Jenni Demanuele

From: Thomas, Sandra (MOECC) <sandra.thomas@ontario.ca>
Sent: Tuesday, May 02, 2017 6:00 PM
To: Huxter,Amanda; Gioseph Anello; Greg Borchuk; Brasowski,Leon; Melodee Smart; Seth Dittman (Seth.Dittman@york.ca); Tara Wilcox
Cc: Hyde, Chris (MOECC); Azocar, Guillermo (MOECC); Hussain, Lubna I. (MOECC); Dunn, Philip (MOECC); Alexan Gorgy, Tamer (MOECC)
Subject: MOECC Comments - AMESA Long Term Sampling System Work Plan

Hi All,

The ministry has reviewed the revised AMESA Work Plan (Work Plan) dated April 11, 2017 and offer the following comments:

Brief Background of AMESA

The AMESA (Adsorption MEthod for SAmpling Dioxins and Furans) Long Term Sampling System (LTSS), installed on each of the two units at the Durham York Energy Centre (DYEC), is a dioxin and furan continuous sampling system

Designed to extract a sample of flue gas from the outlet of the air pollution control system on a continuous and isokinetic basis for the duration of the sampling period.

Dioxins and furans are adsorbed on a replaceable trap filled with adsorbent resin (XAD-2) which is spiked with an internal standard by the laboratory that will complete the analyses following the designated sampling period.

AMESA Operating Procedure (Updated SOP) (DYEC ENV 001) includes Trap replacement strategy and cleaning procedures by rinsing with water, acetone and hexane (in conformance with EPS 1 RM/2).

Previous relative accuracy testing data of the AMESA system when using the reference method (Environment Canada's EPS 1 RM/2) was significantly greater than the RA criterion of 10%.

Data trends from previous testing are typical of results in which the sampling (decline as the initial run of each 3 run test program is typically the highest result) is plagued with insufficient cleaning (as commented by AMESA's manufacturer).

Proposed Work Plan

Objective of this Work Plan: outline revised strategy to improve the consistency of data and complete the performance evaluation of the AMESA LTSS.

The proposed modifications to this Work Plan is a continuation of best efforts to evaluate the performance of the AMESA LTSS.

The complete set of data will be evaluated to determine if the AMESA LTSS provides an accurate estimate of the emissions of dioxins and furans from the Durham York Energy Centre.

Using NATO/CCMS (1989) toxicity equivalency factors with full detection limit.

Highlights of the proposed AMESA Work Plan

1. Incorporate AMESA sampling system cleaning procedures that more fully replicate reference method procedures, specifically EPS 1/RM 2.
2. Substitute the paired RA approach with the validation protocol included within the proposed Technical Specifications for long term sampling systems for PCDD/PCDF as published by the British Standards Institution (BSI) in April 2015.
3. Modify the reference method to replicate the AMESA sampling approach.
4. Eliminate Relative Accuracy (RA) validation testing due to poor correlation of AMESA results, as compared to the reference method used (EPS 1/RM 2).
5. Incorporate a sliding scale for the maximum deviation in relation to the TEQ concentration (BSI specifications CEN/TS 1948-5, Table I.1 in Annex I).

Comments: *CEN/TS 1948-5:2015 is not a British Standards Institute Specification. It is a Swedish Standard Institute Technical Specification; based on copy provided by John Chandler (Environmental Consultant for this program).*

Ministry Comments

The Work Plan strategy of using the Swedish Standard Institute (SSI) Technical Specification CEN/TS 1948-5:2015 relevance deviations between the reference method result and the LTSS (in lieu of Relative accuracy testing) is reasonable due to the extreme low levels of PCDDs/PCDFs and dioxin like PCBs expected in the exhaust gas stream.

The altering of the reference method, by using a single fixed sampling point rather than the grid measurements (multiple point sampling) during this data validation trial, is reasonable; but it is to be noted that it only serves to demonstrate consistency of the data by using a source of traceable accuracy (reference method). As indicated in CEN/TS 1948-5:2015, this approach has not been intended to be used for demonstrating compliance with long term monitoring emission limit values.

A second stage of this Work Plan shall be taken into consideration, if the data validation is successful. This second stage shall be conducted by operating the AMESA system using the single fixed sampling point. Although, the reference method uses the grid measurement approach (as it is designed to include potential spatial and temporal stratification that may be occurring due to the process dynamic/fluctuations).

The present Work Plan emphasizes the single fixed sampling point and CEN/TS 1948-5:2015 relevance deviations. At the end of this email there are some highlights extracted from CEN/TS 1948-5:2015 that should form part of this Work Plan.

Covanta indicates the continuation of the use of NATO/CCME 1988 as the source of toxic equivalent (TEQ) factors. In April 2012, Ontario Regulation 419/05, was amended to reflect that the NATO/CCME 1988 TEQ factors were no longer reflecting the expected impact from PCDDs/PCDFs; and as such, the World Health Organization (WHO)TEQ factors were to be used at once to for such impact determination (this is also highlighted in the MOECC Summary of Standards and Guidelines to Support Ontario Regulation 419/05 - Air Pollution – Local Air Quality).

The PCDDs/PCDFs in-stack TEQ concentrations are to be based on WHO TEQ factors, that includes the dioxin-like PCBs.

Sampling methodology:

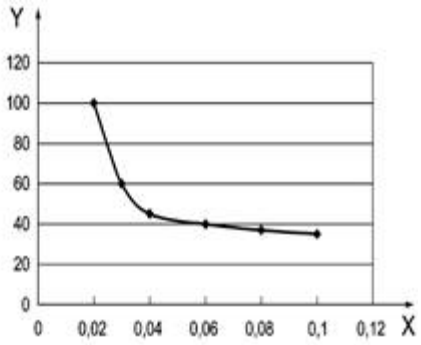
- Five manual method tests of eight hours duration each are conducted sequentially and compared to a single AMESA test spanning the entire 40 hour period covered by the manual tests.
- AMESA testing will use a fixed sampling point in the centre of the duct to mirror the behavior of the AMESA system (Reference method uses multiple sampling points, following the strategy set in the Ontario Source Testing Code, Method ON-5).
- Isokinetic sampling; with the ability to ability of the system to automatically adjust to changes in flow due to changes in the steam generation rate and resultant flue gas flow rate.
- Reference method sampling probe will not traverse the flue gas duct during the entire validation sampling period but rather remain stationary in the duct close to the AMESA sampling port.
- Sampling ports are located in a highly "non-ideal" location (4.4 equivalent duct diameters downstream and 0.7 equivalent duct diameters upstream from the nearest flow disturbances.
- Ability to maintain isokinetic flow successfully is understood to be a key parameter for any long term dioxin sampling system to generate representative data of long term DYEC operation.

Swedish Standard Institute (SSI) Technical Specification CEN/TS 1948-5:2015

- Validation trial required to be carried out to demonstrate comparability of the long-term method against the standard reference method
- Validation trial does not require grid measurements (multiple point sampling)
- The AMESA long term sampling system and the standard reference method validation conditions shall be identical according to the specifications of the long range measurement system.
- Specification does not specify its potential use for **demonstrating compliance with long term emission limit values**.
- Approach not directly applicable to finding a representative point for long term dioxin sampling but provides a pragmatic approach based on temperature, velocity and gas concentrations (O_2, NOx CO).
- Technical Specification on sampling of PCDDs, PCDFs and PCBs using filter/condenser method (two other sampling principles are discussed in the technical specifications, but do not apply to the AMESA system).
- Concentration range 0.003 ng WHO-TEQ/m^3 up to 4.0 ng WO-TEQ/m^3.
- Sampling system collects PCDD/PSCDF and PCBs in the gaseous and particulate form. The technical standard considers the whole collection system as the sampling unit which is sent to the laboratory for analysis.
- Long term sampling and standard reference sampling shall be performed in parallel for at least 40 hours.
- Long term sampling performed for 6 to 8 hours. At least 5 samples of the standards reference method are required.
- Field blank needed to ensure that no significant contamination has occurred during all steps of the measurement.
- Thermal desorption of the probe and sampling line by increasing the temperature to 200^{o}C to remove trace organic compounds which can settle in the probe after a long term sampling. The duration of the purge is typically 15 to 30 minutes.
- Long term sampling system (filter/condenser method) extracts the sample above the flue gas dew point (at approximately125^{o}C), and cool down the sampling gas to about 20^{o}C to prevent thermal degradation of the XAD_2 adsorption medium.
- Quantitation limit less than 5% of the total amount collected (expressed in WHO-TEQ).

- XAD_2 cartridge shall be mounted in a vertical direction in order to avoid channeling, and flue gas shall flow from top to bottom of the XAD_2 cartridge.
- Filter efficiency higher than 99.5% on a test aerosol with a mean particle diameter of 0.3 um at the maximum flow rate anticipated (to be certified by the filter supplier).
- Condensate to be analyzed to validate that less than 10% WHO-TEQ breakthrough occurred.
- Sampling train leak check required to be performed.
- The difference between the mean value of the multiple samples of the standard reference method and the single long-term sample shall be within 35% of the value determined by the standard reference method on the corresponding WHO-TEQ value. If the measurement results are much lower than 0.1 ng WHO-TEQ, the relevance deviations between the reference method result and the long-term sampling system will be checked according to the following table:

Concentration ng I-TEQ/m^3 (at standard conditions, dry)	Maxim. deviation %
0,02	100
0,03	60
0,04	45
0,06	40
0,08	37
0,1	35



Key
X concentration in ng I-TEQ/m^3 (at standard conditions)
Y maximum deviation in %

- O_2 concentrations measured by a certified measurement device, with the probe located near the PCDD/PCDF/PCB sampling probe.
- Technical Specification assumes that low dust concentrations (<20 mg/m^3) in the flue gas show gaseous characteristics (particles less than an aerodynamic diameter of 4.5 um) under standard conditions.
- Field blank values used for calculation of LOD (Level of Detection) representing possible sources of contamination during the complete measurement procedure.
- Extreme low levels of PCBs during the sampling period, even low levels in the field blank samples are problematic.

Please revise the Work Plan accordingly.

Regards,

Sandra