



Ministry of  
Agriculture

# Technical Brief for Land Application

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A part of the Hullcar Situation Review  
Nutrient Management Practices - Technical Report

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# AGRICULTURAL WASTE CONTROL REGULATION (AWCR) TECHNICAL BRIEF

## LAND APPLICATION

**Disclaimer:** The information presented in this technical brief has been prepared by Ministry of Agriculture staff and is based on conversations that have occurred during Agricultural Waste Control Regulation consultation sessions with industry and the Ministry of Environment since April 2012. The material is presented as a summary of some of the thoughts expressed at working group meetings with the intention of providing relevant background information. While the brief does offer some suggestions from the Ministry of Agriculture, the information contained herein should not be considered a final product but rather a starting point for further discussion at future meetings.”

**Attention:** The comments and questions in this text box were added in November 2015 following the posting of the second intentions paper in July 2015 to add clarification, to provide further context or to flag parts of the original brief which may not have attracted adequate discussion in the first round of consultation. The comments are not intended to suggest a revision to or to provide a reinterpretation of the material presented in the original brief or what was documented in the applicable meeting minutes.

To clarify, the ideas discussed during the March 10, 2014 were meant to apply to the materials currently defined to be agricultural wastes in the AWCR, excluding chemical fertilizer.

During the meeting, there was support for 2 ideas discussed in the brief:

### 1. Restricted Periods

- Participants supported having specific dates during which manure/agricultural wastes spreading would not be allowed. The dates discussed were November 1 to February 1 in the Coast and December 1 to March 1 in the Interior.
- Participants did not disagree that “Coast” and “Interior” should be defined according to Section 9 of the current AWCR (using the criterion of 600 mm of total average precipitation from October to April).

### 2. Land Application During Certain Conditions

- Participants supported using the proposed definitions of “frozen,” “snow-covered,” and “saturated” as conditions during which manure spreading would not be allowed.
- To clarify, the proposed restrictions did not apply to agricultural wastes being spread on non-frozen ground prior to snowfall.
- To clarify, the proposed restrictions would not be regional but apply only to the parts of fields that are frozen, snow-covered or saturated.

At least two ideas need further discussion:

- Risk assessments for manure/agricultural waste applications were discussed to be desirable but the what, who, when, where, how, etc. still to be determined
  - It was agreed upon that risk assessments would not be expected during the middle of the summer (e.g. April 1 to August 31 on the “Coast”) but dates have not been agreed upon.
  - A pilot project is in progress (Fall/Winter 2015 to 2016) that may provide a model system for the risk assessments specific to each application, only for the “Coast.” The system accounts for setback distance between application and watercourses.
- A minimum setback distance between manure application and watercourses.
  - At issue is whether there is support for a regulatory minimum distance for surface applications of agricultural waste. A minimum distance of 10 feet (3 m), increasing but not decreasing depending on various risk factors, would be consistent with the best available science and practices for the “Coast” ecoregion (<https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnx3YWVhbnxneDo2MjY1NGZjNjIwZTEzZTJk>).

## INTRODUCTION

Nitrogen (N) and phosphorus (P) losses from land applications may impact water quality. Excessive N as nitrate in drinking water is a human health concern. Excessive N and P can lead to harmful algal blooms depending on the sensitivity of receiving surface waters. Harmful algal blooms can impact aquatic life, recreation and tourism, drinking water treatment costs, and human and animal health. This brief discusses options to address water quality concerns caused by these losses resulting from land application of nutrients.

The focus is on 3 of the 4 “R’s” of land applications of soil amendments: right time, right place, and right source. “Nutrient Management,” a separate brief, focuses on the fourth “R” (i.e. right rate). Specific issues with land application are addressed: distinguishing climatic regions, winter and shoulder season application, setback distances and vegetative buffer strips, and use of soil conditioners versus fertilizers.

## SUMMARY OF CURRENT REGULATION

“Agricultural wastes must not be applied on frozen land, on areas having standing water, [or] on saturated soils if runoff or escape of agricultural waste causes pollution of a watercourse or groundwater, or goes beyond the farm boundary” (Sections 14a, 14c, and 14d)

“Agricultural waste must not be applied to the land if, due to meteorological, topographical or soil conditions or the rate of application, runoff or the escape of agricultural waste causes pollution of a watercourse or groundwater” (Section 13)

“Agricultural waste must be applied to land only as a fertilizer or a soil conditioner” (Section 12).

The following limitations of the above statements will be addressed:

- 1) *Runoff* is subject to interpretation and may not include all losses of dissolved or particulate N and P from land applications.
- 2) *Pollution* may be occurring but may be difficult to prove.
- 3) Lack of definitions: *fertilizer, soil conditioner, and frozen land* are not defined.
- 4) Snow-covered conditions are not included.

## ANALYSIS OF POTENTIAL OPTIONS

### I. Distinguishing climatic regions

- Land application guidelines and regulations should vary with basic differences in climate.
- Section 9 of the AWCR refers to 600 mm of total average precipitation from October to April as a criterion to distinguish two regions of BC for rainy season field storage.
- The Section 9 criterion divides BC roughly into 2 regions that are herein referred to as the ‘Coast,’ consisting mainly of the Lower Mainland and Vancouver Island, and ‘the Interior,’ consisting of the other parts of BC.
- Generally, winters are dry and cold in the Interior regions with a spring snowmelt, whereas winters in the Coast are wet, mild and shorter. Consequently, most runoff and leaching occur in the spring in the Interior and throughout the rainy season in the Coast.

*Option 1 (suggested):* Use “600 mm precipitation (October to April)” as the criteria to distinguish between 2 areas in BC with distinct climates.

*Option 2:* Distinguish 2 or more areas in BC on maps, based on long-term averages of climate parameters to be determined.

### II. Winter and shoulder season application

- The EFP Reference Guide suggests general times of the year in which risks are high: mid-November to January in Coastal regions or November to March in the Interior.
- “There seemed to be a general consensus that spreading on frozen ground and snow-covered land should not be considered an acceptable practice” (draft notes from Oct 22, 2013).
- A committee made of industry and government representatives currently release Manure Spreading Advisories for the Coast.<sup>1</sup> The advisories recognize the ‘shoulder periods’ when field-specific environmental risks are not necessarily high depending on soil/land, crop, and local weather conditions.
- In general, producers already assess risks before each manure application. In the Coast, manure spreading advisories provide general guidance but producers are ultimately responsible for assessing their field-specific risks.

*Step 1:* Have restricted periods that includes part of the high-risk periods from the guidelines. e.g. “No person shall apply nutrients to land from November 1 to February 1 in the Coast or December 1 to March 1 in the Interior.”

- Step 1 excludes shoulder periods.
- End dates for the restricted periods should be informed by climate data (Appendix A).

*Step 2:* Prohibit land application during certain conditions.

e.g. “No person shall apply nutrients to land when the soil is snow-covered, saturated or frozen.”

- Step 2 recognizes that risks are low from spreading manure before the first major snowfall on soil that is not frozen, compared with spreading manure on snow or frozen ground. The following definitions could be added to AWCR to provide clarity:
  - Frozen: “when used in reference to soil, means that a layer of soil with an average minimum depth of five centimetres, located within the top 15 centimetres of the soil, is consolidated by the presence of frozen moisture”.<sup>2</sup>
  - Snow-covered: “when used in reference to soil, means that there is a layer of snow with an average minimum depth of five centimeters”.<sup>2</sup>
  - Saturated: “when used in reference to soil, means that the pore spaces in the top five centimeters of soil are completely filled with water.”

*Step 3:* Do a risk assessment during the ‘shoulder seasons’ to determine if land applications should be allowed.

- Shoulder seasons need to be defined (e.g. “the 30-day periods before and after the restricted period”) but are meant to result in 2 recorded risk assessments per year.
- At issue is whether risk assessments should be standardized. The Application Risk Management (ARM<sup>3</sup>) system being piloted by Whatcom Conservation District (WCD) provides an example of such a methodology (Appendix B).
- The risk assessment methodology should differ between the Interior and the Coast. ARM accounts for various, field-specific factors (e.g. weather, soil properties, soil water, watercourses, crop conditions and management practices and structures).
- Records of completed risk assessments could be inspected after spreading occurrences of concern. Compliance may be judged by whether reasonable steps were taken to minimize risk to an acceptable level according to the assessment.
  - e.g. if the risk assessment indicated low risk because of a low chance of rain, the producer or manure applicator should not be responsible for pollution caused by an unforeseen shower.
  - e.g. if the standardized risk assessment is flawed in its methodology, the producer or manure applicator should not be responsible for pollution if all reasonable steps were followed to apply with low risk according to the assessment.

### III. Manure application setback distances and vegetative buffer strips

- Current BMPs suggest that minimum setback distances from watercourses (including ditches) should be increased depending on soil, soil cover conditions, slopes greater than 5%, and sensitivity of area being protected. The minimum setback distances are:

Coast	Sep to Oct 8 m	Nov to Jan 10 m	Feb to Mar 8 m	Apr to Aug 5 m (wet watercourses) 3 m (dry watercourses)
Interior	Sep to Oct 8 m	Nov to Feb No spreading	Mar to May 8 m	Jun to Aug 5 m (wet watercourses) 3 m (dry watercourses)

Source: Canada-BC Environmental Farm Plan Reference Guide (2010)

- The Nutrient Management Reference Guide mentions “suitable buffers” to reduce P losses from fields to surface waters that are sensitive to P loading. However, the guide does not describe what suitable buffers are.
- It is assumed that direct discharge of agricultural wastes into watercourses will be prohibited in the AWCR. In this context, direct discharge refers to nutrient applications that do not make contact with land before entering a watercourse.

*Step 1:* Prohibit manure application at a minimum distance from watercourses.

e.g. “No person shall apply fertilizer within 3 m of a watercourse at any time unless allowed by a field-specific risk assessment”.

- There may be a minimum distance that most producers already practice and could support.
- Having one distance would be simple to understand and enforce. However, one distance may be inadequate for those times of the year when a greater distance may be warranted depending on other factors.

*Step 2:* Do a risk assessment during the ‘shoulder seasons’ to determine if land applications should be allowed.

- At issue is whether risk assessments should be standardized to account for minimum distances and vegetative buffer strips.
- Step 3 under Section C-II refers to an example of a standardized risk assessment that considers setback distances and vegetative buffer strips in decisions to spread manure.
- Because vegetative buffer strips vary widely in their effectiveness on minimizing P losses (depending on hydrology, landscape, soil P status, etc.)<sup>4,5</sup>, specifications about vegetative buffer strips are recommended for BMPs but not AWCR.

### IV. Soil conditioners vs. fertilizers

- The source of nutrients affects how quickly nitrogen is released into soil, and if released too quickly nitrogen will be lost from the soil-plant system despite the rate, time, or place of application.
- A soil conditioner should not significantly increase soil nutrient supply, unlike fertilizers. Most manures are not soil conditioners, because they release nitrogen too quickly, as indicated by low ratios of carbon to nitrogen (C:N).

- For example, when raspberry fields are replanted about every 8 years, organic matter is added to the soil. If poultry manure is applied at a high rate meant for soil conditioning, nitrogen would release quickly and pose risks of significant nitrate leaching.

## **SUGGESTIONS**

- Over ‘vulnerable aquifers’ (that Ministry of Environment needs to designate), nutrient applications should be distinguished as fertilizer applications or soil conditioner applications.
- Define fertilizers and soil conditioners in the AWCR, adding criteria based on C:N ratios suggested in the Environmental Farm Plan Reference Guide (2010):
  - Fertilizers: C:N ratio less than or equal to 30:1.
  - Soil conditioners C:N ratio greater than 30:1.

## **A. RELATED ADDITIONAL CONSIDERATIONS/UNRESOLVED ISSUES**

- Sensitivity of receiving environment.
  - “Vulnerable aquifers” need to be defined according to vulnerability to nitrate pollution.
  - Surface waters of concern (with respect to N and P loading) should be defined before regulations are suggested to address non-significant concerns.
- Risk assessments need to be developed for land application during the shoulder period.
- Criteria (“vulnerable aquifer”) to determine which operations are required to complete an NMP; requirements for NMPs (qualifications of planners, record keeping requirements, etc.).

**REFERENCES**

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<sup>1</sup> <http://www.agf.gov.bc.ca/resmgmt/ManureAdvisory/>

<sup>2</sup> Ontario's Nutrient Management Act [http://www.e-laws.gov.on.ca/html/regs/english/elaws\\_regs\\_030267\\_e.htm](http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_030267_e.htm)

<sup>3</sup> <http://www.whatcomcd.org/arm>

<sup>4</sup> Fox, G.A. and Penn. C.J. 2013. Empirical model for quantifying total phosphorus reduction by vegetative filter strips. Transactions of the ASABE. 56: 1461-1469.

<sup>5</sup> Sheppard, S.C. et al. 2006. Runoff phosphorus retention in vegetated field margins on flat landscapes. Canadian Journal of Soil Science 86: 871-884.

**APPENDIX A:**

T-Sum at February 1, March 1, and March 15 for various locations. Blanks represent unnecessary data that have been omitted. Source: farmwest.com.

Location	T-Sum (Feb 1, 2013)	T-Sum (Feb 1- average)	T-Sum (Mar 1, 2013)	T-Sum (Mar 1- average)	T-Sum (Mar 15, 2013)	T-Sum (Mar 15- average)	# years averaged
<i>Locations where T-Sum reaches 200 before March 1 in most years.</i>							
Abbotsford	83	84	230	224			52
Agassiz	94	93	241	246			21
Comox	98	115	246	239			21
N. Cowichan	92	113	242	246			21
N. Delta	67	122	187	267			21
Qualicum Beach	88		227				1
Victoria	107	140	263	288			21
<i>Locations where T-Sum reaches 200 after March 1 in most years.</i>							
Cranbook			69	0	131	11	21
Creston			73	11	134	51	20
Kamloops			75	12	161	60	21
Kelowna			75	1	149	26	52
Keremeos			55	86	147	173	9
Osoyoos			64	45	158	112	21
Pemberton			46	17	102	59	21
Summerland			88	22	171	66	52
Vernon			74	3	134	43	21
Prince George			8	0	8	1	21
Fort St John			14	0	8	0	21
Quesnel			0	0	0	6	21
Williams Lake			1	0	1	3	21

"T-Sum' is a method to determine when to make the first application of nitrogen fertilizer in spring. The 'T-Sum' value is the accumulated mean daily temperatures (in ° C) above zero, starting on January 1 (below-zero temperatures are ignored). For example, if the mean daily temperatures for a 5-day period were 6, 3, 0, 1, and -4°C, the 'T-Sum' total is 10. The 'T-Sum' concept assumes that rate of spring growth is related to accumulated mean temperature."

<http://www.farmwest.com/node/937>

**APPENDIX B:**

An example of a completed risk assessment form of the Application Risk Management pilot (Whatcom Conservation District) follows on the next page. The pilot applies only to manure spreading on dairy farms.