Draft Protocol Review Session September 15, 2009
Nitrous Oxide Emission Reduction Draft Protocol
Technical Working Group

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Tom Goddard	Alberta Agriculture
Tom Jensen	International Plant Nutrition Institute
Ray Dowbenko	Agrium
Ken Panchuk	Saskatchewan Agriculture
Matthew Weins	Manitoba Agriculture, Food and Rural Initiatives (MAFRI)
Jon Bower	BlueSource Canada
Jamie Callendar	BlueSource Canada
Devon Worth	AAFC

** = Outstanding Work Item / Modification to Protocol

1. **Introductions - Climate Change Central**
2. **Why We're Here – Alberta Policy Context**
    1. Alberta Regulatory Framework – Specified Gas Emitters Regulation
    2. Offsets Criteria – Carbon Market in AB
    - Projects start after Jan 1, 2002
    - Real, demonstrable, quantifiable
    - Not regulated by law
    - Clearly defined ownership (verifier will seek clear ownership)
    - Generated in Alberta - investment / project undertaken in Alberta
    - Not double counted (only serialize on one system)
    - Verified by 3rd party (chartered account/certified engineer)
    3. Ex Poste Verification
    4. The Protocols are based on the ISO 14064-2 Standard.

3. **Principles to Guide Protocol Decisions/Development**
    - **Environmental Integrity**
    o Does the protocol identify all greenhouse gases in baseline and project according to the requirements of ISO 14064-2?
    o Are reasonable approaches to including and excluding sources and sinks of greenhouse gases made?
    - **Balancing Environmental Integrity with Practicality**
    o Does the protocol take a practical approach to dealing with the sources and sinks of GHGs in the context of the ISO framework?
    - **Streamlined Life Cycle Approach**
    o Does the protocol take into account the materials and energy flows in the baseline and project condition? Have any sources and sinks of GHGs been missed in the baseline or project condition?

- **Building on Approaches Adapted from Others**
  - Are there any existing protocols similar to this one that has unique approaches that could be adapted?
  - Are we using the most relevant Best Practice Guidance available?

Q. Why arent PAgs or others able to verify projects?
A. It was determined by government at the development of the system rules and criteria that a professional association would be accepted to verify projects

4. **Introduction to the Protocol**
   - Overview of the Protocol – Table of Contents overview
     - Work has been ongoing on this NERP protocol over the last two years with various levels of science coordination and consultation with research and technical expertise including within the NERP Steering Committee
     - Can view this information on the Carbon Offset Solutions website under Protocol Development section (http://www.carbonoffsetsolutions.ca/offsetprotocols/workshops.html)
   - Structure of Alberta Protocols

5. **Review of the Protocol - Review of Draft Alberta Protocol: (Section by Section)**

- Run-through of the Protocol elements, basis for the flow diagrams, identification of SSs, rationale for exclusion or inclusion, quantification approaches and appendices, discussion points.

Section 1.0 Protocol Scope and Description

- 1.1. Scope and Description / Protocol Approach

Q. Definition of modifier (versus the Emission Factor in Table 2.5) is different throughout protocol, its unclear – can we be consistent in application throughout the document?

A. Yes, the modifier is based on the reduction of N in project condition based on the BMP levels and the emission factors are based on the National Inventory

**will clarify references of each throughout the protocol and within quantification tables

Q. Is urea considered ammonium based? (TB)

Yes; Suggest a change in definition then to any fertilizer that results in nitrogen in the ammonium form; note, in glossary definition UAN also defined – is allowed but not with Fall application

Q. Why would someone implement the Advanced BMP level if same modifier as Intermediate (AH)

A. The science consultation workshops held in October 2008 and webinar in June 2009 determined the science was not robust enough to differentiate between intermediate and advanced levels (to determine the precision application of N by GPS etc. and advanced techniques) and research was lacking to determine a realized difference between the higher 2 levels of BMPs. It remained in the protocol and is currently a placeholder within this 1st generation protocol until more research is conducted and tools are developed to confidently apply a reduction modifier to the Advanced BMP level

Q. Is there potential to put 'TBD' or an asterisk within the table and/or explain why the numbers are the same…

A. Yes

**Can insert a footnote explaining consensus was not achieved at the science workshop to determine an actual measurable difference with the Advanced level; More research required.

Tables 1.1 and 1.2 BMP Levels

Q. Would like to see what Modifier 1.0 represents? Its difficult to grasp what current levels are. (BM)

A. The 1.0 represents current practices of N management which varies at the farm level – measurement at the farm level also varies considerably – this will be determined on an individual project basis due to the requirement to determine baseline emissions with 3 years historical operations data. What we're finding is that even thought growers say they apply N according to a 4R concept, in practice there is rarely documentation to show they are, and if you ask if they have an nutrient management plan, they often don't know all the components of it.

As the protocol requires the three years of historical operations data prior to implementation of the 4-R Nitrogen Stewardship Plan, for each participating farm will have a varying degree of implementation – therefore the baseline technically starts at 1.0 and the management plan will determine a move to Basic or Intermediate levels and application of corresponding modifier

**Potential to add to Protocol Applicability – clarification of baseline and starting points – clarification that the APA will have to determine what level the farm is starting (assess current management)

**Potential to provide a general example in the protocol of what the baseline management practices are and how they would differ, and link to the supporting modules being developed in the Fertiliser Institutes 4R Stewardship Plans to help clarify the starting points – agreed should be included in supporting modules to the protocol for clarity

General comment on the language in Table 1.2 (Moist Soils) – wording within Right Place i.e. "apply in bands" – some rewording as that does not fit with existing plans in Ontario and might not with Quebec; not applied but injected – potentially solicit other wording of Right Rate from other areas in Ontario

**Update tables to include Apply in Bands/Injection and for Right Rate, Ontario Agriculture has provided feedback and comments throughout the development of this protocol and wording was accepted

- Protocol Approach

Q. Functional Equivalence – kg of N20 emitted per mass of crop produced per unit area basis – yields affect N20 emissions so the committee thought we should include it.

A. Throughout the development process and consultations it was determined will need to bring yield into functional equivalence equations – trying to ensure comparisons are able to made in the project to baseline condition – there is an inherent risk factor associated with the quantification this way (this is consistent with other protocols and was determined conservative and prevention of over crediting) – the Committee are requesting feedback on approach…

A. The intensity is the correct way to go to increase efficiency and overall approach (it will be captured) (RL)

(TB) highly supportive of approach – have to take into account yield

Still concern over modifier definition (page 26) – will get there later in the protocol review

- Flexibility Mechanisms - 3 flexibility options
  - No comments
- Glossary (page 8)
  - **Requesting feedback on the terms and any suggestions

- Project and Baseline Process Flow Diagrams (Figure 1.1 and 1.2 - page 5/6)
  - **Requesting feedback on the terms and any suggestions

Section 2.0 Quantification

- Figure 2.1 and Table 2.1 Project Life Cycle Chart and SSs (page 11/12)
  - **Requesting feedback on the terms and any suggestions
- Section 2.2; 2.3 Baseline Scenario Assessment
- Table 2.2 Assessment of Baseline Scenarios
- Figures 2.2 and Table 2.3 Baseline Life Cycle Chart and SSs (page 18/19)
  - **Requesting feedback on the terms and any suggestions

- Table 2.4. Comparison of Relevant SSs for Project and Baseline (page 23)

  Q. Soil crop dynamics – what does it include?

  Includes emissions associated with cycling of the C and N in soil and plant

  Q. Why is Farm Operations excluded? – if consider crop N application; soil sampling etc. in the project condition that may potentially have an increase in emission in the project – to be conservative should quantify and include – Q. can we limit the quantification to fertilizer (N sources)?

  **Agreement to Include P14 and B14 for quantification, but split out the fertilizer application operations as P14b and B14b from the rest of the farm operations which are unlikely to be affected.

  **Yes, would be able to conservatively exclude Farm Operations not related to N – i.e will separate the Farm Operations into A and B categories – and include the fertilizer component as part of quantification

  Q. on Fertilizer and Lime Production SS upstream is there going to be an increased quantified of N applied

  In coordination with the regulations currently in place – production is required to be reduced by 12% each year – is the required reduction for the fertilizer plant going to be greater than 12% -

  **can put more justification in the table to exclude

Section 2.5 Quantification

- Table 2.5 Quantification Procedures (page 28)

Q. is it emissions per year for project

Yes, calculate per project year

**Q. fix the emissions baseline units – they are not consistent

**Clarify the usage of Modifier and Emission Factor language

**clarify use of term 'yield' production per project in protocol versus per hectare as agronomists recognize (Tom) – perhaps use 'production' of x (kg of DM as defined by Canadian wheat board table with standard moisture content – is in Appendix F – adjust to clarify and refer to Appendix F, first column)

**Review quantification table, mechanics of calculations, approach and provide comments

- Table 2.6 Contingent Data Collection
- **Requesting feedback on the terms and any suggestions

APPENDICES

- **Requesting feedback on the terms and any suggestions
- Appendix A – Soil Temperature Map (page 46)
- Appendix B – Eco district Factors (page 48)
- Appendix C – APA Requirements (page 52)
- APPENDIX D: Flexibility Mechanism Standardization Process
- APPENDIX E: Emission Factors for Flexibility Mechanism
- APPENDIX F: Emission Factors for Crop Residues

6. Next Steps

- Comments on any aspect of protocol by reviewers by end day Tuesday September 22th
- formally acknowledge the work from the NIR specialists and IPNI and work conducted along the way in acknowledgements

COMMENTS RECEIVED THROUGH EMAIL:

1.

From: Worth, Devon [mailto:Devon.Worth@AGR.GC.CA]
Sent: Friday, September 18, 2009 6:54 AM
Subject: RE: Nitrous Oxide Emission Reduction Protocol (NERP) - Standardized Baselines

I've gone through the draft NERP quantification protocol and had a couple of comments on calculations that I thought I would send your way.

1. This is an idea to simplify things, so I'm wondering if it would be possible to remove the N2Oirri calculations. I know in the inventory they always express emissions from irrigation as separate, but that was mainly because it was a new 'source' of emissions not reported under the IPCC standards. Effectively, all irrigation does is to increase the P/PE ratio to 1, so I think you could take out the irrigation equation so long as you include a note in appendix b indicating that the EFbase is 1.7% if you irrigate. Just an idea, but maybe you don't want to change things at this point.
2. For reasons that are not always clear to me (something to do with the in country review of our methodology), in the inventory we now assume that the emission factor for leaching is 2.5%, not 1.25% as it used to be or 0.75% as the IPCC recommends. If the goal is consistency with inventory methodology, then the protocol should probably use 2.5% for now as well.

Talk to you all later,

Devon

2.

I'm all for simplifying things, and 2.5% may be the right emission factor, but for this protocol to be science-based I don't think changes to emission factors should ever be accepted for unclear reasons, particularly by this group. Can anyone explain why these changes in the emission factor for leached nitrate have been made?

Tom

Tom Bruulsema, PhD, CCA
Director, Northeastern Region, North America Program
International Plant Nutrition Institute

3.
I have to agree that putting a protocol together that provides additional incentive to producers to reduce GHG and improve N efficiency is challenging, but worthwhile. Here are a few observations that might be considered by committee members:

1) This protocol would be easier to evaluate and defend if project actions were developed primarily to achieve the objective of reducing GHG emissions per unit of crop production. However, as pointed out by Tom Bruulsema, increased production is another important objective for society and producers. Another objective evident in the 4R plans is to reduce environmental losses by increasing N use efficiency (of which GHG emissions are just one component). These multiple objectives evident in the 4R approach are all important, but make it more difficult to estimate project efficacy and is one factor contributing to the angst regarding reduction modifiers.

For example, the 4R plan requires a producer to fertilize according to landscape variability in order to participate. A GHG-focused plan might require a reduction in N inputs or use of controlled-release N or nitrification inhibitors in depressional areas, where there is most confidence that GHG emissions are high. In many cases, the actions might be the same, but this is not necessarily so.

2) The emission reduction equation in version 4 implies that the amount of N2O produced per unit of production is reduced by 15 or 25% in addition to the calculated change in estimated N2O per unit of production. If N2O per unit of production declines in the project condition due to increased N efficiency (it should), then this implies greater reductions in GHG emissions than 15 or 25%. Was this intended?

3) I tried out the calculation with some data from a long-term crop rotation studies here in Lethbridge. Estimated N2O per unit of production can be quite variable, particularly if droughts or other causes of low grain yield are not excluded. If credits are provided annually when GHG emissions per unit of production decline but not counted when estimates increase, average GHG credits were up to 25% of baseline (with no actions taken). The impact of annual variability could possibly be reduced by averaging project reductions over multiple years, similar to baseline.

4) Unless manured lands are excluded from the protocol, estimates of N2O emissions from manure should also be calculated.

5) The national inventory also includes a term to account for N2O emissions from depressional areas, which should also be included in protocol calculations (e.g., use ecodistrict estimates of the fraction of land in depressions?)

Eric Bremer, Ph.D., P.Ag.
Symbio Ag Consulting
Lethbridge, AB

4.
From: Worth, Devon [mailto:Devon.Worth@AGR.GC.CA]
Sent: Monday, September 14, 2009 9:49 AM
Subject: RE: Nitrous Oxide Emission Reduction Protocol (NERP) 1st Round Technical Review

I've attached a quick map that shows the P/PE ratio by ecodistrict. As you can see, Ontario mostly falls below the 1.0 threshold that we had discussed to differentiate 'wet' from 'dry'. Hard to believe after this summer. . .

Below is a quick table that gives the provincial average P/PE.

Devon

Province	Avg P/PE
Newfoundland	1.65
P.E.I.	1.22
Nova Scotia	1.21
New Brunswick	1.05
Quebec	1.06
Ontario	0.87
Manitoba	0.65
Saskachewan	0.50
Alberta	0.57
B.C.	0.60

5..
Under section 2.5.1, the following equation is found:

$$\text{Emission Reduction}_{\text{crop i}} = (\text{Emissions}_{\text{Baseline, crop i}} - \text{Emissions}_{\text{Project, crop i}}) * EF_{\text{red, crop i}} * \text{Area}_{\text{crop i, field y}} * \text{Yield}_{\text{crop i, field y}}$$

Do you know who can help me understand this? I am confused as to why one would multiply the estimated difference in emissions between the project and the baseline by the emission reduction factor, EF, and why EF would be 0.85 for the basic level of 4R and 0.75 for the intermediate and advanced levels. This would seem to give smaller emissions reductions for the intermediate and advanced levels than for the basic level.

Sincerely,

Tom

Tom Bruulsema, PhD, CCA
Director, Northeastern Region, North America Program
International Plant Nutrition Institute