6) CAFO Storage Structure Environmental Performance Equivalence Demonstration Reinforced Concrete & Below Ground Structures

Introduction

This document is intended to be fully completed to demonstrate environmental performance equivalent to the Natural Resources Conservation Service (NRCS) Conservation Practice Standard No. 313, Waste Storage Facility, dated November 2005 or August 2015 (NRCS 313) and related practice standards, for the purposes of Michigan National Pollutant Discharge Elimination System (NPDES) permitting. This document applies to only waste storage structures constructed prior to the issuance of a facility's Certificate of Coverage (COC) or individual permit.

The Michigan Department of Environmental Quality (MDEQ) issued your Concentrated Animal Feeding Operation (CAFO) a Schedule of Compliance (SOC) allowing up to three years to provide adequate documentation that storage structures are either constructed in accordance with NRCS 313, or provide environmental performance equivalent to NRCS 313. The latter being the purpose of this document. If neither of these can be accomplished prior to the deadline in the SOC, continued use of the storage structure is a violation of the permit.

It is not the intent of the MDEQ to create a financial hardship for producers. However, assuring that storage structures are appropriately constructed and functioning is critical to the MDEQ's mandate to protect human health and the environment in the State of Michigan.

Completing this specific template is not required by law. Alternative formats and demonstrations will be reviewed. However, it should be noted that this form provides standards and documentation which the MDEQ believes minimally demonstrate environmental performance equivalent to NRCS 313.

The MDEQ reserves the right, as outlined in the facility's permit, to conduct inspections of the evaluated structures to assess the validity of the evaluation.

Submission of this evaluation does not constitute an implicit approval, by the MDEQ, that the storage structures meet permit requirements.

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Instructions

1) Instructions vary slightly among the different types of storage structures (particularly Item 10), so please review all instructions thoroughly for each structure reviewed.

2) Each evaluation shall be prepared by an engineer licensed in the State of Michigan. The evaluating engineer's seal must appear on the signature page.

3) Completion of the signature page of this evaluation indicates the evaluating engineer's opinion that all applicable criteria have been addressed and the structure currently meets environmental performance equivalent to the applicable NRCS 313 standard. Thus, indicating that all necessary corrective actions have been completed by the permittee and reviewed by the evaluating engineer.

4) Each criterion must be completed as thoroughly as possible by the evaluating engineer. Any omission or incomplete data from that ordinarily required herein must be described in the evaluation report as to why it could not be performed/obtained and the effect the omission has on the adequacy of the evaluation. Any omission or incomplete data not adequately explained will be regarded as not addressed, and will be considered incomplete.

5) To complete the demonstration, all boxes for each appropriate criterion must be **initialed by the evaluating engineer**. Each box is initialed to indicate that it is the professional opinion of the evaluating engineer that the criterion has been satisfied, in accordance with the applicable NRCS 313 standard or the guidance provided.

6) Guidance is provided for most criteria. The guidance outlines evaluation options or a minimum expected level of investigation necessary to satisfy the Criterion. If a criterion is not applicable, or the investigation differs from the guidance provided, a detailed explanation is necessary so the MDEQ can determine whether the Criterion is adequately addressed.

7) The guidance requests submission of many types of documents. Updated plan view drawings are also required. All plans submitted to the MDEQ should be on 11x17 sheets, if possible. As-built plans, if available, shall be submitted as part of the evaluation. This evaluation may be completed by a different engineer than the one that sealed the as-built plans. Any modifications made by the evaluating engineer to the as-built plans must be identified as such, dated, and initialed. If no as-built plans are available, scaled plans and drawings shall be submitted. At a minimum, this must include a scaled plan view of the structure that provides structure layout, any components that were reviewed, and any corrective actions resulting from this evaluation.

8) Each waste storage structure shall be evaluated separately and have its own signature page. It is recommended that all criteria are read prior to proceeding with an evaluation.

9) Each storage structure evaluation should have a narrative attached to it to describe the facility and provide any design and/or construction information available. Materials provided in support of the evaluation should be enclosed with the evaluation.

10) The structure must be emptied to the maximum achievable extent for the portion(s) of this review which require inspection of the interior of the structure.

11) For some criterion, interviews with knowledgeable parties may be utilized to obtain information and satisfy the criterion. The evaluating engineer may initial and satisfy the criterion if the information provided indicates that the criterion is met in his/her professional opinion. Document the source of information obtained in this manner.

12) Areas used for temporary stacking (i.e. for frozen manure or transfer areas prior to permanent storage) do not need to be evaluated unless the volume in this area is required to meet the minimum storage capacity identified in the permit. However, please note that contaminated runoff from these areas is required to be collected in an acceptable storage structure consistent with NRCS 313 or this guidance.

13) All repairs and/or retrofits associated with completing this evaluation shall be documented and provided as part of the evaluation and demonstration.

14) The ability to satisfy criteria may be limited if access to the interior of the structure is not feasible. If this is the case, alternative methods may be used to demonstrate environmental performance equivalence with the standard. The following list may be used to wholly or partially satisfy individual criterion. This is not an all-inclusive list, as other options will be considered. If alternative methods are used, MDEQ should be consulted prior to implementation to avoid inappropriate methodologies resulting in additional costs to the producer. In all cases, each criterion must be assessed to the extent possible by an evaluation of the exterior.

    a) Collect footing drainage, collect groundwater grab samples, or install groundwater monitoring wells, and collect samples. Evaluate for NO_3, NH_4, and fecal coliform.
    b) Excavate portions of the backfill on the outside of the structure to evaluate the concrete for cracking and leakage.
    c) Conduct an exfiltration study on the structure.
    d) Install a footing drain around the entire structure that drains to a sump and sample the drainage. Evaluate for NO_3, NH_4, and fecal coliform.
    e) Demonstrate that a natural clay base liner is present from ground level to a specified distance below the bottom of the structure, as identified below.*

*The 2005 and 2014 NRCS 313 Standards identify two options to demonstrate a natural clay base liner: 10-foot and 2-foot (10 ft. and 2 ft.). For both options (10 ft. and 2 ft.), the soils must be evaluated at least on three (3) sides of the waste storage structure. The soil evaluations must log the entire soil profile as necessary to meet either option (10 ft. or 2 ft.). Acceptable soil types are CL, CH, MH, SC, or GC as defined by the Unified Soil Classification System (USCS), which have a Plasticity Index (PI) of at least 15. The 2 ft. option requires lab or field permeability tests which demonstrate permeability is less than or equal to that allowed by the 2005 NRCS 313 Standard (Laboratory permeability (*k*) of 0.0028 ft./day (1×10^{-6} cm/sec)). The permeability tests must be representative of the surrounding soils, at depths identified in the 2005 NRCS 313 Standard, Page 6. For the 2014 NRCS 313 Standard the engineer must demonstrate a specific discharge of 0.0153 ft^3/ft^2/day (5.411×10^{-6} cm^3/cm^2/sec) or less, as outlined on Page 5. The results of the soil evaluations and permeability test (if required) must be provided. Historical investigations can be utilized, provided that they were performed by individuals trained in soil science, engineering, geology, or a related field, and meet either the NRCS 313 Standard and/or the guidance above.

Signature Page

Permittee Name	
Storage Structure I.D.	
Location	
Structure Type	
Year Built	
Date of Inspection(s)	

☐ Criteria: The storage structure meets or exceeds environmental performance equivalent to the NRCS Standard, set forth in Conservation Practice Standard No. 313, Waste Storage Facility, dated either November 2005 or August 2014, as identified in the permittee's Certificate of Coverage.

Comments:

Guidance: All remaining sections of this document which apply to the structure must be completed. The signature and seal of the evaluating engineer must appear on this page.

Signatory States: To the best of my knowledge, personal judgment, and belief, as a professional engineer licensed in the State of Michigan, this storage structure meets environmental performance equivalent to the appropriate NRCS Standards, set forth in Conservation Practice Standard No. 313, Waste Storage Facility, as identified in the above referenced permitee's Certificate of Coverage. Furthermore, the Waste Storage Structure appears to be functioning as designed and built, and meets the requirements as set forth by the MDEQ.

_____
Date

6.0 Reinforced Concrete and Below Ground Structures

6.1

☐ Criterion: The structure is not in a floodplain, or is properly protected from inundation from the 25-year flood event or larger. No field tile is located within 50 feet of the structure, except for an artificial drainage system designed to lower a perched water table or as part of a foundation drain. (Page 1 of NRCS 313 Standard.)

Comments:

Guidance: For floodplain and field tile isolation determinations, comment above and/or include technical submissions (drawings, investigations, interviews, etc.).

6.2

☐ Criterion: The constructed bottom elevation is no lower than the seasonal high water table. (Page 7 - November 2005 or Page 6 - August 2014 of NRCS 313 Standard.)

Comments:

Guidance: Conformance with this criterion shall be evaluated by providing documentation of at least (1) one soils investigation on at least three (3) sides of the waste storage structure to determine the presence and elevation of a water table. The same soils investigation may be used for multiple structures provided it is technically appropriate. If a perched water table is present explain how it was lowered in accordance with the NRCS 313 Standard (Page 4 - November 2005 or Page 3 - August 2014 of NRCS 313 Standard). Detailed documentation of the location and results of soils investigation(s) shall be provided. Historical investigations can be utilized, provided that they were performed by individuals trained in soils science, engineering, geology, or a related field, and meet either the NRCS 313 standard and/or the guidance above. For further subsurface investigation guidance and resources, consult the NRCS website.
National Engineering Manual Title 210 Part 531 Geology: Subpart b (usda.gov)
National Engineering Manual Title 210 Part 631 Geology, Chapter 2 Engineering Geology: Part 631-National Engineering Handbook, Chapter 2-Engineering Geology (usda.gov)

6.3

	Criterion: Proper drinking water well isolation distances are addressed. (Page 1 of NRCS 313 Standard.)

Comments:

Guidance: Collect data and provide documentation as outlined below.

1) Provide a scaled drawing of the facility which identifies all of the following:
    a) Waste storage structures
    b) Buildings and other structures
    c) All on-farm wells (whether currently in use or not) that have not been abandoned in accordance with Part 127, Michigan's Well Construction Code, of 1978 PA 368 Public Health Code, as amended, and the Administrative Rules.
    d) All off-farm wells not meeting the setbacks from the evaluated structure as identified in Item 2 below.
    e) All properly abandoned wells (attach well abandonment logs).
2) Document the well type (as identified in 1976 PA 399 Michigan's Safe Drinking Water Act, as amended, and the Administrative Rules), NRCS 313 Standard setback distance, and actual setback distance from the storage structure for each non-abandoned well (1a-1d above) identified on the scaled drawing. NRCS 313 Standard setback distances are listed below:
    a) Private wells – 150 ft.
    b) Public wells, Type IIb and III – 800 ft.
    c) Public wells, Type I and IIa – 2,000 ft.
3) For Type IIb and III public wells not meeting the setbacks identified in Item 2, determine if isolation distances can be reduced utilizing the most current version of the NRCS's Well Isolation Distance Worksheet For Major and Potential Sources of Contamination (NRCS Worksheet).
4) For any wells which meet either the isolation distances in Item 2, or the appropriate reduced isolation distances as identified by the NRCS Worksheet, submit the scaled drawing, applicable NRCS Worksheets, and all NRCS Worksheet supporting documentation (including well logs for each well).
5) For any wells which do not meet the minimum isolation distances, identified in Item 2, and do not meet reduced isolation distances requirements from the NRCS Worksheet, submit all of the following:
    a) Information about how each water well at the facility is used, including: pumping capacity, average amount pumped per day, how many months of the year the well is pumped, and if the water is available for human use.
    b) Well log or construction details. If a well log is not available, determine and provide the well depth, casing depth, screened interval or open bedrock interval, grouting information, static water depth, and geologic formation materials information.
    c) Local groundwater flow direction information and supporting documentation.
    d) Historical bacteriologic and nitrate sampling results. If no historical samples are available, provide at least one sample result from each well including analysis for fecal coliform and nitrate.
6) If the information provided is not sufficient to allow a deviation from the required isolation distances, the MDEQ may request additional information or require corrective action(s).

6.4

☐ Criterion: If a known or suspected subsurface drainage system (perched water table or otherwise) is present, the drainage water and the outlet pipe appear clean and are free of manure odor.

Comments:

Guidance: Consult available historical information and documentation, and inspect the entire exterior of the structure for evidence of a subsurface drainage system. On the submitted drawings or plans, identify any known or suspected subsurface drainage system(s) within 50 feet of the structure and show the location of the outlet(s). Provide a written description of the visual condition and any odors associated with the drainage water and the outlet pipe in the comments section above. If no drainage water was observed, indicate in the comments above. Document the time of year the inspection occurred and any weather data that would support the findings. If not applicable, indicate in the comments and initial.

6.5

☐ Criterion: There are no noted signs of design, construction, or structural deficiencies.

Comments:

Guidance: Review any available plans or designs for adequacy. Otherwise, use sound engineering judgment. During the site visit, review the structure for observable deficiencies.

6.6

☐ Criterion: Visual inspections of the interior and exterior of the structure were conducted and documented. Inspection methods and limitations are described below.

Comments:

Guidance: Documentation of these inspections shall be included and the findings shall be summarized. For the interior inspection, the structure must be emptied to the maximum achievable extent. Interior inspections may be done by means other than entry, such as videotaping. The entire interior of the structure does not need to be inspected. However, the interior inspection must be adequate to be representative of the condition of the structure. Pump out areas, such as “doghouses” may provide adequate viewing area to make an assessment of the condition of the structure. All visible areas of the exterior shall be inspected.

6.7

☐ Criterion: The walls of the structure appear to be vertical. There is no bowing or separation at the corners of the structure. There is no visible horizontal cracking in the walls of the structure

Comments:

Guidance: Horizontal cracking and/or corner separation must be further investigated and repaired as appropriate.

6.8

☐ Criterion: The floor of the structure is relatively flat and constructed of appropriate materials. No major cracking or displacement was observed.

Comments:

Guidance: Solid accumulation may prevent direct viewing of the bottom of the structure. However, this evaluation must provide evidence that the bottom liner is constructed of appropriate material (generally concrete). The results of the inspection should be summarized in the comments above or the supporting documentation.

6.9

☐ Criterion: There is NO visible differential settlement in the backfill areas around the structure.

Comments:

Guidance: Settlement must be further investigated and addressed prior to completion of this evaluation.

6.10

☐ Criterion: There is no evidence of uncorrected localized extensive cracking, structural cracking, displacement (out of plane movement), spider webs, undermining, delamination, or other potential structural failure signs.

Comments:

Guidance: Extensive cracking is to be determined by the professional engineer conducting the evaluation. If any of these are present, there may be a local problem in the structure that can be addressed in the location of the problem. A remedy, which provides environmental performance equivalent to the NRCS 313 Standard, must be implemented before this criterion is met. Enclose documentation of the size, type, and location of structural cracks which required corrective action.

6.11

☐ Criterion: Uncorrected vertical cracks are not greater than 3 millimeter (mm) in width.

Comments:

Guidance: Cracks assessed in this section should be relatively evenly spaced along the structure and representative of cold joints, cracking during curing, and cracking caused by temperature variations. If this is not the case, the cracks must be addressed in Item 6.10 above. Please provide a brief evaluation of vertical cracks in the comments above. This should include the number of cracks per linear foot of sidewall. Cracks greater than 3 mm, require a remedy which provides environmental performance equivalent to the NRCS 313 Standard before this criteria is met. Provide the location of cracks which required corrective action.

List of References

1976 PA 399 Michigan's Safe Drinking Water Act, as Amended, and the Administrative Rules

Appleby, Josh, *Manure storage review sheets,* Michigan Agriculture Environmental Assurance Program, February 28, 2008, Michigan.gov/mdard/environment/maeap

Comprehensive Nutrient Management Plan (CNMP) MAEAP Guidance Document for Comprehensive Nutrient Management Plans, Michigan Agriculture Environmental Assurance Program, MAEAP CNMP Committee, April 20, 2015, Michigan.gov/mdard/environment/maeap

Guidance for the Evaluation of Existing Storage Structures, Michigan Department of Environmental Quality, Water Bureau. December 2, 2005. (The link provided was broken and has been removed)

Part 127, Michigan's Well Construction Code, of 1978 PA 368 Public Health Code, as amended, and the Administrative Rules

Natural Resources Conservation Service (NRCS) Documents

NRCS-Michigan Well Isolation Distance Worksheet for Major and Potential Sources of Contamination, June 2014.

NRCS-Michigan, Subsurface Investigations for Waste Storage Facilities, NRCS website:
- National Engineering Manual Title 210 Part 531 Geology: Subpart b (usda.gov)
- National Engineering Manual Title 210 Part 631 Geology, Chapter 2 Engineering Geology: Part 631-National Engineering Handbook, Chapter 2-Engineering Geology (usda.gov)

Waste Storage Facility, NRCS-Michigan Conservation Practice Standard No. 313, August 2014, <https://www.nrcs.usda.gov/resources/guides-and-instructions/field-office-technical-guides>

Waste Storage Facility, NRCS-Michigan Conservation Practice Standard No. 313, November 2005, <https://www.nrcs.usda.gov/resources/guides-and-instructions/field-office-technical-guides>

Waste Storage Facility – Pond, Code 313, NRCS-Michigan Operation and Maintenance Plan, September 2014, <https://www.nrcs.usda.gov/resources/guides-and-instructions/field-office-technical-guides>

Waste Storage Facility – Stacking Facility, Code 313, NRCS-Michigan Operation and Maintenance Plan, September 2014, <https://www.nrcs.usda.gov/resources/guides-and-instructions/field-office-technical-guides>

Waste Storage Facility – Tank, Code 313, NRCS-Michigan Operation and Maintenance Plan, September 2014, <https://www.nrcs.usda.gov/resources/guides-and-instructions/field-office-technical-guides>