NRCB | Natural Resources Conservation Board

Interim guidance on the use of Roller Compacted Concrete (RCC) as a potential liner at confined feeding operations (CFOs)

By issuing this interim guidance, the NRCB makes no guarantee that future guidance will contain the same requirements or standards.

If future guidance contains more stringent requirements or standards than those contained in this interim guidance, the NRCB will address the discrepancies by enhancing the ongoing inspection, monitoring, and repair permit conditions. The NRCB reserves the right to amend a permit issued under this interim guidance, under section 23 of the* Agricultural Operation Practices Act *(AOPA).

1.0 Use of RCC on top of an AOPA liner

When using RCC on top of an AOPA liner:

1. **No** AOPA permit is required; however, care should be taken during installation of the RCC to not damage or alter any existing liner.
2. Operators will need to demonstrate that they have sufficient surface runoff storage, since more water will run off of a pen floor with RCC on top of an AOPA liner.

2.0 Use of RCC as an AOPA liner

2.1 Background

1. A study by the Technical Advisory Group (includes representation from Alberta Agriculture and Forestry, the NRCB, and the livestock industry) concluded that there is insufficient Alberta-specific information to develop a guideline on the use of RCC as an approved AOPA liner at CFOs. The NRCB Board, in a recent decision, "encourages the development of an RCC technical guideline" to provide guidance on how RCC might be used as a liner to meet AOPA requirements. The potential for a guideline is currently being assessed but will likely take some time to complete.

2. Section 9(6) of the AOPA Standards and Administration Regulation requires that a liner "…if constructed of compacted soil or constructed of concrete, steel or other synthetic or manufactured materials, must provide equal or greater protection than that provided by compacted soil".

   Section 9(6)(c) specifies that the minimum requirement for a liner at a solid manure storage facility or solid manure collection area is 0.5 m in depth with a hydraulic conductivity of not more than 5×10^{-7} centimetres per second.

3. The NRCB strongly discourages installation of RCC as a primary liner for groundwater protection until a guideline is developed. In the meantime, the NRCB has adopted a cautious approach when considering the use of RCC as an AOPA liner at a CFO. As part of this approach, ongoing inspection and testing requirements will be essential to monitor liner performance.

4. At this time, the NRCB will only consider the use of RCC as an AOPA liner for solid manure facilities.

2.2 NRCB requirements if RCC is proposed to be used as an AOPA liner

Base onto which RCC will be placed:

1. The base must be designed by a professional engineer.
2. Construction must be supervised by an on-site professional engineer or their designate.
3. Information provided with the application to the NRCB must include:
   a. composition of materials to be used to construct the base,
   b. thickness of base,
   c. methodology for compaction of the base, and
   d. levelling methods, slope of base, and compaction test methodology.
4. The base must be at least four inches thick and compacted to 95 percent Standard Proctor Density. Additionally, the professional engineer must assess the soil and either provide mitigation for frost heaves, soil expansion, and soil pumping, or alternatively, explain why no actions are required.
5. Prior to installation of the RCC, the applicant must provide the NRCB with post-testing reports of the base authenticated by a professional engineer.

Roller Compacted Concrete:

1. The RCC must be designed by a professional engineer.
2. Installation of the RCC must be supervised by an on-site professional engineer or their designate.
3. Information provided with the application to the NRCB must include:

Design:

   a. mix, (proportions of mix, water-cement ratio, any additives etc.),
   b. proposed strength at 28 days,
   c. expected hydraulic conductivity,
   d. thickness of proposed RCC liner; must have a compacted thickness of at least six inches (0.15 metres),
   e. proposed crack control methods,
   f. levelling methods, slope of the RCC liner, and
   g. methods of RCC compaction to ensure that the full thickness of the RCC layer is compacted, including around transition zones (cold joints, stock waterers, the feed bunk apron, the pen entrances, fence posts, and any other objects that penetrate the RCC).

Installation:

   a. placement and installation methods,
   b. methods used to promote proper curing of the RCC for different weather conditions (the RCC must be protected to conserve moisture and allow proper curing not longer than two hours from time the RCC is placed and compacted),

Ongoing inspection, monitoring, and repair:

a. ongoing inspection and testing schedule, at a minimum, on an annual basis (including details describing how this will be carried out and measured); ongoing testing and inspections must be carried out by a professional engineer or their designate in the presence of an NRCB inspector; post-testing and post-inspection reports must be authenticated by a professional engineer and provided to the NRCB,
b. explanation of how the RCC liner will be made “inspectable” (e.g., remove the manure and clean /wash in selected areas, including transition zones, so that any cracking is visible),
c. the proposed monitoring to confirm performance of the RCC liner (e.g. groundwater, sub-soil monitoring); prior to population or manure being placed on the RCC liner, a baseline will need to be identified, and
d. how damage, including cracks and transition zones, to the RCC liner will be repaired to ensure that the integrity of the RCC liner is not compromised.

4. A professional engineer must authenticate that the design specifications and installation methods (listed above) are met. A final report will include:

    a. as-built drawings showing all transition zones (cold joints, stock waterers, feed bunk apron, pen entrances, fence posts, and any other object that penetrate the RCC),
    b. testing methodology to confirm that the above design and installation specifications are met,
    c. verification methods to verify that the RCC was compacted to 98 percent Modified Proctor Density during the installation process, including identification of any issues experienced and how they were properly addressed,
    d. methods used to promote proper curing,
    e. all installation testing results,
    f. all inspection and reporting results, and
    g. on-site testing results of the batched RCC to ensure the product was consistent throughout the complete installation; this includes regular testing of the moisture content of the batches; material out of specification (+/- 0.5% of optimum) must not be placed.