NRCB | Natural Resources Conservation Board

Water Well Exemption Screening Tool Companion Document

AOPA exemption to water wells within 100m of manure storage facilities

Version 1.0

June 2016

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APPENDICES

Background

The purpose of the Agricultural Operation Practices Act (AOPA) and its regulations is to ensure that the province's livestock industry can grow to meet the opportunities presented by local and world markets in an environmentally sustainable manner. AOPA and its regulations can be prescriptive in some areas, giving the regulator and operator little flexibility. Other parts of the legislation provide more flexibility to evaluate and oversee management of potential environmental risks.

An area requiring further attention is the NRCB's determination of exemptions under Section 7(1) of the Standards and Administration Regulation, where the construction of manure storage facilities is prohibited within 100 meters of a water well, unless an exemption is granted or monitoring is required. To help guide the development of a consistent determination for this exemption, the Water Well Team was established to create a screening tool (see Appendix A).

Description of the Water Well Exemption Screening Tool

This tool was designed for screening assessment of water wells located within 100 meters of a manure storage facility or manure collection area. The tool is designed to look at one individual water well at a time and is to be completed separately for each well in cases where multiple water wells exist within a 100 meters of a facility.

Water wells located within a manure storage facility or collection area are automatically considered 'exemption less likely; action required'.

The tool consists of two components:

1. Preliminary screening

Preliminary screening focuses primarily on water well construction and completion details and helps identify water wells for which an exemption is more likely (secondary screening not required), for which an exemption is less likely (action required and secondary scoring is required), and for which additional assessment is needed (secondary scoring is required).

2. Secondary screening

Secondary screening assesses additional water well information relative to site specific conditions. There may be scenarios where water wells exist within 100 m of multiple facilities, and in these cases the water well is assessed relative to each individual facility. The secondary screening scoring sheet is formatted for three facilities, however all facilities within 100 meters should be scored. Secondary screening helps further assess/identify water wells for which exemptions are more likely or less likely.

Guidance on Completing Water Well Tool

In order to complete the tool, the site information form[1] and water well impact assessment checklist (Appendix B) are required. If no information is available for specific sections of the scoring, the most conservative approach should be used (i.e., worst case scenario). Various other published/available information may also be used in the assessment (e.g. water well logs, topography maps).

[1]See most recent version of Environmental Risk Screening Tool's site information form

General

- CFO Name – name of operation
- Legal Land Location – quarter section, township, range and meridian of the subject property
- Screening Completed By – list who was involved in completing the form
- Date Completed – date that form is completed
- Contact Name – name of individual interviewed
- Water Well ID# - Indicate the water well identification number from the water well drilling report in the Alberta Environment Groundwater Information Centre Water Well Database (GIC Well ID). If a well report was not filed with Alberta Environment, assign a label to the well and indicate the same name on the table. It may also be useful to include a site diagram detailing the location of wells relative to the facilities.

Preliminary Screening

- **Presence of a Pit**
  Pit wells: typically have the well casing cut-off below ground level and are enclosed in a pit. Pits can be constructed using wood, concrete or steel cribbing. Provincial regulations now prohibit the construction of well pits (Water (Ministerial) Regulation 205/1998).

  Some water wells may also be wet wells, which tend to be shallow structures (generally <3 m) used for groundwater storage. Groundwater enters these wells through perforations in the casing material or from the bottom (e.g., cribbed, caisson). For the purpose of the Water Well Exemption Screening Tool, these wells are classified as pit wells

  Pit-less wells: completed without a pit, usually have a pump house or pitless adaptor.

- **Age of Well**
  Alberta Environment and Parks released the Water (Ministerial) Regulation 205/1998 in 1998. The regulation requires the submission of more detailed borehole logs and well completion information. Water wells drilled prior to 1998 did not have the more rigorous borehole lithology and completion requirements and are assigned a relatively higher score than those completed post-1998 due to the uncertainties in installation, construction, completion, and reporting.

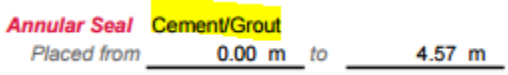
Well Completion			Measurement in Metric
Total Depth Drilled	*Finished Well Depth*	*Start Date*	*End Date*
60.96 m		1983/11/01	1983/11/04

- **Depth of Seal versus Distance between Bottom of Seal and Screened/Perforated Interval**
  Both the depth of the seal and distance between the bottom of the seal and the screened interval are important factors for assessing the potential for groundwater containing manure constituents to impact groundwater quality in a water well. These

factors limit or allow which groundwater resources contribute to overall water production, or influences from groundwater resources, within the water well.

If no information on screened/perforated interval, use bottom of drillhole to determine distance between bottom of seal and screened/perforated interval (most conservative approach).

- **Seal Type**
  Poorly sealed water well(s) can be a conduit for manure constituents from a facility to enter into the uppermost groundwater resource, therefore the seal type is an important factor when determining whether an exemption should be granted.



- **Information Table**
  This section provides 'yes' and 'no' questions. Further description of some items include:
  - Protected: the well is situated so that no physical damage can occur to the well (e.g. in a well house or has steel barriers surrounding the well)
  - Ground mounded: the area immediately surrounding the well is protected from surface water drainage from manure storage facilities and collection areas and prevents pooling of water around the water well. This at times, can include mounding around the well casing or a well house.
  - Casing height: well construction material (e.g. steel or plastic) above grade
  - Properly capped: nothing can enter well through cap; acceptable to have small wiggle when adjusting cap
  - Good condition: in good shape (e.g., no visible damage, not wobbling)
  - Used: as described by the operator
  - Non-domestic: for purposes other than human consumption (e.g., livestock, irrigation)

- **Special Considerations**
  The score for this portion of the tool is to account for considerations that are not accounted for in the other sections. The allowable range is -4 to +4 (10% of total score). Score zero if there are no special considerations.

  If points have been added or subtracted for special considerations, provide detailed explanation on the form outlining factors considered for the special consideration(s) used.

- **Screening Results:**
  <u>Exemption less likely; action required</u>
  It is likely that an exemption would not be granted without requiring monitoring of the well or remedial actions at the water well to reduce the overall score. Examples of actions to reduce the overall score include: creating mounding around the well, directing runoff

away from the well, decommissioning the well or capping the well. More information is required, therefore continue to secondary screening.

Continue to next section
More information is required, therefore continue to secondary screening.

Exemption more likely
An exemption may be granted for the water well within 100 meters without any action being required. No need to continue to Secondary Screening.

Secondary Screening

- **Facility**
  Name of facility within 100 meters of water well scored in preliminary screening. Scoring sheet is formatted for three facilities, however all facilities within 100 meters should be scored.

- **Water Well Gradient**
  Land topography can be used to estimate the direction of surface water drainage. Since the water table is a subdued replica of the topography, the topography can also be used to estimate groundwater flow direction. If information from a site visit and topographic information from maps is inconclusive about land slope, choose the most conservative approach when scoring.

  Surface water drainage: If the water well is known to be upgradient of the facility with respect to surface water drainage, score 0 points. If the water well is known to be down gradient (or unknown) of the facility with respect to surface water drainage, score 10 points.

  Groundwater flow: If the water well is known to be upgradient of the facility with respect to groundwater flow, score 2 points. If the water well is known to be down gradient (or unknown) of the facility with respect to groundwater flow, score 5 points.

- **Likelihood of Runoff from a Manure Storage Facility or Collection Area Reaching a Water Well**
  The likelihood of runoff water containing manure constituents reaching a water well increases with decreasing permeability of the land surface and the horizontal distance to the water well. The land surface should be greater than 50% of the total pathway towards the well.

- **Manure Storage Facility or Collection Area Runoff Control and Average Annual Precipitation**
  Rainfall amount and runoff control are important factors in assessing runoff potential from a facility. Acceptable runoff control minimizes the movement of surface water impacted by manure constituents towards a water well or directs these constituents away from the well. The effectiveness of a runoff control system is determined by the amount of manure impacted surface water runoff that is prevented from entering the

water well area. If there is no runoff control from a facility, then there is increased potential for manure impacted runoff to enter the water well area. Typically, if a facility has acceptable runoff control, then the runoff control would meet AOPA standards (e.g. freeboard, catch basin area). If the facility being assessed is fully covered (like a barn) and there is no manure contaminated runoff generated, assign a score of zero. If all the runoff generated at the facility is controlled (i.e. properly sized catch basin, liquid manure storage with adequate freeboard) or if the runoff is treated (e.g. natural biological processes in a wetland) prior to leaving the operator's property then score as acceptable runoff control. If there are minimal, inadequate, or no runoff control mechanisms in place between the facility and the well, then score as non-acceptable runoff control.

Note: if scoring feedlot facility and pens slope away from well, then score as acceptable runoff control.

- **Special Considerations**
  The score for this portion of the tool is to account for considerations that were not accounted for in other sections. The allowable range is -3 to +3 (10% of total score). Score zero if there are no special considerations.

  Some possible factors that could be considered in special considerations are:

  Cross-gradient flow: If the water well is known to be cross gradient of the facility, then special considerations can be added or subtracted to obtain an appropriate score. Cross gradient could apply to surface water and drainage or groundwater flow.

  If points have been added or subtracted for special considerations, provide detailed explanation on the form outlining factors considered for the special consideration(s) used.

- **Screening Results**
  Exemption less likely; action required
  It is likely that an exemption would not be granted without requiring monitoring of the well or remedial action(s) to reduce the overall score of the facility on the water well. Examples of actions to reduce the overall score include: addressing facility concerns (e.g., construction, maintenance, etc.) or improving runoff control. Also, all possible actions listed under preliminary screening may be applicable.

  Exemption more likely
  An exemption may be granted for the water well within 100 meters without action being required.

Appendix A: Water Well Exemption Screening Tool

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Water Well Exemption Screening Tool

Screening tool for water wells within 100 meters of manure storage facilities or collection areas

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CFO Name: _____
Legal Land Location: _____
Screening Completed By: _____
Date Completed: _____

Contact Name: _____

Water wells within 100m of a manure storage facility

Water Well ID#:_____

For all cases when information is not available, score worst case.

☐ If the water well is directly located inside a manure storage facility or manure collection area, score the water well as exemption less likely.

PRELIMINARY SCREENING

Presence of a Pit

Pit well	10
Pit-less well	2

Score: ☐

Age of Well

Drilled prior to and including 1998	3
Drilled after 1998	1

Score: ☐

Depth of Bottom of Seal versus Distance Between Bottom of Seal and Screened Interval

**** if no seal or unknown score 5 points***

	Distance Between Bottom of Seal and Screened Interval		
Depth of Bottom of Seal	<2 m	2-5 m	>5 m
<10 m	3	4	5
10-20 m	2	3	4
>20 m	1	2	3

Score: ☐

Seal Type

Bentonite	1
Concrete/grout/puddled clay	3
Drive Shoe	6
Cuttings	8
None	10

Score: ☐

Information Table

	Yes	No	
Is the well protected from physical damage (e.g. housed in a building)	0	2	Score: ☐
Is the ground mounded around the well? (e.g. clay, concrete)	0	5	Score: ☐
Is the casing height >1ft above ground level?	0	2	Score: ☐
Is the well properly capped?	0	1	Score: ☐
Is the well in good condition (e.g. undamaged, casing stable)?	0	3	Score: ☐
Is the well being used?*	0	2	Score: ☐
Is the well solely used for non-domestic purposes?*	0	2	Score: ☐

*information received from operator

Special Considerations (Allowable range ± 4. *Score is 0 if there are no special considerations*)

Other:

Score: ☐

Total Preliminary Screening Score (maximum 45): ☐

Screening Result	**Score (maximum score – 45)**
Exemption less likely; action required; continue to next section	**>28**
Continue to next section	**10-28**
Exemption more likely; do not complete next section	**<10**

☐ If the water well is directly located inside a manure storage facility or manure collection area, score the water well as exemption less likely.

SECONDARY SCREENING

Facilities within 100m of a water well

Facility #1:_____ Facility #2:_____ Facility #3:_____

Water Well Gradient

Water well is known to be up-gradient from the facility with respect to surface water drainage	0
Water well is downgradient or unknown from the facility with respect to surface water drainage	10
Water well is known to be up-gradient from the facility with respect to groundwater flow	2
Water well is downgradient or unknown from the facility with respect to groundwater flow	5

Score: ☐ ☐ ☐

Score: ☐ ☐ ☐

Likelihood of Runoff from a Manure Storage Facility or Collection Area Reaching a Water Well

	Land Surface Cover from Facility to Well (>50% of total pathway)		
Horizontal Distance to Water Well	Vegetated	Bare	Paved
>30 m	2	3	4
30-10 m	3	4	5
<10 m	6		

Score: ☐ ☐ ☐

Manure Storage Facility or Collection Area Runoff Control and Average Annual Precipitation

	Average Annual Precipitation (mm)		
Runoff Control Between Facility and Well	<400	400-600	>600
Covered/Acceptable Facility	0		
Acceptable runoff control	1	2	3
Non acceptable runoff control	6	7	8

Score: ☐ ☐ ☐

Special Considerations (Allowable range ± 3. *Score is 0 if there are no special considerations*)

Cross-gradient flow etc. Other:	Score:

Total Pathway Score (maximum 29):

Screening Result	Score (maximum score – 29)
Exemption less likely	**>20**
Exemption more likely	**4-19**

Appendix B: Water Well Impact Assessment Checklist

Water Well Impact Assessment Checklist

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Water Well Impact Assessment Checklist

Agricultural Operation Practices Act

CFO Name: _____ Land location: _____

Contact Person: _____ Permit #: _____

Inspector/Approval Officer: _____ Date: _____

This checklist is completed for multiple programs administered by the NRCB. Some information fields are used by one program but not another program. Therefore, the checklist does not have to have information entered in all fields in order to be completed for use in any one of the programs.

Well Information

Well ID #: _____

Presence of a Pit: ☐ Pit Well ☐ Pit Less	**Year Well Drilled:**
Depth of Bottom of Seal: ☐ <10 m ☐ 10-20 m ☐ >20 m	
Screened Interval Depth:	
Seal Type: ☐ Bentonite ☐ Concrete/grout/puddled clay ☐ Driven ☐ Cuttings ☐ None/Unknown	
Protection Around Well from Physical Damage(describe)**:**	
Is the Ground Mounded Around the Well? ☐ Yes ☐ No	
Casing Height: ☐ >1' ☐ <1'	**Well Properly Capped:** ☐ Yes ☐ No
Well Properly Cased: ☐ Yes ☐ No	
Well Condition: ☐ Good ☐ Damaged	**Used for Non-domestic:** ☐ Yes ☐ No
Is the Well in Use: ☐ Yes ☐ No	**Purpose of Well:** ☐ Livestock ☐ Lawn/shelter belt ☐ Other
Total Depth of Well:	**Location of Well** (e.g. near hog barn)**:**
GPS Coordinates:	

Hydrogeological Information

Hydraulic Properties of Producing Zone:
Hydraulic Properties of Geologic Material Above the Producing Zone (ie. protective materials)**:**

Sampling Information

Sample Collected From:	**Type of Container Used:**
Transportation Storage Method:	**Sample Collected at Point Before any Treatment System:** ☐ Yes ☐ No

Notes:_____

_____

_____

_____

_____

Facility Information

Facility #1:	
Type of Manure Storage: ☐ Solid ☐ Liquid ☐ Catch Basin	**Distance to Manure Storage:**
Evidence of Surface Contamination: ☐ Yes ☐ No	**Age of Manure Storage:**
Type of Liner Under Manure Storage:	**Depth of Manure Storage:**
Slope of Land From Manure Storage to Well:	
Land Surface cover from Facility to Well (greater than 50% of total pathway): ☐ Vegetated ☐ Bare ☐ Paved	

Facility #2:	
Type of Manure Storage: ☐ Solid ☐ Liquid ☐ Catch Basin	**Distance to Manure Storage:**
Evidence of Surface Contamination: ☐ Yes ☐ No	**Age of Manure Storage:**
Type of Liner Under Manure Storage:	**Depth of Manure Storage:**
Slope of Land From Manure Storage to Well:	
Land Surface cover from Facility to Well (greater than 50% of total pathway): ☐ Vegetated ☐ Bare ☐ Paved	

Facility #3:	
Type of Manure Storage: ☐ Solid ☐ Liquid ☐ Catch Basin	**Distance to Manure Storage:**
Evidence of Surface Contamination: ☐ Yes ☐ No	**Age of Manure Storage:**
Type of Liner Under Manure Storage:	**Depth of Manure Storage:**
Slope of Land From Manure Storage to Well:	
Land Surface cover from Facility to Well (greater than 50% of total pathway): ☐ Vegetated ☐ Bare ☐ Paved	

Notes:_____

_____

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_____

_____