PROCEDURE TITLE: RESTRICTION ON WINTER APPLICATION OF NUTRIENTS – APPLICATION IN AUTUMN AFTER NOVEMBER 10TH

Intent:

- The purpose of this document is to provide a procedure for the Departments of Agriculture and Resource Development and Conservation and Climate (the Departments) to vary winter spreading dates in autumn on a regional/provincial basis.
- The Livestock Manure and Mortalities Management Regulation and Nutrient Management Regulation both contain clauses restricting the application of livestock manure and nutrients to land between November 10th of one year and April 10th of the following year.
- Subsection 14(5) of the Livestock Manure and Mortalities Management Regulation and subsection 12(2) of the Nutrient Management Regulation both contain clauses allowing the director to vary the dates, if necessary, after considering soil and weather conditions.
- The purpose of the Livestock Manure and Mortalities Management Regulation is "to prescribe requirements for the use, management and storage of livestock manure and mortalities in agricultural operations so that livestock manure and mortalities are handled in an environmentally sound manner".
- The purpose of the Nutrient Management Regulation is "to protect water quality by encouraging responsible nutrient planning and by regulating or prohibiting (a) the application to land of substances containing nitrogen or phosphorus; and (b) the development of certain types of nutrient generating facilities in areas where water bodies or groundwater are sensitive to impact."
- The intent of Section 12 of the Nutrient Management Regulation is to prohibit the application of nutrients onto frozen or snow-covered soils as these situations pose an increased risk of runoff. Section 12 also encourages producers to avoid late autumn application of nutrients where the risk of spring runoff to waterways may be increased
- There may be some years where weather conditions are such that soils have not frozen as of November 10th and agricultural land can reasonably be worked to apply nutrients for uptake by crops. In these situations, variations in winter spreading dates will only be considered if nutrient management practices employed will not negatively affect water quality.
- The risk to water quality may be diminished in situations where soils have not yet frozen, the soil is dry enough to support fertilization equipment, the product is applied sub-surface (e.g. injection or surface applied followed by incorporation), the soils are well drained to moderately well drained and are not expected to be saturated during spring thaw, and the field is not prone to water erosion.
- Therefore, the Departments may authorize regional/provincial variations to the November 10th date where conditions (soil moisture, weather forecast, etc.) indicate a low risk to water quality with nutrient application.
- This procedure ensures a consistent approach between the Water Science and Watershed Management Branch as it relates to the Nutrient Management Regulation and the Environmental Approvals Branch as it relates to the Livestock Manure and Mortalities Management Regulation to varying and communicating the dates.

Background:

- It is generally recognized that from an environmental perspective, a number of scenarios (weather, application, soil moisture, etc.) result in greater losses of fertilizer to the environment in the autumn relative to application in the spring. At best, under ideal circumstances, there would be no difference between the two application periods. For example, McKenzie (2002) notes that autumn fertilization can "range from very effective to disastrous depending on soil moisture conditions, the form of nitrogen fertilizer used and how it is applied" but also notes that it "always puts your fertilizer N at risk". However the level of risk is a function of local conditions. Water quality studies conducted in Minnesota as part of a broader initiative assessing factors leading to the loss of nutrients from agricultural lands found that "Minnesota data suggest that an average 15 % reduction of leaching loss in drainage water with spring application of ammonia compared to a late October application when soil temperatures are at or below 50° F (10° C)" (Randall and Sawyer, 2008). Randall and Sawyer further reported that nitrate losses from autumn-applied N throughout the Corn Belt could "range between 0 and 25 %" depending on time of application (early vs. late), autumn and winter soil temperatures and spring rainfall."
- Research indicates that the application of anhydrous ammonia or urea in late autumn when soil temperatures are less than 5° C delay the conversion process of ammonia to nitrate. Tiessen *et al.*, (2003) reported that in instances where urea was banded into cold soils (1° C), the number of days required to convert 100 % of the ammonia to nitrate increased to 380 days. The adoption of this management practice results in nitrogen remaining in the ammoniacal form and held by the cation exchange surfaces on negatively-charged clay and organic matter particles. Precipitation will not dislodge or leach nitrogen when it remains in this form. In contrast, nitrogen in the nitrate form is more susceptible to leaching.
- Conversely, applying anhydrous ammonia earlier in the autumn when soil temperatures are warmer results in considerable ammonia conversion to nitrate prior to soils freezing (McKenzie, 2002). The Departments want to discourage application of anhydrous ammonia or urea in early autumn when nutrients are more subject to loss. Application of anhydrous ammonia or urea during the window of ideal temperature conditions when soil temperatures are less than 5° C may not result in impacts to water quality as long as the soil is dry enough to support fertilization equipment, the product is applied sub-surface, the soils are well drained to moderately well drained and are not expected to be saturated during spring thaw, and the field is not prone to water erosion. The Departments recognize that in some years, this period of ideal temperatures may extend beyond November 10th.
- Autumn application of anhydrous ammonia or urea may in some cases provide additional water quality protection as compared to spring application since application to wet spring soils can cause compaction and lead to increased nutrient runoff during spring precipitation events.

Procedure:

Application/Intent

- Per Section 14 of the Livestock Manure and Mortalities Management Regulation, no person shall apply livestock manure to land between November 10th of one year and April 10th of the following year. Subsection 14(5) provides the director with a mechanism to consider varying winter spreading dates, if necessary, based on local soil and weather conditions.
- Per Section 12 of the Nutrient Management Regulation, no person shall apply a substance containing nitrogen or phosphorus to land in any Nutrient Management Zone between November 10th of one year and April 10th of the following year. Subsection 12(2) provides a mechanism, to consider varying these dates to a later date as specified by the Director.
- Section 22(1) of *The Interpretation Act* states that 'a period of time is described as beginning or ending on, at or with a specified day includes that day.' Using the winter spreading dates above, this means that one cannot apply nutrients on November 10th or April 10th of a given year.
- This procedure is not intended to be used as a means to grant approval to apply nutrients within the Nutrient Buffer Zone (Nutrient Management Regulation) or within setbacks adjacent to surface water, surface watercourses or groundwater features described in Schedule C of the Livestock Manure and Mortalities Management Regulation.
- This procedure does not apply to:
    - requests received under Section 14(4) of the Livestock Manure and Mortalities Management Regulation and is not meant to evaluate an emergency situation or other extenuating circumstances whereby the director provides authorization to apply livestock manure to land between November 10th of one year and April 10th of the following year.
    - requests received under Section 12(3) of the Nutrient Management Regulation whereby municipality may request the application of wastewater sludge or biosolids to land in an emergency or under exceptional circumstances.
    - the application of biosolids or sewage sludge to agricultural land pursuant to an *Environment Act* Licence, which shall be carried out at all times in accordance with the limits, terms and conditions of the Licence.
    - to spring application of nutrients prior to April 10th. Refer to 'Restriction on Winter Application of Nutrients – Application in Spring Prior to April 10th' procedure for further information.
- Staff in the areas responsible for administration of the Nutrient Management Regulation and the Livestock Manure and Mortalities Management Regulation will communicate throughout the implementation of this procedure to encourage collaboration, maximize efficiencies, and enable explanation of consistent or divergent approvals to clients.

Procedure to vary dates on a regional or provincial-wide basis by the Departments

- The Departments may initiate a variance on a regional or provincial basis based in part on soil temperatures from the network of over 100 monitoring stations maintained by Manitoba Agriculture and Resource Development throughout agro-Manitoba.
- Around November 1st of each year, the Departments, Keystone Agricultural Producers, Manitoba Pork, Manitoba Beef Producers, Canadian Association of Agri-Retailers, the commercial manure applicator industry and other stakeholders will discuss soil/weather conditions encountered throughout Manitoba.
- Each year, approximately one week prior to November 10th, the mean daily soil temperatures from the network of monitoring stations will be reviewed (https://www.gov.mb.ca/agriculture/weather/weather-conditions-and-reports.html). The mean daily soil temperatures will also be compared to the long term forecast issued by Environment and Climate Change Canada (http://www.weatheroffice.gc.ca/canada_e.html) to determine the likelihood of soils freezing prior to November 10th. A regional or province-wide variance will not be issued if the soil is frozen (mean daily soil temperature of 0° C or less) at a 5 cm depth on November 10th or if the ground is snow covered. Snow cover will be determined using visual spectral imagery obtained from Environment and Climate Change Canada using the Geostationary Operational Environmental Satellite through a partnership with the National Oceanic and Atmospheric Administration (http://weather.gc.ca/data/satellite/goes_wcan_visible_100.jpg). Other relevant information may also be considered as deemed appropriate.
- In the days leading up to November 10th, if above seasonal temperatures are forecast past November 10th, soils are not expected to freeze and significant precipitation is not expected then a variance may be provided for a period of not more than five days. The length of the variance will depend in part on the weather forecast.
- As weather conditions may change rapidly, weather and soil conditions and the weather forecast will be closely monitored. The variance may be rescinded if conditions change and soils become frozen, snow covered or significant precipitation is expected during the period of the variance.
- In instances where mean daily soil temperatures and long term forecasts vary from one area of a province to another, regional rather than province-wide variances may be issued.
- Regional or province-wide variances and rescinded variances will be communicated to producers through best available means such as through a Manitoba Government news release, the Manitoba government web site and through communication with Keystone Agricultural Producers and the Canadian Association of Agri-Retailers.

- Regional or province-wide variances to the November 10th date would include the following conditions:
    - Nutrients are not to be surface-applied without immediate incorporation.
    - Nutrients are not to be applied within Nutrient Management Zone N4 or the Nutrient Buffer Zone (Nutrient Management Regulation).
    - Nutrients are not to be applied to poorly or very poorly drained soils including coarse textured Gleysols with improved drainage (for example agriculture capability class 4w, 5w and 6w soils) that are saturated for extended periods during spring thaw.
    - Nutrients are not be applied to erosive soils located near watercourses but outside the Nutrient Buffer Zone (as specified in the Nutrient Management Regulation).
    - The agricultural producer is obliged to assess current weather conditions and periodically check weather forecasts when applying nutrients after November 10th. Nutrients should not be applied in instances where the weather outlook is unfavourable such as if snow or an appreciable amount of rainfall is expected that would result in runoff.
    - All other local, federal and provincial legislation must be followed.
    - In the case of livestock manure:
        1. Livestock manure cannot be applied to land in a manner or rate that due meteorological, topographical or soil conditions causes pollution of surface water, ground water or soil.
        2. Minimum setback distance requirements from surface water, surface watercourses or groundwater features shall be maintained per Schedule C of the Livestock Manure and Mortalities Management Regulation:
        3. Field application information must be completed and submitted for all operators who file manure management plans.
- Decisions on regional or province-wide variances will be authorized jointly by individuals who have been delegated authority by the Ministers responsible for the administration of the Livestock Manure and Mortalities Management Regulation and the Nutrient Management Regulation.
- Requests for individual variances are expected to be rare and limited to very unique situations. If a regional/province-wide variance has not been granted and an individual producer believes their soil/weather conditions warrant a variance, agricultural producers are encouraged to contact staff in the Nutrient Management Regulation program at nmr@gov.mb.ca or by phone at (204) 945-0002 to discuss the specific situation. If after discussion, an individual wishes to make a formal request for a variance, the request must be provided in writing through a Professional Agrologist or Certified Crop Advisor and signed by the producer. Appropriate contact details, legal land description(s), proposed details about nutrient application activities (product(s), method of application, crop(s) to be grown, application rate(s), application date(s)), recent soil test results, as well as current soil conditions (temperature, moisture, etc.), description of environmental risk mitigation measures in place, and the rationale for the request are required along with any other information requested by the Director.

- A similar process as included in the regional/province-wide variance section will be used to evaluate individual requests.
- Note: Agricultural technology and fertility products may change over time and additional science may become available regarding runoff of nutrients from land. As such, this procedure will be reviewed (and revised if necessary) at least once every three years.

References:

- McKenzie, Ross H. 2002. Alberta Agriculture and Forestry. Agri-Facts. Agdex 542-11 http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex5695/$file/542-11.pdf?OpenElement.
- Randall, G.W., and J.E. Sawyer. 2008. Nitrogen application timing, forms and additives. p. 73-85. *In* G. Laing (ed.) Final Report: Gulf Hypoxia and Local Water Quality Concerns Workshop. Upper Mississippi Sub-basin Hypoxia Nutrient Committee, Ames, IA. 26-28 Sep. 2005. ASABE, St. Joseph, MI.
- Tiessen, K.H.D., 2003. Efficiency of fall-banded urea fertilizer in Manitoba: effect of application date, landscape position and fertilizer additives. M.Sc. Thesis, University of Manitoba, Winnipeg, MB, 413 pp.