



EnCana Corporation tel: 403/645-2210
EnCana on 8th 1800, fax: 403/290-8287
855-2nd Street. SW
Calgary, AB, Canada www.encana.com
T2P 4Z5

Summary of Feedback and Comments Received During and After Technical Review for Instrument Gas to Instrument Air Conversion Protocol on Monday November 3rd, 2008

Introduction

This document contains feedback and comments from the reviewers given during and after the review up to the final submission date (Monday November 10th, 2008). In order to simplify matters, the reviewer's name and comments are followed by a text box with a response to those comments or suggestions.

A. Modification of Protocol Based on Feedback from Reviewers during Review (taken from minutes of meeting)

- Stephanie: Q. In Baseline Condition Diagram – vented and flared gas but in written Protocol Approach, flared gas is not listed, need to add to written description for baseline conditions

Omar: A. okay will do that. This has been modified in the protocol.

- Amanda: Comment: Questioning usage of the Directive 60, i.e. inspection and correction for leakage (no discount factor) and a discount factor if no leakage assessments are conducted on a yearly basis for dealing with leakage issues; as opposed to mandating leakage assessments as part of the protocol and project, not very clear the 2 specific project conditions: new installation of air system vs. already installed. *Comment: Clarify project requirements for new installation versus already installed air conversion systems.*

These points have been clarified in the protocol.

- Alex: Q. where does 2% per year come from?

Omar: A. EPA Natural Gas Star program – did not find leak rates, but document commonly used, has certain percentages, Omar used criteria and engineering to develop the number

Alex: Comment. Ensure list references

Omar: reference page 40 – was 25 over 10 years (2.5%) so made assumption that 2% is conservative

But can increase to 2.5% to fall in with program calculations – No Objection

This value has been increased to 2.5%.

- Milos - (Agreed) Like the one month, but question on allowing more flexibility for differences in facilities, add another flexibility mechanism

Omar: A. Agreed for another flexibility mechanism

Insert Flexibility Mechanism for quantification of baseline by using metering from a “representative month (one month)” if justification is provided for usage of specific month of data

Flexibility mechanism has been added to address this issue.

- Amanda: Clarify the Electricity Displacement Factor (vs. emission factor as listed) from the Offset Project Guidance document from AENV, is currently 0.65 CO₂e/MwH and will be reviewed every 3 years

This has been clarified in the protocol.

- Jeff: Q. Listing in Appendix B1 – list is not complete, more instruments added in future and thought of – how will the list be updated? There may be some bias in some of the listings.

All: A. As long as the project developer has a listing of instrument with specifications, can be used for project – the listing is a general representation to what information is required for project

Amanda: Can use the premise behind the Appendix and insert them into the document itself (as opposed to the whole list), provide information on Best Practice/Best Management, subject to verification, just mention that manufacturers should have this kind of data

Explanation to lists has been modified to address this. It has been stated that they are for illustrative purposes only and the project developer should contact manufacturer of devices for more accurate technical specifications.

- Stephanie: Q. on Sources listed – P9 Fuel Extraction and Processing - where does this come from? Unclear of where numbers/emission factors come from? Should be referenced if they came from a source

Omar: A. usage of fossil fuels to power air conversion system subject to quantification – use Emission Factors from Environment Canada

Include in references where the references come from (Environment Canada) National Inventory data and include subject to most recent data

This has been modified in the protocol. The references and the statement that

B. Modification of Protocol Based on Written Feedback from Reviewers

1. Alex De Visscher (University of Calgary)

- p. 10, table, row P5, column 2, second sentence: “This clean gas, also referred to as fuel gas, is drawn from the processed.” there seems to be a grammar problem here.

Done, corrected grammar and completed sentence fragment.

- 2) p. 13, second paragraph, 5th line: “a metering systems” delete s at the end or delete a at the beginning.

Done, deleted s.

- I did some calculations with the equations on air flow rate, and I found that they overestimate mass flow rates unless G_{CH_4} is replaced by G_{gas} . That applies to the equations on p. 28, eq. 8-9 p. 39, eq. 12-13 p. 41, and p. 44.

The problem with your approach is that the gas composition of G_{GAS} is unknown, as can be inferred from the table on p. 38. There are ranges. If we convert all in terms of a known reference gas G_{CH_4} , then we will be able to apply the gas composition data to adjust the volumes we are quantifying. As an example, if the gas is really 100% methane, then using your approach we would be underestimating the volume. But if we use the reference gas, and then the gas composition data, we arrive at an exact volume. This is a consistent approach, whereas your approach would be dependant on knowing the fuel supply G_{GAS} prior to calculating the volumes.

- Also, wherever it says %CH₄, what is really meant is the volume fraction, so %CH₄/100. Make sure this is clear from the text. It applies to the first equation on p. 28 (in the second equation there is a ratio of percents, so that’s OK), eq. 8 p. 39, eq. 12 p. 41, and p. 44.

We have modified the text so that the project developer understands it is the fraction, not and not the 2 digit number using text form previous protocols as precedent.

- p. 31- table 1-5, column 5: The word “reconciliation” is not incorrect, but it does not say much to me in this context.

This word is used in all other protocols. It is standard language and the word comes from the accounting field meaning to a process that compares 2 sets of records (usually the balances of two accounts) to make sure they agree. Reconciliation is used to ensure that the money leaving an account matches the actual money spent; this is done by making sure the balances match at the end of a particular accounting period. The same would apply for the volumes of ghg being measured or estimated in this or other protocols.

- p. 36 bottom: I assume gas specific gravity is density divided by air density at the same conditions (ie molar mass divided by air molar mass, which is just under 29). You might want to specify that.

Done, specified in the text

- same: Fk is not really the specific heat ratio, but the specific heat ratio of the gas divided by the specific heat ratio of air, which is 1.4.

Done, specified in the text

- same: I assume X_T is maximum pressure drop ratio to absolute inlet pressure before choking.

It is the terminal or limiting pressure drop ratio. In this condition choking occurs.

- The top equation on p. 43 will be adequate in most cases. In the unusual case that only a small section was converted to instrument air t years ago, whereas the majority of the plant was converted later, t_i years ago, then the following equation will be more accurate:

$$BE' = BE * t_i + \sum_{i=1}^n BR_i * (1 + DR_i) * (t - t_i)$$

I don't know if the above situation occurs. If it does, it might be useful to include this equation.

It may, we can include it, but this first review we will not. If a conversion occurs all the instruments are converted not just a section, it is not practical to do it piece-wise. So it may not even happen.

2. Jeff Seaborn (Spartan Controls)

Good meeting yesterday. I think it was great to get the different parties involved.

Firstly, I think your whole strategy to simplify this process, using conservative values and factors, is a good idea. Any process or documentation that is difficult or onerous to act on, will be dismissed or misused. Keeping it simple will increase its chance of success. Well done.

In review of the protocol, my only concern is the Bleed Rate Information presented in Table 1 on page 47. As I'd mentioned during the conference call, this information is misleading. I think it is valuable to keep some typical bleed rate data listed in the protocol; however I would suggest removing the last column of information that is titled "Field Data". Please recognize that this table of information was generated as a sales tool for a so-called environmentally friendly device marketed by CETAC-WEST. CETAC-WEST's philosophy as quoted from their website is "We do not pick winners, we *make* winners." I won't get into the issues with their product, but unfortunately, the data they present in their table is biased to *make* their device look like a winner. You have put in a footnote to refer to the manufacturer's data for more accurate information, but I've found people tend to miss footnotes. Keeping the table limited to manufacturer's published numbers will keep the bias out, and can't be refuted.

Thanks for inviting me to share in this protocol and for considering my thoughts.

We have removed the last column and specified in the text of the document that the project developer should consult the manufacturer of any specific device so that the correct and most current values are used. We hope this will remove any biases as we have also indicated in the

text that the lists are for illustrative purposes only, to be used as an indicator of the volume of emission that may be expected.

3. Stephanie Trottier (Alberta Research Council)

Good morning Omar,

Further to the discussion last Monday, I had some quick comments on the protocol.

Regarding the use of supplier provided bleed rates for the instruments, there seems to be a range of values for a given instrument. It should be highlighted in the protocol that, unless justification can be provided, the proponent should use the most conservative value.

As mentioned in the meeting, the discount factor used to accounts for leaks should be readjusted to the actual value of 2.5%.

Other than these small issues, I thought the protocol was sound.

Regards

We have clarified the use of bleed rates as per Jeff Seaborn's comments (see comments above). We have eliminated the field data and suggested that the developer use vent rates from the manufacturer. We have also suggested that the project developer contact the manufacturer for further details on these devices. We hope the project developer uses the maximum vent rate as this will no doubt be a conservative approach. The highest value, when subtracted from the project condition, should reflect lower emission and claimable offsets, thus achieving a conservative value.

The 2.5% has been adjusted as per Dr. Alex de Visscher's comment. This was the original value from the EPA document and should be a better discount factor as it will give a conservative approach in the estimations.