

NATURAL RESOURCES CONSERVATION BOARD

How to complete the AOPA application form:

Part 2—Technical Requirements, Solid Manure, Compost & Composting Materials

February 2018

This guide has been developed to help applicants complete Part 2—Technical Requirements, Solid Manure, Compost & Composting Materials for an application under the *Agricultural Operation Practices Act* for an approval, registration or authorization to expand or construct a new confined feeding operation, manure collection area or manure storage facility.

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How to complete Part 2—Technical Requirements, Solid Manure, Compost & Composting Materials

Applicants who wish to construct or expand a confined feeding operation, manure collection area or manure storage facility must complete the required Part 2 application forms. Part 2—Technical Requirements, Solid Manure, Compost & Composting Materials must be completed if relevant to the proposed expansion or new construction being applied for.

To determine which sections of this form must be completed for your proposed development, please contact a Natural Resources Conservation Board (NRCB) approval officer in your region (see Appendix 1). The approval officer will confirm which sections must be completed, and whether other information is required for your application.

In order to complete the Part 2—Technical Requirements, Solid Manure, Compost & Composting Materials form, you must provide the information, measurements, calculations, plans and reports as indicated. The NRCB approval officer can identify where you may wish or be required to hire a third party consultant or professional, at your expense, to assist with technical information.

An NRCB approval officer can also help you determine the permit implications of the options you are considering. NRCB approval officers will not carry out any design work or conduct any testing or sampling on behalf of the applicant.



Note: A delay by the applicant, the agent or their consultants in providing the required information will result in a delay in processing the application.

Filling out the form

If the space provided is not sufficient to enter all of your information, please use a separate sheet for any additional information.

Shaded portions of the form are marked “NRCB USE ONLY.” Please do not write in these sections. These sections will be completed by the NRCB approval officer during the technical review of the application.

Sections of the form are provided below with examples to illustrate the information applicants should provide.

Naturally occurring protective layer

An engineering soils investigation is required for most barn, feedlot, and storage facilities for solid manure, composting materials, or compost with a naturally occurring protective layer. Contact an NRCB approval officer to determine the scope of the required soils investigation.

Naturally occurring protective layer(s) for solid manure collection and storage facilities must have a minimum thickness of two metres, a maximum hydraulic conductivity of 1×10^{-6} cm/s, and a positive slope, to prevent liquids from ponding on the surface of the protective layer.

SOLID MANURE, COMPOST & COMPOSTING MATERIALS: Barns, feedlots & storage facilities - Naturally occurring protective layer
(complete a copy of this section for EACH barn, feedlot and storage facility for solid manure, composting materials or compost with a naturally occurring protective layer for the liner)

Facility description / name *(as indicated on site plan)*

1. East Feedlot Pens 2. West Feedlot Pens

Manure storage capacity

	Length (m)	Width (m)	Estimated storage capacity (m ³)	Depth below grade of the top protective layer surface (m)
1.	300m	200m	9786m ³	0m.
2.	200m	200m	9786m ³	0m

- 1 Enter the facility description/name as it is indicated on the site plan.
- 2 Provide the length and width (in metres) of the proposed barn, feedlot, or storage facility.
- 3 Enter the total estimated manure storage capacity of the facility, in cubic metres.
- 4 Provide the depth below grade of the top of the floor of the manure storage facility.

Surface water control systems

☐ Under roof: Surface water will be controlled by the walls and roof of the building and by the finished landscaping.

☒ Outdoor: Describe the run-on and runoff control system proposed for feedlots and outdoor manure storage facilities:
Runon will be controlled by above grade berm.

- 5 Indicate the method of surface water control by selecting the appropriate check box. If the surface water will **not** be controlled by the walls and roof of the building and by the finished landscaping, describe the run-on and runoff control system in the additional information section.

- Run-on controls prevent upstream surface water from coming into contact with manure.
- Runoff controls prevent surface water that has come into contact with manure from leaving the confined feeding operation property.

For feedlots and outdoor manure storage facilities, select the second option.

For feedlots and outdoor manure storages, surface run-on water should be prevented from coming into contact with manure. Water that does come into contact with manure should be controlled and directed into a runoff control catch basin or other runoff control system.

If a catch basin is proposed as the method of runoff control, enter "catch basin" under "Additional information," **referencing the runoff control catch basin information you have provided in the Part 2, Technical Requirements, Runoff Control Catch Basin application.** Also refer to the guide *How to Complete the AOPA Application Form: Part 2—Technical Requirements, Runoff Control Catch Basin.*

Depending on the nature of the surface water controls, the surface water control systems may need to be engineered. Speak with an NRCB approval officer to confirm whether an engineered system is required.

Naturally occurring protective layer details			
a. Naturally occurring protective layer <div>6</div>	Thickness of naturally occurring protective layer <u>2</u> (m)	Provide details: <u>Borehole logs show a heavy clay material for a depth of 1-3m below surface</u>	
b. Soil texture <div>7</div>	<u>18-20</u> % sand	<u>20-22</u> % silt	<u>60-62</u> % clay
c. Hydraulic conductivity - naturally occurring protective layer <div>8</div>	Material tested Borehole: <u>3</u> Depth: <u>1.0-3.0</u> (m)	Hydraulic conductivity (cm/s) <u>1×10^{-6}</u> cm/sec	Describe test standard used <u>Field falling head test conducted in borehole ASTM 5093</u>
Additional information: <u>attach copies of soil test reports</u> <div>9</div> <u>See attached engineering soils report for details on hydraulic conductivity & soil information.</u>			

- 6 Provide the thickness of the naturally occurring protective layer(s), in metres, that is proposed to provide the groundwater protection. Describe the type of soil material that would make up the naturally occurring protective layer(s).
- 7 Provide the results of laboratory tests for the percentage of sand, silt, and clay for the naturally occurring protective layer(s). Enter this information in the appropriate box, as a range using the highest and lowest values found. Copies of the test results should be attached to the application.
- 8 Not all protective layers require hydraulic conductivity testing. In instances where it is not clear whether or not the naturally occurring material can provide adequate protection, in-situ hydraulic conductivity testing will likely be required. Contact an NRCB approval officer to confirm whether hydraulic conductivity testing is required for your proposed site.

If hydraulic conductivity testing is done, provide the borehole number and the range of depth in metres across the borehole over which the hydraulic conductivity test was conducted. Enter the hydraulic conductivity test results in centimetres per second and describe the test standard used to determine the hydraulic conductivity.

Hydraulic conductivity determined using re-compacted soil samples or consolidation tests are typically **not** accepted for naturally occurring protective layers. In-situ hydraulic conductivity testing is generally accepted.

- 9 Use this space for additional information you would like to provide, such as describing the surface run-on and runoff system proposed, or other information relating to the naturally occurring protective layer.

Include details of any proposed leakage detection or groundwater monitoring and any other information relevant to this section.

Attach copies of soil test reports.

Note: 1 metre = 3.2808 feet
1 m³ = 35.315 ft³

1 foot = 0.3048 metres
1 ft³ = 0.0283 m³

Compacted soil liner

An engineering soils investigation is required for most barn, feedlot, and storage facilities for solid manure, composting materials, or compost with a compacted soil liner. Contact an NRCB approval officer to determine the scope of the required soils investigation.

Compacted soil liners for solid manure storages must be a minimum of 0.5 metres thick, constructed with material having a maximum hydraulic conductivity of 5×10^{-7} cm/s, and have a positive slope, to prevent liquids from ponding on the liner surface.

SOLID MANURE, COMPOST & COMPOSTING MATERIALS: Barns, feedlots & storage facilities - Compacted soil liner
(complete a copy of this section for EACH barn, feedlot and storage facility for solid manure, composting materials or compost with a compacted soil liner)

Facility description / name *(as indicated on site plan)*

1. North Feedlot Pens 2. _____

Manure storage capacity

	Length (m)	Width (m)	Estimated storage capacity (m ³)	Depth below grade to the bottom of the liner (m)
1.	300m	200m	9786 m ³	0m
2.				

10 Enter the facility description/name as it is indicated on the site plan.

11 Provide the length and width in metres of the compacted soil liner for the proposed barn, feedlot or storage facility.

12 Enter the total capacity of the manure storage facility, in cubic metres.

13 Provide the depth below grade of the bottom of the compacted soil liner.

Surface water control systems

☐ Under roof: Surface water will be controlled by the walls and roof of the building and by the finished landscaping.

☒ Outdoor: Describe the run-on and runoff control system proposed for feedlots and outdoor manure storage facilities:
Runon will be controlled by above grade berm.
Catchbasin will be constructed for proposed pens.

14 Indicate the method of surface water control by selecting the appropriate check box. If the surface water will **not** be controlled by the walls and roof of the building and by the finished landscaping, provide a description of the run-on and runoff control system in the additional information section.

- Run-on controls prevent upstream surface water from coming into contact with manure.
- Runoff controls prevent surface water that has come into contact with manure from leaving the confined feeding operation property.

For feedlots and outdoor manure storage facilities, select the second option.

For feedlots and outdoor manure storages, surface run-on water should be prevented from coming into contact with manure. Water that does come into contact with manure should be controlled and directed into a runoff control catch basin or other runoff control system.

If a catch basin is proposed as the method of runoff control, enter "catch basin" under "Additional information," **referencing the runoff control catch basin information you have provided in the Part 2, Technical Requirements, Runoff Control Catch Basin application.** Also refer to the guide *How to Complete the AOPA Application Form: Part 2—Technical Requirements, Runoff Control Catch Basin*.

Depending on the nature of the surface water controls, the surface water control systems may need to be engineered. Speak with an NRCB approval officer to confirm whether an engineered system is required.

Compacted soil liner details			
a. Thickness of compacted liner (m)	Provide details:		
0.5m 15	Borehole logs indicate clay loam material for a depth of 4m from sourced material.		
b. Soil texture	34-36 % sand	30-34 % silt	36-32 % clay
c. Atterberg limits	Plastic limit 19-22	Liquid limit 42-45	Plasticity index 24-27
d. Hydraulic conductivity	Hydraulic conductivity (cm/s) 5x10 ⁻⁸ cm/sec		
	Describe test standard used Falling head test done in lab on recompacted sample to ASTM 5084.		
Liner protection			
Describe how the physical integrity of the liner will be maintained		Provide details:	
19			
Additional information: (attach copies of soil test reports)			
See att'd engineering report. 20			

- 15 Provide the thickness of the compacted soil liner material, in metres, that is proposed to provide the required groundwater protection. Describe the proposed compacted soil liner material that would be used.
- 16 Provide the results of the laboratory tests for the percentage of sand, silt and clay for the soil to be used as the compacted liner. Enter this information in the appropriate box, as a range using the highest and lowest values found. Copies of the test results should be attached to the application.
- 17 Provide the results of lab tests for the range of values for plastic and liquid limits and the plasticity index in the appropriate boxes. If an engineering soils investigation is carried out, this information should be included in the engineering soils report.
- 18 Not all compacted soil liners require hydraulic conductivity testing. In instances where it is not clear whether or not the compacted soil liner material can provide adequate protection, hydraulic conductivity testing will likely be required. Contact an NRCB approval officer to confirm whether hydraulic conductivity testing is required for the proposed site.

If hydraulic conductivity testing is done, provide the hydraulic conductivity test results in centimetres per second and the test method used to determine the hydraulic conductivity. If an engineering soils investigation is carried out, the hydraulic conductivity information should be contained in the engineering soils report.

Hydraulic conductivity results determined using consolidation tests are typically **not** accepted for compacted soil liners. Hydraulic conductivity results from samples that have been tested in a laboratory are typically reduced by an order of magnitude to better reflect what can be obtained in the field.

- 19 Provide the details about how the physical integrity of the liner or protective layer will be maintained.

- 20** Use this space for additional information you would like to provide, such as describing the proposed surface run-on and runoff system, or other information relating to the compacted soil liner system.

Include details of any proposed leakage detection or groundwater monitoring.



Include any other information relevant to this section.

Attach copies of soil test reports.

Note: 1 metre = 3.2808 feet
1 m³ = 35.315 ft³

1 foot = 0.3048 metres
1 ft³ = 0.0283 m³

Concrete liner

Complete this section for all solid manure collection or storage areas of barns, feedlots, or manure storage facilities that will have a constructed concrete liner. For information on which portions of barn floors require liners for solid or liquid manure, and the type of concrete typically used, please contact an NRCB approval officer.

The following concrete mixes are for information purposes only, and are provided to help applicants understand the information that is typically required:

Example: Concrete mix #1 specifications
1. Maximum water to cementing materials ratio of 0.50 2. Type 10 cement with 20-25% fly ash added (sulphate resistance) 3. Air entrainment
Example: Concrete mix #2 specifications
1. Maximum water to cementing materials ratio of 0.50 2. Type 50 cement (sulphate resistance) 3. Air entrainment

SOLID MANURE, COMPOST & COMPOSTING MATERIALS: Barns, feedlots & storage facilities - Concrete liner
(complete a copy of this section for EACH barn, feedlot and storage facility for solid manure, composting materials or compost with a concrete liner)

Facility description / name *(as indicated on site plan)*

1. Broiler Barn 21 2. Layer Barn

Manure storage capacity

	Length (m)	Width (m)	Estimated storage capacity (m ³)	Depth below grade to the bottom of the liner (m)
1.	<u>103.6m</u> 22	<u>18.3m</u>	<u>204m³</u> 23	<u>0m</u> 24
2.				

- 21 Enter the facility description/name as it is indicated on the site plan.
- 22 Provide the length and width in metres of the concrete liner for the proposed barn, feedlot area, or storage facility.
- 23 Enter the estimated manure storage capacity, in cubic metres, for this facility.
- 24 Provide the maximum depth of the bottom of the concrete liner below the normal level of the soil outside the manure storage (grade).

Surface water control systems 25

☒ Under roof: Surface water will be controlled by the walls and roof of the building and by the finished landscaping.

☐ Outdoor: Describe the run-on and runoff control system proposed for feedlots and outdoor manure storage facilities

- 25 Indicate the method of surface water control by selecting the appropriate check box. If the surface water will **not** be controlled by the walls and roof of the building and by the finished landscaping, provide a description of the run-on and runoff control system in the additional information section.
- Run-on controls prevent upstream surface water from coming into contact with manure.
 - Runoff controls prevent surface water that has come into contact with manure from leaving the confined feeding operation property.

For feedlots and outdoor manure storage facilities, select the second option.

For feedlots and outdoor manure storages, surface run-on water should be prevented from coming into contact with manure. Water that does come into contact with manure should be controlled and directed into a runoff control catch basin or other runoff control system.

If a catch basin is proposed as the method of runoff control, enter "catch basin" under "Additional information," **referencing the runoff control catch basin information you have provided in the Part 2, Technical Requirements, Runoff Control Catch Basin application.** Also refer to the guide *How to Complete the AOPA Application Form: Part 2—Technical Requirements, Runoff Control Catch Basin.*

Depending on the nature of the surface water controls, the surface water control systems may need to be engineered. Speak with an NRCB approval officer to confirm whether an engineered system is required.

Concrete liner details	
Concrete thickness <div>26</div>	Provide details: .10 m
Concrete strength <div>27</div>	Provide details: 25 MPa (@56 days)
Method of sulphate protection <div>28</div>	Provide details: Type 10 cement with 20-25% fly ash.
Concrete reinforcement size and spacing <div>29</div>	Provide details: 10M rebar spaced at .61m both ways.
Additional information: See attached drawings. <div>30</div>	

26 Provide the thickness of the concrete liner to be used.

27 Provide the strength of the concrete to be used for the liner. Specify whether the concrete strength is measured at 28 days or 56 days

Typically, a 56-day concrete strength of 30 MPa is equivalent to a 28-day concrete strength of 25 MPa.

28 Provide the method of sulphate protection to be used (examples of sulphate protection include type 10 cement with 20-25% fly ash, or type 50 cement). Technical guidelines with information on concrete manure liners are available on the NRCB website, at www.nrcb.ca.

29 Provide the concrete reinforcement size used for the liner. Provide the spacing of the concrete reinforcement, for both the length and the width, to be used in the concrete liner.

30 Use this space for additional information you would like to provide, such as describing the proposed surface run-on and runoff system, or other information relating to the concrete liner system.

Include details of any proposed leakage detection or groundwater monitoring. Include any other information relevant to this section.

Note: 1 metre = 3.2808 feet
1 m³ = 35.315 ft³

1 foot = 0.3048 metres
1 ft³ = 0.0283 m³

Alternative liner

An alternative liner must provide equivalent or greater protection than the protection provided by a compacted soil liner with a thickness of 0.5 metres and a hydraulic conductivity of 5×10^{-7} cm/s. It must also have a positive slope, to prevent liquid accumulation.

SOLID MANURE, COMPOST & COMPOSTING MATERIALS: Barns, feedlots & storage facilities - Alternative liner
(complete a copy of this section for EACH barn, feedlot and storage facility for solid manure, composting materials or compost with a alternative liner)

Facility description / name *(as indicated on site plan)*

1. South Feedlot 31 2. Solid manure storage

Manure storage capacity

	Length (m)	Width (m)	Estimated storage capacity (m ³)	Depth below grade to the bottom of the liner (m)
1.		32	33	34
2.				

- 31 Enter the facility description/name as it is indicated on the site plan.
- 32 Provide the length and width in metres of the alternative liner for the proposed barn, feedlot area, or storage facility.
- 33 Enter, in cubic metres, the estimated manure storage capacity of the proposed storage.
- 34 Provide the maximum depth of the bottom of the alternative liner below the normal level of the soil outside the manure storage (grade).

Surface water control systems 35

☐ Under roof: Surface water will be controlled by the walls and roof of the building and by the finished landscaping.

☐ Outdoor: Describe the run-on and runoff control system proposed for feedlots and outdoor manure storage facilities:

- 35 Indicate the method of surface water control by selecting the appropriate check box. If the surface water will **not** be controlled by the walls and roof of the building and by the finished landscaping, describe the run-on and runoff control system in the additional information section.
- Run-on controls prevent upstream surface water from coming into contact with manure.
 - Runoff controls prevent surface water that has come into contact with manure from leaving the confined feeding operation property.

For feedlots and outdoor manure storage facilities, select the second option.

For feedlots and outdoor manure storages, surface run-on water should be prevented from coming into contact with manure. Water that does come into contact with manure should be controlled and directed into a runoff control catch basin or other runoff control system.

If a catch basin is proposed as the method of runoff control, enter "catch basin" under "Additional information," **referencing the runoff control catch basin information you have provided in the Part 2, Technical Requirements, Runoff Control Catch Basin application.** Also refer to the guide *How to Complete the AOPA Application Form: Part 2—Technical Requirements, Runoff Control Catch Basin.*

Depending on the nature of the surface water controls, the surface water control systems may need to be engineered. Speak with an NRCB approval officer to confirm whether an engineered system is required.

Alternative liner details	
a. Describe the proposed alternative liner <div style="text-align: center;">36</div>	Provide details:
b. Information and calculations used to show equivalency <div style="text-align: center;">37</div>	Provide details:
Additional information: <div style="text-align: center;">38</div>	

- 36** Describe the proposed alternative liner.
- 37** Provide the details and calculations used to show the alternative liner is equivalent to the AOPA requirements.
- 38** If there additional information you would like to provide, enter it in this space. Include details of any proposed leakage detection or groundwater monitoring.

Note: 1 metre = 3.2808 feet 1 foot = 0.3048 metres
 1 m³ = 35.315 ft³ 1 ft³ = 0.0283 m³

Appendix 2: Glossary of terms

These definitions are based on existing definitions in AOPA and its associated regulations.

Affected party	A person or municipality determined in accordance with the regulations to be an affected person.
Agent	A party that is authorized in writing to act on behalf of the applicant.
AOPA	Alberta provincial legislation consisting of the Agricultural Operation Practices Act (AOPA) and its associated regulations.
Applicant	The person or company that is applying to the NRCB for a permit, or an amendment to an existing permit, for a new or expanded confined feeding operation, manure collection area, or manure storage facility.
Application	A two-part application for an approval, registration, or authorization to construct a new or expanded CFO, manure collection area, or manure storage facility, or an application for an amendment to an existing permit issued by the NRCB, municipal district, or health authority.
Approval	The permit type required to construct or expand a confined feeding operation in accordance with the number of animals and livestock type set out in Column 3, Schedule 2 of the Part 2 Matters Regulation.
Authorization	The permit type required to construct or to expand a manure storage facility that is for containment of 500 tonnes or more of manure for seven months or more in any calendar year.
Compost	A solid mature product resulting from composting. Does not include compost to which the Fertilizer Act (Canada) applies.
Composting	A managed process of bio-oxidation of composting materials, including a thermophilic phase.
Composting materials	Organic material generated by an agricultural operation described in clause (b)(ii), (iv), (v), or (vi) of AOPA, other than carcasses or parts of carcasses. Includes other substances permitted by the regulations.
Construct	Includes reconstructing, renovating, altering, or expanding a structure, operation or facility, but does not include general maintenance of a structure, operation or facility, or the clearing and levelling of land.
Confined feeding operation (CFO)	Fenced or enclosed land or buildings where livestock are confined for the purpose of growing, sustaining, finishing, or breeding by means other than grazing, and any other building or structure directly related to that purpose. Does not include residences, livestock seasonal feeding and bedding sites, equestrian stables, auction markets, racetracks, or exhibition grounds.
Development permit	A permit issued under a land use bylaw, pursuant to the Municipal Government Act .
Expansion	The construction of additional facilities to store more manure, composting materials, or compost, or to accommodate more livestock.
Freeboard	The vertical distance between the full storage level of a structure and the upper edge of the structure.
Liner	A layer constructed out of natural or manufactured materials that restricts the migration of the contents of the manure storage facility or manure collection area.

Liquid manure	Manure that is in a predominantly liquid state or manure to which water has been added.
Manure	Livestock excreta, associated feed losses, bedding, litter, soil and wash water. Does not include manure to which the Fertilizers Act (Canada) applies.
Manure collection area	The floor of a barn, the under-floor pits of a barn, the floor of a feedlot pen or a catch basin where manure collects. Does not include the floor of a livestock corral.
Manure storage facility	A facility for storing manure, composting materials or compost, or a composting facility. Does not include such a facility at an equestrian stable, an auction market, a racetrack or exhibition grounds.
Minimum distance separation	Under AOPA, the minimum distance required between a manure storage operation or facility and the nearest residence that is not owned or controlled by the facility's operator.
Municipal development plan	A municipal land use plan adopted by bylaw, under the Municipal Government Act .
Operator	The operator of a confined feeding operation, manure collection area, or manure storage facility.
Permit	An approval, registration, or authorization that is issued by the NRCB or grandfathered under AOPA.
Registration	The permit type required to construct or expand a confined feeding operation in accordance with the number of animals and livestock type set out in Column 2, Schedule 2 of the Part 2 Matters Regulation.
Referral agency	Government of Alberta authorities with responsibility for agriculture, health, the environment, and transportation that are provided by the NRCB with a copy of applications to expand or construct a confined feeding operation, for their information, review and response.
Runoff	Liquid (including rainwater and meltwater) that drains as surface flow out of an agricultural operation or part of an agricultural operation.
Run-on	Liquid (including rainwater and meltwater) that drains as surface flow onto an agricultural operation or part of an agricultural operation.
Solid manure	Manure that is 20% or more solid matter, and that does not flow when piled.