

**Concrete Pit Review Checklist**

Permittee: \_\_\_\_\_ Engineer: \_\_\_\_\_

Co.: \_\_\_\_\_ Twp.: \_\_\_\_\_ Sect.: \_\_\_\_\_ Qtr.: \_\_\_\_\_

Date Reviewed: \_\_\_\_\_ Site is: (check one) \_\_\_\_\_ &gt;1000 a.u. \_\_\_\_\_ 300 – 1000 a.u. \_\_\_\_\_ &lt;300 a.u.

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**Site Restrictions** - Is the structure located in (circle YES if it applies to the site and NO if it does not apply):

**NOTE:** A “YES” response to any of the following items indicates that the permit application, plans and specifications for any manure storage area, and any other attachments to the permit application need to be reviewed to be sure that the applicable rule requirements are met.

1. Shoreland? (Minn Rule 7020.0300 Def. Subp. 21 & 7020.2005 Subp. 1) – If there is no existing animal housing or manure storage areas on this site, no construction is allowed. (Minn. Rule 7020.2005 Subp. 1) – If site has 1000 a.u. or more after construction, a pit can not be constructed at this site. (Minn. Rule 7020.2005 Subp. 2) – If site has 300 – 999 a.u. after construction, the pit may not be constructed closer to high water mark than any other animal housing or manure storage area on the site. (Minn. Rule 7020.2005 Subp. 2)	<b>YES</b>	<b>NO</b>
2. Floodplain? (Minn. Rule 7020.0300 Subp. 12 + 7020.2005 Subp. 1)	<b>YES</b>	<b>NO</b>
3. Within 300 ft. of a sinkhole? (See checklist for KARST features) (MN Rule 7020.2005 Subp.1 & Definition MN 7020.0300 Subp. 22)	<b>YES</b>	<b>NO</b>
4. Within 100 ft. of a private well with casing or 200 ft. of a private well that is not protected by >50ft. of casing or at least 10 ft. of impermeable soil material? (Minn. Rule 7020.2005 Subp 1)	<b>YES</b>	<b>NO</b>
5. Within 1000 ft. of a community well or other wells serving a public or private school or licensed child care center? – If so, the pit may be constructed if <u>ALL</u> 3 conditions are met: (MN Rule 7020.2005 Subp. 1, B, (1)-(3)) <ul style="list-style-type: none"> <li>• MDH has approved a drinking water supply management area for the well</li> <li>• The pit is not within the drinking water supply management area; and</li> <li>• The pit is not within 200 feet of the well.</li> </ul>	<b>YES</b>	<b>NO</b>

**NOTE:** If the proposed construction will correct an existing pollution hazard and site has <300 a.u. after construction, there are no prohibitions on construction or expansion of existing feedlots within shoreland, a floodplain, or the karst area. (Minn. Rule 7020.2100 Subp. 2, C.)

**Design Standards:** Is this information in the plans and specifications for this project?  
(Circle YES if the item is included and NO if it is not included)

**NOTE:** A “NO” response to any of the items listed below indicates that the plans and specs may not comply with the minimum requirements of Minn. R. chap. 7020.

1. “Design Engineer” signature on plans?(Minn. Rule 7020.2100 Subp. 4) (MS 326.12, Subd 3) A. Not required for concrete pits less than 20,000 gal.(Minn. Rule 7020.2100.Subp. 4) B. Design Engineer is a P.E. or NRCS staff with approval authority (Minn. Rule 7020.0300 Subp. 9(d))	<b>YES</b>	<b>NO</b>
2. Information to indicate that the plans and specifications are for the site whose permit application is under review? A. County, township, section, ¼ sections (MN Rule 7020.0505 Subp. 4. A.) B. Owner Name, address (MN Rule 7020.0505 Subp. 4. A.)	<b>YES</b>	<b>NO</b>
3. Estimated storage capacity by volume & time period (manure + runoff + process wastewater)? (Minn. Rule 7020.2100, Subp 4.C.) A. Design Storage Volume AND Length of Time before pit will reach full capacity	<b>YES</b>	<b>NO</b>
4. If site is <u>1000 AU or more</u> , then the capacity of pit provides a minimum of 9 months of storage? [Minn. Rule 7020.2100.Subp 3.A.]	<b>YES</b>	<b>NO N/A</b>
5. If Pit is open to precipitation or runoff inputs then calculations MUST also include: A. Volume capacity for 25 year/24 hour rainfall event <b>OR</b> B. Freeboard depth of not less than 1 foot (Minn. Rule 7020.2100, Subp 4.D.)	<b>YES</b>	<b>NO N/A</b>
6. Plan for a preconstruction conference which includes the design engineer, inspector, owner and contractor(s)? (Minn. Rule 7020.2100.Subp 4.E.)	<b>YES</b>	<b>NO</b>
7. Soil Report? Were the following elements included: (Minn. Rule 7020.2100.Subp 4.A.) A. Site plan indicating location of each boring relative to location of pit? (Subp 4.H) i. Proposed pit outline & boring locations (with dimensions)	<b>YES</b>	<b>NO</b>
B. Analysis of foundation soils for suitability of the proposed structure? (Subp 4.A.(1)) i. Discussion or a statement of the suitability of the soil	<b>YES</b>	<b>NO</b>
C. Borings at 2 locations within pit boundaries for first ½ ac. and a minimum of 1 boring per additional acre? (Minn. Rule 7020.2100 Subp 4.A.(2))	<b>YES</b>	<b>NO</b>
D. Sufficient soil records have been obtained to represent soil conditions at the pit site? (Minn. Rule 7020.2100 Subp 4.A.(2)) i. Are soil profiles somewhat similar in soil types, water elevations, bedrock?	<b>YES</b>	<b>NO</b>

<p>E. Soil boring depth below the proposed pit bottom adequate?</p> <p>i. 5' below proposed pit bottom(s) for NON-Karst areas (Minn. Rule 7020.2100 Subp 4.A.(3))</p> <p>ii. Karst Areas</p> <p>a. 5' minimum for sites &lt; 300 a.u. (Minn. Rule 7020.2100 Subp.2.B.(1))</p> <p>b. 10' minimum for sites with &gt;300 a.u. (Minn. Rule 7020.2100 Subp.2.B.(2) and (3))</p> <p>c. to 15' for areas susceptible to soil collapse or sinkhole formation (Minn.Rule 7020.2100 Subp. 2 B.)</p> <p>Note: For definitions of above see MPCA Factsheet "Siting Manure Storage Areas in Minnesota's Karst Region: State Requirements" May 2002</p> <p>d. if bedrock encountered then interpretation of type of bedrock stated</p>	<p><b>YES NO</b></p>
<p>F. Each borehole was sealed throughout the entire depth by a method that will ensure that the borehole does not become a preferential flow path for vertical groundwater transport. (Minn. Rule 7020.2100 Subp 4.A.(3))</p>	<p><b>YES NO</b></p>
<p>G. Each soils record identifies soil texture, depth to regional and seasonal water tables? (Minn. Rule 7020.2100. Subp 4.A.(5))</p> <p>i. Soil Profile with individual soil thickness indicated and described by either:</p> <p>a. USDA soil texture (ex: loam, sand, ...) &amp; Soil color (Soil Survey Manual, Agricultural Handbook No. 18 (October 1993)) (MPCA Concrete Guideline)</p> <p>(1) Interpret soil colors based upon either:</p> <p>(a) Soil Survey Manual (USDA) <b>OR</b></p> <p>(b) other method with provided reference (EX: "brown (10YR 5/3),dry and smoothed" )</p> <p>b. Unified Soils Classification System (USCS) (ex: SM, OL, CL, ...) (NRCS - 313)</p> <p>ii. Approximate depth to regional water table is stated? (Sources: well logs, surface water elevations from topo map, borings, etc.)</p> <p>iii. Approximate depth to seasonal water table is stated? (As indicated by soil borings)</p> <p>iv. Date soils investigation was completed?</p>	<p><b>YES NO</b></p> <p><b>YES NO</b></p> <p><b>YES NO</b></p>
<p>H. Boring method can identify changes in soil texture and sand lenses throughout profile? (Minn. Rule 7020.2100. Subp 4.A.(6))</p> <p>i. Acceptable Methods Include: (ref: 1998 MPCA concrete fact sheet p.4)</p> <p>a. backhoe excavation,</p> <p>b. hollow stem auger – Shelby Tube, <b>OR</b></p> <p>c. solid auger removed intermittently (EX: "pull auger approximately every 6 inches to sample")</p>	<p><b>YES NO</b></p>

<p>I. For karst areas, a map of the proposed site shows any karst features within ½ mile? (Minn. Rule 7020.2100. Subp 4.A.(7))</p> <p>i. See MPCA Karst/Feedlot Factsheet for all requirements</p> <p>ii. Supplemental Karst Application for karst inventory filled out for site in following counties: Dakota, Dodge, Fillmore, Goodhue, Houston, Mower, Olmsted, Rice, Wabasha, and Winona. Use MPCA Fact Sheet: <u>Siting Manure Storage Areas in Minnesota's Karst Region: State Requirements</u> <a href="http://www.pca.state.mn.us/publications/wq-f8-13.pdf">http://www.pca.state.mn.us/publications/wq-f8-13.pdf</a></p> <p>iii. <u>Karst Features</u>: open and filled sinkholes, depression areas in the landscape, known caves, resurgent springs, disappearing streams, karst windows, and blind valleys.</p>	<p><b>YES NO N/A</b></p>
<p>J. An evaluation of the potential for groundwater intrusion and liner damage is included? (Minn. Rule 7020.2100. Subp 4.A.(8))</p> <p>i. Show/Discuss location of natural ground elevation of each soil boring relative to proposed concrete manure storage structure bottom elevation. (ref: 1998 MPCA concrete fact sheet p.5)</p> <p>ii. Clear statement for need or lack of need for perimeter tile</p> <p>a. <u>Perimeter tile NOT required</u> where regional water table or seasonal high water table does not exist within the soil profile at the proposed building site</p> <p>(1) <u>If no perimeter tile will be installed.</u> Then O&amp;M will need to include recommendations on the control/effects of rain/snow water collecting in the disturbed soils along the foundation's footings and walls. (ref: 1998 MPCA concrete fact sheet p. 6)</p>	<p><b>YES NO</b></p>
<p>K. Plans for installation of a <u>perimeter tile</u>? If YES, is the location of the following elements shown on the plan? (Minn. Rule 7020.2100 Subp 4.A.(9) &amp; Subp 4.J.)</p> <p>i. Drain tile located a horizontal distance of at least 1' outside the pit footing and at a depth that is at least as deep as the bottom of the pit floor? (Minn. Rule 7020.2100 Subp 4.A.(9)(b))</p> <p>a. State actual location OR maximum distance from pit (no more than 7 ft, unless evaluated)</p> <p>ii. A separate drain tile system for each concrete pit? (Minn. Rule 7020.2100 Subp 4.A.(9)(c))</p> <p>iii. Access for collection of tile-water samples for each drain tile system? (Minn. Rule 7020.2100 Subp 4.A.(9)(d))</p>	<p><b>YES NO N/A</b></p>
<p>8. Site is in MDH approved drinking water supply management area (DWSMA)? – If YES applies, was the following information included? (Minn. Rule 7020.2100 Subp 4.B.(1) thru (4)) Contact Minn. Dept. Health to see if site is within DWSMA. 1-800-818-9318 <b>OR</b> Online Maps <a href="http://www.mda.state.mn.us/water/protection/mapping.htm">http://www.mda.state.mn.us/water/protection/mapping.htm</a></p> <p>A. Location of feedlot, manure storage areas, and land app. sites on map of DWSMA?</p> <p>B. Copy of the vulnerability assessment of the DWSMA?</p> <p>C. Description of vulnerability for manure storage and land app. from assessment?</p> <p>D. Copy of all parts of DWSMA plan pertaining to feedlots?</p>	<p><b>YES NO N/A</b></p>

<p>9. Plans for water stops or joint sealant materials at all construction joints? (Minn. Rule 7020.2100 Subp 3.B.(2))</p> <p>Construction Joint = The junction of two successive placements of concrete, typically with a keyway or reinforcement across the joint.</p> <p>A. State what will be used (water stop OR joint sealant) and show location on diagrams</p> <p>B. Show location on diagrams for Keyway or reinforcement across joint</p>	YES	NO
<p>10. Plans for sealing of all cracks which may extend through concrete liner with appropriate materials? (Minn. Rule 7020.2100 Subp 3.B.(2))</p> <p>EX: Epoxy Injection; routing and joint sealant; stitching</p>	YES	NO
<p>11. Floor is at least 5" thick? And the floor <u>has one</u> of the following:</p> <p>A. Steel reinforcing based on subgrade drag theory? (Slabs on Grade, ACI-360) (Minn. Rule 7020.2100 Subp 3.B.(2)(a)) <b>OR</b></p> <p>i. Provisions for supporting reinforcing steel in intended location by appropriate chairs or concrete blocks. (NRCS - 313 page 7)</p> <p>B. Fiber reinforcing and specifications on type of fibers and the dosage rate? (Minn. Rule 7020.2100 Subp 3.B.(2)(b))</p>	YES	NO
<p>12. All penetrations identified w/info on purpose, dimensions, and methods for sealing? (Minn. Rule 7020.2100 Subp 3.C)</p>	YES	NO
<p>13. Bottom Slab Thickness under columns and for wall footings (ACI 318)</p> <p>A. 8 inch slab min without rebar reinforcement and (see also Rect. C.M.S p.28)</p> <p>B. 10 inch min if footing not poured continuous with bottom slab</p> <p>C. Provisions for supporting reinforcing steel in intended location by appropriate chairs or concrete blocks. (NRCS 313 page 7)</p>	YES	NO
<p>14. Pit is open to precipitation or collects runoff? If YES, is the greater of either item below included in the plans? (Minn. Rule 7020.2100 Subp 4.D)</p> <p>A. Vol. for precipitation and runoff w/o overflow for a 25-year, 24-hour or greater event? <b>OR</b></p> <p>B. Freeboard depth of not less than 1'?</p>	YES	NO N/A
<p>15. QA/QC plan including specs for <u>inspections</u>? (Minn. Rule 7020.2100 Subp 4.K)</p> <p>A. Inspector Info is one of following: (Minn. Rule 7020.2100 Subp. 6.A.)</p> <p>i. ACI concrete 1 Field Test Cert,</p> <p>ii. MN P.E. or person working under direct supervision, or</p> <p>iii. NRCS approved person</p>	YES	NO

16. QA/QC plan including specs for <u>ASTM testing methods and frequencies during construction?</u> (Minn. Rule 7020.2100 Subp 4.K)		
A. Plans can state that testing will follow one of the following options:	YES	NO
<ul style="list-style-type: none"> <li>i. ACI 318-02 field testing methodology</li> <li>ii. ACI 301-99 field testing methodology</li> <li>iii. ASTM C-94</li> <li>iv. List of separate tests that includes the following: <ul style="list-style-type: none"> <li>a. ASTM C-172 = concrete sampling</li> <li>b. ASTM C-31 &amp; C-39 = Compressive Strength (min. @ 150 cy or different mix)</li> <li>c. ASTM C-138 or C-173 or C-231 = Air Content (note: MPCA has had air testing as a recommended but not required test in past; ref: concrete guideline)</li> <li>d. Slump: (a) ASTM C-143 <u>OR</u> (b) if plasticizer in concrete indicate dosage</li> <li>e. ASTM C-1064 = Temperature</li> </ul> </li> </ul>		
B. Additional testing to represent new mixes or different concrete suppliers	YES	NO
C. Frequency needs to be stated (not less than @ 150 cy for strength per ASTM C-94)	YES	NO
17. Specifications for liner protection during and after construction? Does it include protection from:		
A. Drying and cracking during and after liner construction? (Minn. Rule 7020.2100 Subp 4.L(1))	YES	NO
<ul style="list-style-type: none"> <li>i. How to keep moist options: (a) spray or pond; (b) cover plastic or burlap; (c) curing compound; (d) steam</li> </ul>		
B. Freezing and Thawing? (Minn. Rule 7020.2100 Subp 4.L(3))	YES	NO
<ul style="list-style-type: none"> <li>i. After construction – maintain water level, heat, etc</li> <li>ii. In the event of non-use will protection from concrete freeze-thaw be needed?</li> </ul>		
C. Hot and cold weather construction? (Ref: MPCA Concrete Guidelines) (Minn. Rule 7020.2100 Subp 4.L(4))	YES	NO
<ul style="list-style-type: none"> <li>i. Hot: ACI 305R “Hot Weather Concreting” or detailed instructions</li> <li>ii. Cold: ACI 306.1 “Standard Specification for Cold Weather Concreting” or detailed instructions</li> </ul>		
18. O & M plan for pit(s)? Does it include the following items?		
A. Routine inspections, repair methods and recordkeeping to document repairs? (Minn. Rule 7020.2100 Subp 4.N(1-2))	YES	NO
<ul style="list-style-type: none"> <li>i. state inspections frequency (during empty events)</li> <li>ii. repair methods for cracks</li> <li>iii. record location, pictures (pictures suggested)</li> </ul>		
B. Methods used to monitor the liquid level in pit? (Minn. Rule 7020.2100 Subp 4.N(3))	YES	NO
C. Routine inspections of perimeter tile line outlets and inspection manholes? (Minn. Rule 7020.2100 Subp 4.N(4))	YES	NO N/A
<ul style="list-style-type: none"> <li>i. state inspections frequency</li> <li>ii. look for evidence of manure in discharge (visual, smell)</li> </ul>		

MPCA Concrete Guideline = “Guidelines for Concrete Manure Storage Structures” Dec. 1997.

## APPENDIX: Karst Region Additional Review Items:

Definitions from MPCA Fact Sheet “Siting Manure Storage Areas in Minnesota’s Karst Region: State Requirements” May 2002.

### Areas Susceptible to Sinkhole Formation

This term is used in Minnesota rules Ch. 7020 and the alternative standards developed by the karst workgroup. The term is not defined in rules, but was later defined by the karst workgroup as follows: “Areas susceptible to sinkhole formation” exist where the conditions under either A or B are met, as described below:

#### A. Shallow depth to carbonate bedrock

1. Depth to carbonate bedrock is less than 50 feet, **AND**
2. Uppermost bedrock is carbonate materials or other geologic conditions where soil collapse or sinkhole formation occurs including the New Richmond Sandstone and basal St. Peter Sandstone

#### OR

#### B. Presence of Nearby karst features

1. Karst features exist within 1000 feet of the proposed site (sinkholes, blind valleys, mapped caves, springs, or karst windows)

#### AND

2. Geologic conditions near the karst features are similar to those of the proposed site.

#### Boring Depth Requirements:

Animal Units	Minimum Soil Boring Depth (feet below Proposed Bottom Pit)
<300	5 feet
300 to 999	10 feet
≥1000	15 feet