note [b]	Note [b]

[1] Table 1610.1, Lateral Soil Load, International Building Code (IBC), 2018, International Code Council (ICC).

[a] Design loads based on moist conditions for the specified soils at optimum density. Actual field conditions shall govern. Submerged or saturated soil presures shall include the weight of the buoyant soil plus hydrostatic loads.

[b] Unsuitable as backfill material.

[c] The definition and classification of soil materials shall be in accordance with ASTM D2487.

Structural Design

Design structures with reinforced concrete, steel, wood, or masonry materials in accordance with 210-NEM-536, Structural Engineering. Account for all items that will influence the performance of the structure, including loading assumptions, durability, serviceability, material properties and construction quality. Ensure that the material used for a fabricated structure is compatible with the waste product to be stored. Indicate design assumptions and construction requirements on the plans.

Tanks may be designed with or without a cover. Covers, beams, or braces that are integral to structural performance must be indicated on the construction drawings. Design openings in a covered tank to accommodate equipment for loading, agitating, and emptying. Equip these openings with fencing, grills or secure covers for safety, and for odor and vector control as necessary.

Underlay all structures with free draining material or locate footings below the anticipated frost depth.

Eliminate potential uplift pressures by drainage or include such pressures in the structural design (including buoyancy and flotation). A factor of safety of 1.2 should be used in structure design if drainage is not provided.

Minimum requirements for fabricated structures are as follows:

- Steel - Manual of Steel Construction, American Institute of Steel Construction;
- Timber - National Design Specifications for Wood Construction, American Forest and Paper Association;
- Concrete - Building Code Requirements for Reinforced Concrete, ACI 318, American Concrete Institute;
- Masonry - Building Code Requirements for Masonry Structures, ACI 530, American Concrete Institute;
- Precast concrete - ACI-523 Guide for Pre-cast Cellular Concrete Floor, Roof and Wall Units and ACI-533 Guide for Precast Concrete Wall Units, American Concrete Institute;
- Slabs on grade - Consider the required performance and the critical applied loads along with both the subgrade material and material resistance of concrete slabs. Where applied point loads are minimal and liquid-tightness is not required, such as barnyard and feedlot slabs subject only to precipitation, and the subgrade is uniform and dense, the minimum slab thickness is 4 inches with a

minimum joint spacing of 10 feet. Joint spacing can be increased if steel reinforcing is added based on subgrade drag theory;

- When heavy equipment loads are to be re-sisted and/or where a non-uniform foundation cannot be avoided, an appropriate design procedure incorporating a subgrade resistance parameter(s) such as ACI 360 shall be used;
- For applications where liquid-tightness is required, such as floor slabs of storage tanks, the minimum concrete thickness for uniform foundations is 5 inches. The required area of such reinforcing steel shall be based on subgrade drag theory as discussed in industry guidelines such as American Concrete Institute, ACI 360, De-sign of Slabs-on-Grade;
- Liquid tightness - Applications such as tanks that require liquid tightness shall be designed and constructed in accordance with standard engineering and industry practice appropriate for the construction materials used to achieve this objective;
- Coatings - Coatings shall be approved in accordance with procedures in the National Engineering Manual (210-512.20 to 512.23);
- Glass fiber reinforced plastics/resins and glass-fused steel – Approve products in accordance with procedures in the National Engineering Manual (210-512.20 to 512.23)

Sensitive Environmental Settings
Classify and design the storage structure as a reinforced concrete hydraulic or environmental structure according to 210-NEM-536 where liquid-storage is to be provided in sensitive environmental settings (i.e., tanks in areas with shallow wells in surface aquifers, high-risk karst topography, or other site-specific concerns). Alternatively, use a flexible liner membrane, designed and constructed in accordance with standard engineering and industry practice, to provide secondary liquid containment for structures constructed with other methods described in 210-NEM-536.

Precast Structures
Precast concrete structures shall meet the requirements of ASTM C-913 Standard Specification for Precast Concrete Water and Wastewater Structures or C-478 Precast Reinforced Concrete Manhole Sections, as appropriate.

Additional Criteria for Stacking Facilities
A stacking facility may be open, covered, or roofed and is used for wastes which behave primarily as solid. Determine the wall height using the anticipated stacking angle of repose of the waste material and any clearance height needed for containment of the stacked material. Construct a stacking facility of durable materials. Design the stacking facility with adequate safety factors to prevent failure due to internal or external pressures, including hydrostatic uplift pressure and imposed surface loads such as equipment which may be used within, on, or adjacent to the structure.

Seepage and Internal Drainage
Locate the stacking facility in soils with a permeability that meets all applicable regulations and use the appropriate NRCS CPS Pond Sealing or Lining, Compacted Soil Treatment (Code 520), Geomembrane or Geosynthetic Clay Liner (Code 521), or Concrete (Code 522) to reduce the potential for groundwater contamination.

Collect and utilize leachate in a safe manner to prevent pollution of surface or groundwater. Prevent influent seepage or surface runoff from infringing on the designed storage capacity or on the suitability of the waste being stacked and stored. Leachate control may not be needed on sites that have a roof, waste material with little seepage potential, or are located in arid climates.

Make provisions for drainage of leachate, including rainfall from the stacking area (especially those without a roof). Collect leachate and transfer to a tank, waste storage impoundment, treatment lagoon, or vegetated treatment area.

Poultry Litter Stacking Facility
For wood walled facilities, design the height of the litter stack not to exceed 7 feet, with no litter to wood contact to reduce the potential for spontaneous combustion.

To reduce the potential for fires in satellite storage structures, concrete walls will be used due to the anticipated differences in moisture content in litter collected from different sources with varying clean out schedules.

Soils and Foundation
Design the waste field stacking pad so that the pad is above the seasonal high water table.

Types of Pads and Liners

Waste field stacking pads will have a pad or liners that meet the following:

- Concrete pad – Meet the requirements for concrete, and steel reinforcement for concrete pads as stated in the Fabricated Structure Criteria;
- Synthetic liner - A synthetic liner a minimum of 20 mils thick, completely free of tears or punctures in order to prevent any seepage from passing through to the groundwater.
- Install the liner by excavating the stacking pad area one-foot below desired finished grade. Remove all sharp stones and other sharp material to prevent puncturing the liner. Cover the liner with one foot of non-stony soil locally available. Installation of the liner to conform to manufacturer's recommendations;
- Compacted clay pad - A clay pad consisting of a one-foot layer of compacted clayey material (SC, GC, CL). Install clay pads under optimum moisture conditions and compact in 6 to 8-inch lifts. Construct the pad essentially level with only enough grade away from the center of the pad to allow drainage of water. Excavated or constructed side slopes will not be steeper than three (3) horizontal to one (1) vertical.

Stabilize all disturbed areas beyond the edges of the pad as shown in the vegetative plan.

Jersey barriers or retaining walls may be used to assist in tying down any needed covers over stockpiles, as well as providing a push wall to assist in loading out the pile. When used as a push wall, some backfill (12 to 18 inches) may be desired to prevent sliding.

Size

Size the waste field stacking pads to store the amount manure/litter required for proper nutrient management as identified in the Comprehensive Nutrient Management Plan or the Waste Management Plan.

Covering and Shaping
Shape all field-stacked manure to minimize percolation of precipitation through the pile. Poultry manure stacked in a conical shape need not be covered. Also, horse manure with a minimum 50:50 ratio of straw bedding to manure may be left uncovered.

All other field-stacked manure may be uncovered if stacked for no longer than 30 days. If 30 days are exceeded, shape and cover the field-stacked manure with opaque plastic or polyethylene sheeting (minimum thickness of 6 mils), or other impermeable and equally strong material. The cover for the stacked manure/litter shall be free of tears or punctures, and place over the pile with care to prevent tearing. Place weights such as used tires over the sheeting to anchor it and prevent tearing during high winds. Construct a trench 12 inches deep around the waste and bury the edges of the sheeting in and

through the trench. In lieu of a trench, Jersey barriers or similar materials may be used to secure the cover.

In lieu of covering manure stacks, runoff from any waste field stacking pad must be controlled. This may be accomplished with a surrounding grass filter area or by collection and application. Design in accordance with Wastewater Treatment Strip (Code 635) as appropriate.

Seepage
Prevent leachate in amounts that would pollute surface or groundwater with collection and disposal of liquids in a safe manner as necessary. Prevent influent seepage in amounts that would infringe on designed storage capacity. Seepage control may not be necessary on sites that have a roof, waste material with little seepage potential or in certain climates.

Internal Drainage
Make provisions for drainage of leachate, including rainfall from the stacking area (especially those without a roof). Collect leachate in a tank or waste storage impoundment, or properly treat in a lagoon or vegetated treatment area.

CONSIDERATIONS

General Considerations
Consider the use of textured liners or addition of features such as tire ladders, that would allow for escape from the waste storage structures, for exposed liners utilizing HDPE or similar materials that are slippery when wet.

Solid/liquid separation of runoff or wastewater entering impoundments to minimize the frequency of accumulated solids removal and to facilitate pumping and application of the stored waste.

Consider environmental concerns, economics, the overall waste management system plan, and safety and health factors.

Provide the operator with the cost to close the facility since the economics and risks associated with waste storage facilities are quite high. Cost should include removal of the planned sludge accumulation volume and the waste stored at the maximum operating volume.

Considerations for Siting
Consider the following factors in selecting a site:

- Proximity to the source of waste.
- Access to other facilities.
- Ease of loading and unloading waste.
- Compatibility with the existing landforms, vegetation, and prevailing winds, including building arrangement to minimize odors and adverse impacts on visual resources.
- Facility loading and unloading methods including routes, utilities, and equipment to be used.
- Adequate maneuvering space for operating, loading, and unloading equipment.
- Distance to surface water, wells, non-farm residence(s), and property lines.
- Avoid locating waste storage facilities upwind of areas where heavy gasses may accumulate.

Considerations for Minimizing Impacts of Sudden Breach of Embankment or Accidental Release from the Waste Storage
Consider features, safeguards, and management measures to minimize the risk of failure or accidental release, or to minimize or mitigate impact of this type of failure when any of the categories listed below might be significantly affected.

Potential impact categories from breach of embankment or accidental release include:

- Downstream drinking water sources.
- Surface water bodies—perennial streams, lakes, wetlands, and estuaries.
- Critical habitat for threatened and endangered species.
- Riparian areas.
- Farmstead, or other areas of habitation.
- Off-farm property.
- Historical and archaeological sites or structures that meet the eligibility criteria for listing in the National Register of Historical Places.

Consider the following either individually or in combination to minimize the potential of or the consequences of sudden breach of embankments:

- An auxiliary spillway.
- Additional emergency volume.
- Additional freeboard.
- Storage for wet year rather than normal year precipitation.
- Reinforced embankment— such as, additional top width, flattened and/or armored downstream side slopes.
- Secondary containment.
- Dual liner.

Consider the following options to minimize the potential for accidental release from the waste storage facility through gravity outlets.

Comment on noting that electronic monitoring of water levels is available.

- Outlet gate locks or locked gate housing.
- Secondary containment.
- Addition of an electronic water elevation monitoring device or alarm system.
- Another non-gravity means of emptying the waste storage facility.

Considerations for Minimizing the Potential of Storage Pond Liner Failure

Avoid sites with categories listed below unless no reasonable alternative exists.

Potential impact categories for liner failure are:

- Any underlying aquifer is at a shallow depth and not confined.
- The vadose zone is rock.
- The aquifer is a domestic water supply or ecologically vital water supply.
- The site is located in an area of water-soluble bedrock such as limestone or gypsum.

Consider providing a leak detection system in conjunction with the planned liner to provide an additional measure of safety for a site with one or more of these site conditions.

Considerations for Stacking Facilities

Leachate collection within a stacking facility can be accomplished by use of a timber wall with the boards installed vertically, leaving 3/4-inch cracks. The timber wall drainage section may be included in a concrete or masonry block wall. Use the design criteria for timber walls.

A roof should be considered for all solid stacking facilities. Solid organic wastes such as manure with bedding may produce seepage as a result of waste degradation and will produce seepage with exposure to precipitation. This seepage will concentrate in low areas of storage facilities and methods should be provided for its containment and safe utilization. Provision of a roof with good side ventilation will minimize seepage accumulation. Without good ventilation, use of a roof may increase odor problems.

Considerations for Organic Operations

Use rot-resistant or treated lumber that meets the requirements for organic production for any facility that is an organic producer or that sells manure to organic producers. The producer should consult with the organic certifier as to the use and acceptability of treated lumber for waste storage.

Considerations for Health and Safety

Consider the following options to minimize health and safety issues:

- Include adequate ventilation, especially when agitating stored manure.
- Add emergency equipment such as multi-gas monitor, buoys and self-contained breathing apparatus.
- Remove potential sources of sparks.
- Impacts of low berms around manure storage structures that can trap heavy gases and allow gases to collect above manure storages.

Considerations for Improving Air Quality

Liquid manure storage may result in emissions of volatile organic compounds, ammonia, hydrogen sulfide, methane, nitrous oxide, and carbon dioxide. Solid manure storage may result in emissions of particulate matter, volatile organic compounds, ammonia, carbon dioxide, and nitrous oxide. Consider minimizing liquid storage time to reduce emissions.

Reduce emissions of greenhouse gases, ammonia, volatile organic compounds, particulate matter and odor, by adding other NRCS Maryland CPSs Anaerobic Digester (Code 366), Roofs and Covers (Code 367), Waste Treatment (Code 629), Amendments for Treatment of Agricultural Waste (Code 591), Composting Facility (Code 317), and Air Filtration and Scrubbing (Code 371) to the waste management system.

Some fabric and organic covers have been shown to be effective in reducing odors.

Maintain appropriate manure moisture content for solid manure storage facilities. Excessive moisture will increase the potential for air emissions of volatile organic compounds, ammonia, and nitrous oxide, and may lead to anaerobic conditions, which will increase the potential for emissions of methane and hydrogen sulfide. Too little moisture will increase the potential for dust and other particulate matter emissions.

Adjusting pH below 7 may reduce ammonia emissions from the waste storage facility but may increase odor when waste is surface applied—see NRCS CPS Nutrient Management (Code 590).

PLANS AND SPECIFICATIONS

Prepare plans and specifications that describe the requirements for applying the practice to achieve its intended use. As a minimum, include the following in the engineering plans and specifications:

- Plan view of system layout, including loading and unloading routes and obstacles, with relevant benchmark elevation and descriptions.
- Drainage/grading plan if needed.
- Soil and foundation findings, interpretations, and reports.
- Pertinent elevations of the facility on the plan view and details.

- Structural details of all components, including specific concrete requirements, reinforcing steel, type of materials, thickness, anchorage requirements, lift thickness, soil compaction requirements, rock gradations, etc.
- Locations, sizes, and type of pipelines and appurtenances.
- Requirements for foundation preparation and treatment.
- Roof structure design data and dimensions, if applicable.
- Locations and details of safety features.
- Backfill requirements: lift thickness, method of compaction, material type, material size and moisture content.
- Safety features.
- Material quantities.
- Approximate location of utilities and notification requirements.
- Vegetative requirements.
- Temporary erosion control measures during construction.

OPERATION AND MAINTENANCE

Develop an operation and maintenance plan that is consistent with the purposes of the practice, its intended life, safety requirements, and the criteria for its design. At a minimum, the plan will contain the following information where appropriate:

- Operational requirements for emptying the storage facility and the expected storage period. Begin removal of the liquid storage facility as soon as practical before the maximum operating level has been reached. Include the requirement that waste be removed from storage and utilized at locations, times, rates, and volume in accordance with NRCS CPS Nutrient Management (Code 590).
- Explanation of the staff gauge or other permanent marker to indicate the maximum operating level, for impoundments and other liquid storages. Identify the method for the operator to measure the depth of accumulated waste, for storages where the contents are not visible and a staff gauge would not be visible, such as below a slatted floor.
- Provisions for emergency removal and disposition of liquid waste in the event of an unusual storm event that may cause the waste storage structure to fill to capacity prematurely.
- Instructions, as needed, for ventilating confined spaces according to ASABE standard S607, Ventilating Manure Storages to Reduce Entry Risk.
- Develop an emergency action plan for waste storage facilities where there is a potential for significant impact from breach or accidental release. Include site-specific provisions for emergency actions that will minimize these impacts.
- Describe the routine maintenance needed for each component of the facility. Include provisions for maintenance that may be needed as a result of waste removal or material deterioration.

SUPPORTING DATA AND DOCUMENTATION

Field Data and Survey Notes

The following is a list of the minimum data needed:

1. System plan sketch;
2. Topographic survey of the site showing building locations, elevations at structure location and at outlets from barns, separators, etc., location of dwellings, wells, floodplains, etc.;
3. Soils investigation showing seasonal high water table and location of test holes;

4. Operator data such as desired storage time and volumes of manure, bedding or wash water generated.

Design Data

Record on appropriate engineering paper. For guidance on the preparation of engineering plans see chapter 5 of the EFH, Part 650. The following is a list of the minimum required design data:

1. Project narrative;
2. Location map with index page;
3. Comprehensive Nutrient Management Plan or Waste Management Plan, as appropriate;
4. Design summary presenting in narrative form the objectives, data, criteria, assumptions, procedures, and decisions used in the design. The summary should provide relevant site history and background information as well as a brief description of major features, job classification, drainage area, storm frequencies, landscape resources, capacities, etc. as appropriate.
5. All required permits and documentation on file with the design information;
6. Plan view including, location map, all system components, material and construction specifications;
7. Construction drawings, and component details;
8. Structure sizing computations;
9. Structure and component design and details;
10. Area grading plan;
11. Quantities estimate;
12. Engineering job class on plan;
13. Details of foundation drainage, when required;
14. Planting plan. This must meet the criteria, specifications, and documentation requirements of the Maryland conservation practice standard for Critical Area Planting (Code 342).

Construction Check Data/As-Built

Record on survey notepaper, SCS-ENG-28, or other appropriate engineering paper. Survey data will be plotted on plans in red. The following is a list of minimum data needed for As-builts:

1. Documentation of site visits on CPA-6. Include the date, who performed the inspection, specifics as to what was inspected, all alternatives discussed, and decisions made and by whom;
2. Actual dimensions of installed structure;
3. Verification of adequate foundation preparation;
4. Documentation of installation of foundation drainage;
5. Documentation of reinforcing steel and proper concrete installation, if applicable;
6. Condition of precast panels, if applicable;
7. Certification statement from the contractor(s) that they have constructed/assembled the structure in accordance with the plans and specifications;
8. Statement on seeding and fencing;
9. Final quantities and documentation for quantity changes, and materials certification;
10. Sign and date checknotes and plans by a person with appropriate approval authority. Include statement that the practice meets or exceeds plans and NRCS practice standards.

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Chapter 2

Operation& Maintenance Plan

Waste Storage Facility - 313 (2021)

USDA

Operation & Maintenance Plan
Waste Storage Facility (313)

Landowner/Operator: _____ Date: _____

NRCS Service Center: _____ Conservation District: _____

Practice Location: _____ Tract/Field ID: _____
(Lat/Long or UTM Coord. or Sec/TS/R)

Operation & Maintenance Requirements

A properly operated and maintained waste storage structure is an asset to your farm. The waste storagestructure was designed and installed to be used for the temporary storage of animal wastes. Estimated life span of this installation is at least 15 years. The life of this installation can be assured and usually increased by developing and carrying out a systematic operation and maintenance program.

This practice will require periodic maintenance and may also require operational items to maintain satisfactory performance. Your operation and maintenance program includes:

- Remove waste from storage and utilize at locations, times, rates, and volumes in accordance with the Waste Management System Plan (WMSP). Maryland state regulations, including the certified Nutrient Management Plan must be followed when applying animal wastes.
- Operate the facility in a manner that minimizes odors and air drift.
- Follow the **Emergency Action Plan** in case of an overflow, breach, leakage, fire, need foremergency land application, etc.
- **Do not allow human entry into any enclosed structure unless the appropriate safety equipment is used. Store safety equipment near the facility in a visible and easily accessible location. This equipment will include a ladder, safety harnesses, and breathingapparatus.**
- Maintain all fences, railings, and warning signs to prevent unauthorized human or livestock entry.Maintain all lids, grates, and shields on openings to underground structures. Regularly check the effectiveness of gas control components and ventilation systems.
- Maintain all pumps, agitators, piping, valves and all other electrical and mechanical equipment in good operating condition by following the manufacturer's recommendations. Grounding rods andwiring for all electrical equipment shall be maintained in good condition.
- Maintain positive drainage away from the facility.
- Eradicate or otherwise remove all rodents or burrowing animals and repair any damage caused bytheir activity. Maintain screens and/or rodent guards.
- Immediately repair any vandalism, vehicular, or livestock damage to the structure, earthen areassurrounding the structure, or any appurtenances.

Additional Requirements for an Earthen Pond-type Animal Waste Storage Facility:

- When the maximum waste storage elevation is reached, agitate and pump out the liquid waste storage pond. Mark the maximum waste storage elevation shown in Figure 1 on the staff gage.
- Operate an unroofed liquid waste storage facility so that the storage capacity required for the 25- year, 24-hour storm and storm runoff is always available. See Figure 1.
- If the accumulated stormwater raises the waste in the facility above the planned maximum waste storage elevation, immediately agitate the pond and pump out the waste volume that is above the maximum waste elevation.

- Immediately remove all foreign debris within the structure that may cause damage to pumps,agitators, liners, or earthfill.
- Periodically inspect earthen embankments for longitudinal cracks or unusual settlement. Makesure all structure drains are functional and soil is not being transported through the drainage system.
- Maintain vigorous growth of non-woody vegetative coverings on earthen structures. Reseed, fertilize, and apply herbicides, when necessary. Mow the embankment and other vegetated areasto maintain a protective vegetative cover. Clip vegetation a minimum two times each year on the pond embankments. Do not allow trees to grow on the embankments.
- Protect the soil liner against damage from agitators or other equipment activities that could reducethe effectiveness of the soil liner. The soil liner must also be protected from the erosive forces of filling operations.
- Prevent animals from entering the waste holding pond to protect the soil liner from damage.

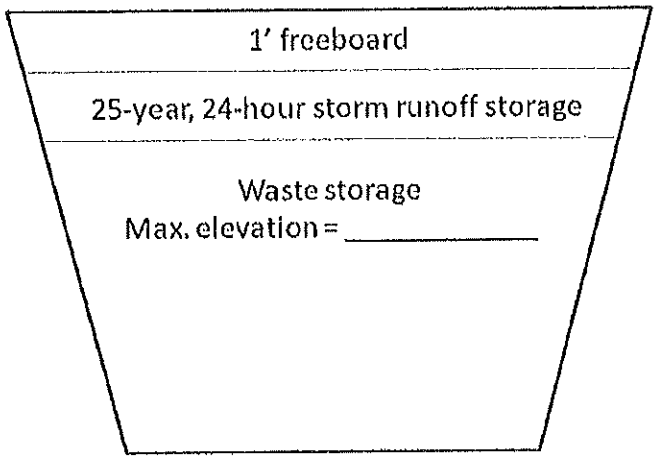

Figure 1. Pond or pit storage components and maximum waste storage elevation.

Additional Requirements for a Concrete Pit-type Animal Waste Storage Facility:

- When the maximum waste storage elevation is reached, agitate and pump out the liquid waste storage pit. The maximum waste storage elevation shown in Figure 1 will be marked on the staffgage.
- Operate an unroofed liquid waste storage facility so that the storage capacity required for the 25- year, 24-hour storm and storm runoff is always available. See Figure 1. If the accumulated stormwater raises the waste in the facility above the planned maximum waste storage elevation, immediately agitate the pond and pump out the waste volume that is above the maximum waste elevation.
- Do not allow the operation of any heavy equipment on or within ten feet of the structure.
- Immediately remove all foreign debris within the structure that may cause damage to pumps oragitators.
- Check backfill areas around structures often for excessive settlement. Determine if settlement iscaused by backfill consolidation, erosion, or failure of the structure. Make necessary repairs immediately.

- Check walls and floor often for cracks and separation of concrete. As a minimum, check 2 timesper year when the facility is empty. Make needed repairs promptly.
- Keep the outlets of the foundation drains open. When the storage facility is in use, check the outflow from these drains frequently to determine if there is leakage from the storage structure. Ifleakage is detected, repairs shall be made immediately to prevent the possible contamination of ground water.
- Maintain vigorous growth of non-woody vegetative coverings around the structure. Reseed, fertilize, and apply herbicides, when necessary. Mow vegetated areas to maintain a protectivevegetative cover. Clip vegetation a minimum two times each year. Do not allow trees to grow within 25 feet of the structure.

Additional Requirements for a Dry Stack Animal Waste Storage Facility:

- Inspect stacking facilities at least twice each year when the facility is empty. Replace any wooden parts, hardware, or other replaceable parts which are damaged or show excessive wear or decay. Roof structures should be examined for structural integrity. Walls of dry stacks that are constructedwith lumber may need repair or replacement during the life of the structure.
- To prevent erosion, establish and maintain a good vegetative cover around facilities. Clip vegetation twice a year to kill noxious weeds and ensure a vigorous stand. Maintain and/or replacetraffic accesses as necessary.
- Check backfill areas around structure for excessive settlement. Make necessary repairs.
- When moving manure to the dry stack facility, scrape and clean push-out and loading areas to prevent surface water contamination. When removing manure from the dry stack facility, load themanure into the truck from inside the facility, to the extent possible. If the truck is loaded outside,scrape up all spilled manure and place in the truck.

Additional Requirements for a Poultry Litter Dry Stack Facility:

- Do not store poultry litter outside unless an emergency situation occurs. Cover litter in accordancewith the certified Nutrient Management Plan and Maryland state law.
- Inspect stacking facilities at least twice each year when the facility is empty. Replace any wooden parts, hardware, or other replaceable parts which are damaged or show excessive wear or decay. Roof structures should be examined for structural integrity. Walls of dry stacks that are constructedwith lumber may need repair or replacement during the life of the structure.
- To prevent erosion, establish and maintain a good vegetative cover around facilities. Clip vegetation twice a year to kill noxious weeds and ensure a vigorous stand. Maintain and/or replacetraffic accesses as necessary.
- Check backfill areas around structure for excessive settlement. Make necessary repairs.
- When moving litter from the houses to the dry stack facility, scrape and clean push-out and loadingareas to prevent surface water contamination. When removing litter from the dry stack facility, loadthe litter into the truck from inside the facility, to the extent possible. If the truck is loaded outside, scrape up all spilled litter and place in the truck.
- In order to reduce the potential for fires in the litter storage structure, the following isrecommended:
  - Pile height should not exceed 7 feet. Storing material in separate small windrows reduces thecross-sectional area and is the safest option for stacking.

- Keep the litter dry. Do not wet the litter in the hope of preventing fire; just the opposite mayoccur.
- Avoid placing wet material in contact with dry material. Do not layer new litter on top of old,and do not let dead poultry compost come into contact with stored litter.
- Do not compact the material by driving over it or packing it with equipment.
- Monitor temperatures at different points in the pile frequently. If temperatures exceed 190°, or

  If the material is smoldering, prepare to remove material from the building. This includes notifying the local fire department to be on hand. A smoldering pile could burst into flames ifexposed to air. A garden hose could be inadequate to extinguish the fire.

Should any problems occur, contact the _____
Conservation District at _____ Ext. 3.

I have read and understand this Operation and Management Plan.

_____
Owner/Operator Date

_____
Conservationist Date

Chapter 3

Maryland Conservation Practice Construction Specifications
Waste Storage Facility - 313 (2021)

NATURAL RESOURCES CONSERVATION SERVICE
MARYLAND
CONSERVATION PRACTICE CONSTRUCTION SPECIFICATION
WASTE STORAGE FACILITY, CODE 313

1. SCOPE

This specification covers the construction of waste storage facility. The work shall consist of furnishing all materials, labor, and equipment necessary for constructing the waste storage facility, including all appurtenances, in accordance with the construction drawings and these specifications.

2. SAFETY

Landowners or operators, sponsoring organizations, and/or contractors shall be liable for damage to utilities and damage resulting from disruption of service caused by construction activities.

It is the responsibility of the landowner and contractor to determine if there are buried or overhead utilities in the vicinity of the proposed work. The contractor is required to call the Maryland One Call System (811). They shall follow proper procedures to ensure that the utilities are not jeopardized, and that equipment operators and others will not be injured during construction operations. They will conduct all work and operations in accordance with the proper safety codes for the types of construction being performed with regard to the safety of all persons and property.

The Natural Resources Conservation Service (NRCS) makes no representation on the existence or non-existence of any utilities. Absence of utilities on the drawings is not assurance that no utilities are present at the site.

The owner, operator, contractor or other persons will conduct all work and operations in accordance with proper safety codes for the type of construction being performed with regard to the safety of all persons and property.

3. CONSTRUCTION OPERATIONS

NRCS should be notified at least 72 hours before the start of construction operations.

4. PERMITS

All permits required to install and operate this waste storage facility shall be the responsibility of owner. All required permits must be obtained prior to the start of construction.

Construction operations shall be carried out in such a manner and sequence that erosion and air and water contamination are minimized and held within legal limits.

5. CLEARING AND GRUBBING

Clearing and grubbing will be done in designated areas as shown on the plans or as specified in Section 17 of this specification. Dispose of trees, snags, logs, brush, stumps, shrubs, and

rubbish in designated disposal areas onsite in a manner that will not alter existing drainage paths. Debris hauled offsite will be disposed at an approved waste disposal site.

6. EXCAVATIONS

Excavations shall be to the lines, grades and elevations shown on the drawings or as specified in Section 18 of this specification.

The side slopes of excation shall not be steeper than 2 horizontal to 1 vertical (2H:1V) to permit adequate compaction and create a safe working area.

Suitable excavated material shall be used in fills. Excess excavated material or unsuitable material shall be disposed of in designated spoil areas as shown on the drawings, or as stated in Section 18.

Provisions shall be made to esure safe working conditions where unstable soil, trench depth, or other conditions can be hazardous to personnel working in excations.

7. EARTHFILL

Earthfill shall be constructed to the lines, grades and elevations shown on the drawings, as staked in the field, or as specified in Section 18 of this specification.

Foundations for earthfill shall be stripped to remove vegetation and other unsuitable material. Fill material shall be taken from approved designated borrow areas or hauled from offsite if no suitable material present onsite. It shall be free of roots, stumps, wood, rubbish, stones greater than 6", frozen or other objectionable materials.

Except as otherwise specified, earth foundation surfaces shall be graded to remove surface irregularities and shall be scarified parallel to the axis of the fill or otherwise acceptably scored and loosened to a minimum depth of 2 inches. The moisture content of the loosened material shall be controlled as specified for the earthfill, and the surface material of the foundation shall be compacted and bonded with the first layer of earthfill as specified for subsequent layers of earthfill.

Fill materials shall be placed in maximum 8 inch thick (before compaction) layers which are to be continuous over the entire length of the fill.

The minimum required density of compaction shall not be less than 95% of maximum dry density with a moisture content within ±2% of the optimum of ASTM D1557 Modified Standard Proctor.

8. CONCRETE

Concrete will meet the requirement specified on the drawingsor as specified in Section 18 of this specification.

Unless otherwise specified, concrete shall have a minimum of 28-day compressive strength of 4,000 psi, 5% air entrainment and a slump of 3 to 5 inches. Air entrainment admixtures shall conform to ASTM C260. The concrete thickness shall be as shown on the drawings or specified in Section 18, with a minimum thickness of 4 inches.

9. STRUCTURAL COMPONENTS

All structural components including all appurtenances (roofs and covers, posts, lumber, metal hardware, nails, etc.) shall be shown on the plans, meet the requirement of Maryland NRCS Construction Specification 367, or specified in Section 18 of this specification.

10. LINER CONSTRUCTION

Detailed specifications for liner construction will be specified in the plan or Section 18 of the specification.

11. INLET AND OUTLET STRUCTURES.

Inlet and outlet pipes and structures shall be placed to the lines and grades show on the plans.

12. MATERIALS

All of the component parts of the inlet and outlet pipes and supports, ramps, fence, and other materials shall be specified on the plans and shall be installed in a workmanlike manner.

Trusses supplied by others will be certified as meeting the requirements as shown on the engineering plans by a professional engineer register in Maryland.

Materials used to construct the liner shall be of the size and quality as shown on the engineering plans.

13. VEGETATION

All disturbed areas shall be immediately vegetated according to NRCS MD CPS 342 Critical Aea Planting or as shown on the drawings. Any stockpiled topsoil shall be spread prior to vegetating.

14. POLLUTION CONTROL

Construction operations shall be carried out so that erosion and sediment are controlled during construction, and air and water pollution are minimized. Best management practices (BMP) for construction shall be installed and maintained as needed and according to NPDES permit if required. BMP's consisting of silt fences, hay bale barriers, diversions, mulching, stream crossings, temporary vegetation, fencing and others may be appropriate to adequately control erosion and sediment during construction.

15. WORKMANSHIP

Construction shall be performed to the neat lines and grades specified by the design and as shown on the engineering plans.

All construction shall be performed in a workmanlike manner, and the job site shall have a neat appearance when finished.

The installer (if not the owner) shall furnish a written guarantee to the owner that protects the owner against defective workmanship and materials/appurtenances for no less than one year. The written guarantee shall identify the manufacturer and specifications of the materials/appurtenances used. Copies shall be provided to NRCS. Owners who install their own materials/appurtenances shall furnish NRCS with records that show the manufacturer and specifications of the materials/appurtenances used.

16. BASIS OF ACCEPTANCE

The acceptability of this practice shall be determined by quality assurance inspections to insure compliance with all the provisions of this specification and construction drawings. Construction shall be approved by an NRCS (or partner) employee with appropriate engineering job approval authority or Technical Service Providers.

Any modifications to the plans and specifications or changes shall be approved by the responsible NRCS or partner employee before construction begins and any modification or changes needed during construction will be approved before installed.

17. CERTIFICATION AND GUARANTEE

The installing contractor shall certify that the installation complies with the requirements of this standard. The installing contractor shall provide a written guarantee that protects the owner against defective workmanship and materials for not less than one (1) year.

18. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefor are:

Chapter 4

Statement of Work
Waste Storage Facility - 313-Maryland (2024)

STATEMENT OF WORK
Waste Storage Facility (313)
Maryland

These deliverables apply to this individual practice. For deliverables for other planned practices, refer to those specific Statements of Work.

DESIGN

Deliverables

1. Design documentation that will demonstrate that the criteria in the Maryland NRCS practice standard have been met and are compatible with other planned and applied practices.
   a. Practice purpose(s) as identified in the conservation plan.
   b. List of required permits to be obtained by the client.
   c. Compliance with NRCS national and state utility safety policy (NEM Part 503-Safety, Subpart A - Engineering Activities Affecting Utilities).
   d. List of facilitating practices.
   e. Practice standard criteria related computations and analyses to develop plans and specifications including but not limited to:
      i. Geology and soil mechanics (NEM Subpart 531a).
      ii. Storage volume and maximum operating level.
      iii. Structural, mechanical, and appurtenances.
      iv. Maximize clean water diversion.
      v. Environmental considerations (e.g. liner failure, location, breaching, air quality).
      vi. Safety considerations (NEM Part 503 - Safety, Subpart A).
2. Written plans and specifications including sketches and drawings shall be provided to the client that adequately describes the requirements to install the practice and obtain necessary permits.
3. Design Report and Quality Assurance Plan (QAP) as appropriate (NEM Part 511, Subpart B Documentation, and Part 512, Subpart D Quality Assurance Activities).
4. Operation and Maintenance (O&M) Plan as per the NRCS National Operation and Maintenance Manual, Part 500, Subpart D.
5. Certifications that the design meets practice standard criteria and complies with applicable laws and regulations (NEM 501 Subpart A).
6. Design modifications during installation as required.
7. Design work must be in accordance with the Maryland conservation practice standard. Plans must be prepared in accordance with the SUPPORTING DATA AND DOCUMENTATION, Field Data and Survey Notes, and Design Data sections of the Maryland conservation practice standard.

INSTALLATION

Deliverables

1. Pre-construction conference with client and contractor.
2. Verification that client has obtained required permits.
3. Staking and layout according to plans and specifications including applicable layout notes.
4. Installation inspection (according to the QAP as appropriate).
   a. Actual materials used (NEM Part 512 - Construction, Subpart D - Quality Assurance Activities).
   b. Quality assurance records.
5. Facilitate and implement required design modifications with client and original designer.
6. Advise client/NRCS on compliance issues with all federal, state, tribal, and local laws, regulations and NRCS

policies during installation.

7. Certification that the installation process and materials meet design and permit requirements.
8. Check out and certification of the conservation practice shall be in accordance with the SUPPORTING DATA AND DOCUMENTATION, Construction Check Data/As-Built section of the Maryland conservation practice standard.

CHECK OUT

Deliverables

1. As-Built documentation.
   a. Extent of practice units applied.
   b. Drawings as per NEM, Part 512 - Construction, Subpart F - As-Builts.
   c. Photo documentation of the installation.
   d. Final quantities installed.
2. Certification that the installation meets Maryland NRCS standards and specifications and is in compliance with permits (NEM Part 501 - Authorizations, Subpart A - Review and Approval).
3. Progress reporting (CPA-6 notes).
4. Check out and certification of the conservation practice shall be in accordance with the SUPPORTING DATA AND DOCUMENTATION, Construction Check Data/As-Built section of the Maryland conservation practice standard.

REFERENCES

- NRCS Field Office Technical Guide (eFOTG), Section IV, Conservation Practice Standard - Waste Storage Facility, 313.
- NRCS Agricultural Waste Management Field Handbook (AWMFH)
- NRCS National Engineering Manual (NEM).
- NRCS National Environmental Compliance Handbook
- NRCS Cultural Resources Handbook

Note: All references listed in the References section of the conservation practice standard apply.