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March 31, 2017

File: 160950528

Attention: Ms. Marinha Antunes, Air Quality Analyst

Ministry of the Environment and Climate Change

Technical Support Section

5775 Yonge Street, 8th Floor

North York, ON M2M 4J1

Dear Ms. Antunes,

**Reference: Durham York Energy Centre, MOECC Data Validation Review of Q2 & Q3 2016
Quarterly Reports (April to June 2016 and July to September 2016)**

The Ministry of the Environment and Climate Change (MOECC) conducted a review and issued a comment letter (dated January 10, 2017) regarding the Q2 and Q3 2016 quarterly reports for the Durham York Energy Centre (DYEC) project. This letter provides our responses to the MOECC's comments and is an addendum to the reports.

1.0 CONTINUOUS PARAMETERS

MOECC Comment #1 (page 2 of 3): *On April 26/2016, a string of zeroes from 0 to 9 am were reported for PM_{2.5} at Rundle Station (45200). A similar trend is noted at different times of the day on April 27 through April 30, 2016. The explanation in the log that these were due to low air pollution events and occasionally the drift of the nephelometer was provided. Although a drift occurs, these should not be occurring for long periods such as April 26 to April 30, and May 18/2016, etc. Monthly calibrations have been performed at this station, however it is recommended to perform a zero check on a weekly basis to correct this issue. This has been previously discussed during the July 28, 2016 meeting among MOECC and Stantec staff.*

Stantec Response: As noted in the edit log, these strings of zeros are suspected to be due to a combination of periods with low ambient PM_{2.5} levels and nephelometer drift. The July 28, 2016 meeting between the MOECC and Stantec discussed the non-continuous Hi-Vol monitors and both Stantec and Valley Environmental Services (VES) do not recall a discussion with the MOECC regarding a zero check to be performed on a weekly basis. However, as requested by the MOECC, Stantec and VES will begin conducting zero checks on both monitors on a weekly basis starting the week of April 3, 2017. The weekly zero checks will be continued until the next quarterly MOECC audit, at which time the PM_{2.5} monitoring data will be reviewed with the MOECC auditor and the need for continuation of the weekly zero checks re-evaluated and discussed with the MOECC.



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Discussions were held with the MOECC instrumentation specialists regarding implementing an additional maintenance procedure (not discussed in the manufacturer's manual) in addition to the MOECC Operations Manual and manufacturer's manual requirements. This additional procedure was performed at both stations in August 2016 and is now performed on an as-needed basis based on daily reviews of the monitoring data for the presence of repeating zero measurements. Since implementation of this maintenance procedure, the incidences of repeating zero values have decreased – as noted by the MOECC in Comment #3 below. The Rundle Road Station Q4 2016 and January/February 2017 monitoring data have no incidences of repeating zero PM_{2.5} measurements, which suggests that implementation of the new maintenance procedure has been effective at reducing this issue.

MOECC Comment #2 (page 2 of 3): *Zero drift corrections should be applied to the PM_{2.5} data as noted above, so that the annual report has the revised concentrations.*

Stantec Response: The PM_{2.5} Sharp monitor does not record values below zero. If the instrument has negative drift, negative values are not recorded and therefore a zero offset cannot be estimated from the measurement data. The monitor measures a mass concentration based on both the nephelometer and beta attenuation readings. The relationship between the beta concentration and nephelometer concentration may indicate zero drift in the instrument and could be used for correcting zero drift. However, the individual nephelometer and beta detector readings cannot be logged and downloaded via the analog data logger setup utilized in the monitoring stations as per the Ambient Monitoring Plan. The Sharp monitor's internal memory cannot retain long-term records (more than one week). As such, these data were not available to estimate zero drift corrections for the PM_{2.5} data recorded in April 2016.

This MOECC comment and the Stantec response will be included in the 2016 annual report.

MOECC Comment #3 (page 2 of 3): *Overall, the strings of zeroes were less frequent during the third quarter compared to the second quarter.*

Stantec Response: Acknowledged. Fewer incidences of multiple hours with zero PM_{2.5} concentrations have been measured since the new maintenance procedure discussed in Comment #1 (above) was implemented in August 2016.

MOECC Comment #4 (page 2 of 3): *During the third quarter, as reported in section 3.4 of the quarterly report, there were zero drifts beyond 5 ppb for NO₂ and SO₂ concentrations. Please note as per the Operations Manual for Air Quality Monitoring in Ontario, NO₂ and SO₂ concentrations should be corrected if a zero drift exceeds 5 ppb. Please revisit the data and if any corrections are applicable they should be reflected in the annual report.*



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Stantec Response: Section 3.4 of the Q3 2016 quarterly report provides a summary of monitor internal calibrations – these are not required information to be included in quarterly reports by the MOECC Operations Manual, but have been included at the request of the MOECC. The internal zero/span checks utilize uncertified zero and SO₂ permeation tube sources, which Section 4.3 of the MOECC Operations Manual notes are not recommended for auto span adjustment. The MOECC Operations Manual requires zero drift corrections to be performed when external performance checks with calibration equipment certified to a primary reference standard (e.g., United States National Institute of Standards and Technology (NIST)) are utilized. As per the Environment Canada document, “*National Air Pollution Surveillance Network Quality Assurance and Quality Control Guidelines*”, which is referenced in the MOECC Operations Manual and discussed in Section 3.4 of the Q3 2016 quarterly report, daily internal zero checks are not recommended as a basis for analyzer zero or span adjustments, calibration updates, or adjustment of ambient data. Rather, they should be used as a quick and convenient method to check for possible analyzer malfunction or drift between calibrations.

Section 3.4 of the Q3 2016 quarterly report discusses the instances for which the auto zeros were greater than 5 ppb and the rationales for not adjusting the data – review of the instrument measurements around each occurrence did not support the instrument zero actually having drifted by greater than 5 ppb. Additional detail for each occurrence is provided below:

- *Rundle NO_x monitor (September 8, 2016 – Automatic NO_x zero was 10.7ppb): Ambient NO_x measurements within 24 hours prior to and after this check ranged from 0.1 to 13.8 ppb. The measurements were within the normal operating range of the instrument and the variation in the measured levels over this period did not show evidence of the instrument drift actually being greater than 5 ppb.*
- *Rundle SO₂ monitor (July 27, 2016 – Automatic zero was 7.3 ppb): Ambient SO₂ measurements within 24 hours before and after the check ranged from 0.9 – 10.8 ppb. The measurements were within the normal operating range of the instrument and did not show evidence of the instrument drift actually being greater than 5 ppb.*
- *Rundle SO₂ monitor (August 2, 2016 – Automatic zero was 6.3 ppb): Ambient SO₂ measurements within 24 hours before and after the auto-zero ranged from 2.6 – 22.6 ppb and did not show evidence of the instrument drift actually being greater than 5 ppb.*

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2.0 NON-CONTINUOUS PARAMETERS

MOECC Comment #1 (page 2 of 3): *The field sheets provided for TSP/Metals are incomplete for the following sampling dates; May 30th 2016, and June 11th 2016. Please ensure that the final elapsed time and pressure are documented.*

Stantec Response: Both field sheets have been updated and have been forwarded to the MOECC under a separate cover. The operator has reviewed the requirement to ensure the final elapsed time and pressure are documented properly.

MOECC Comment #2 (page 2 of 3): *The TSP and metals data at Courtice were invalid on May 6 and May 12 based on the Hi-Vol flow being below the 40 CFM ministry's requirement. However, on May 6 and May 12, Rundle and fence line HiVol flows were 10% above the ministry's flow requirement and the data was still reported. Please provide a rationale in the annual report as to why the data were not invalidated.*

Stantec Response: The TSP and metals data at the Courtice WPCP stations were invalidated on May 6 and 12 due to the unit's mass flow controller malfunctioning and being unable to maintain a consistent flowrate, which resulted in the Hi-Vol flow being below the 40 cfm MOECC requirement.

As discussed with the MOECC at the initiation of the monitoring program and also discussed at a meeting with the MOECC on July 28, 2016, during the May 6 and 12 runs, Stantec was operating the TSP/metals Hi-Vol samplers following the U.S. Environmental Protection Agency (U.S. EPA) reference method for TSP Hi-Vol sampling (IO-2.1) and reviewing the flow data following the requirements of Section 11.4.1 of IO-2.1. Following the IO-2.1 methodology, the May 6 and 12 runs at the Rundle Road and Fence Line Stations were within $\pm 10\%$ of 40 cfm (-1% to 1% at the Rundle Road Station and -7% to -1% at the Fence Line Station).

At the July 28, 2016 meeting, Stantec and the MOECC agreed to utilize, going forward, a Hi-Vol sampling methodology for TSP/metals corresponding with a MOECC method rather than the U.S. EPA protocol.

The MOECC comment and the Stantec response will be included in the 2016 annual report.

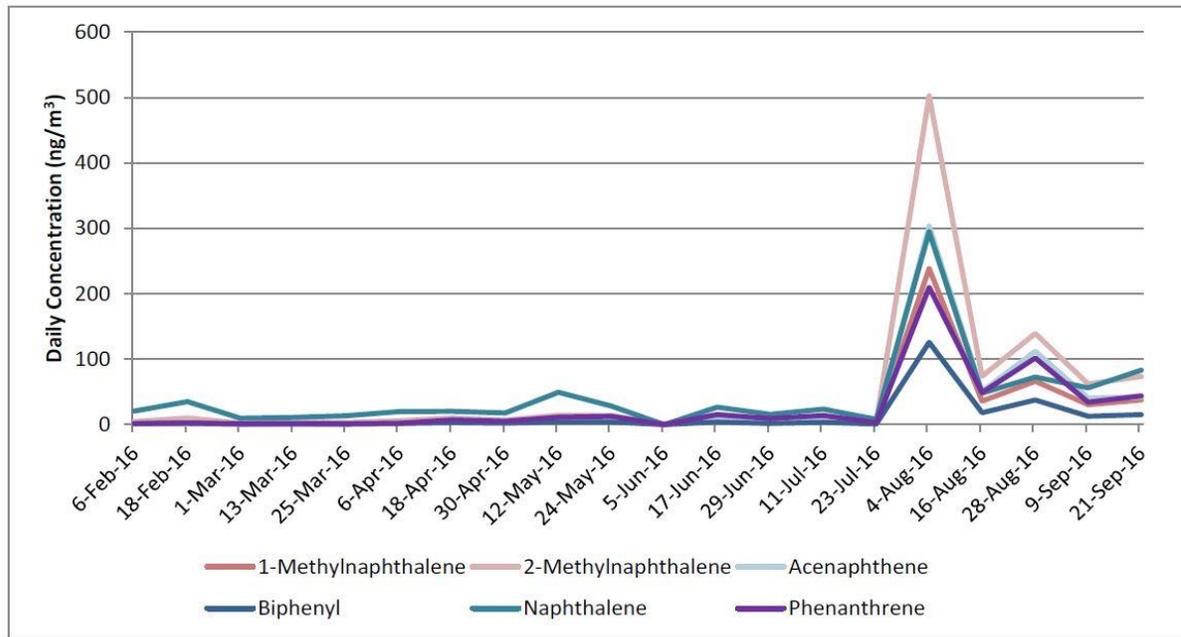
MOECC Comment #3 (page 2 of 3): *For the third quarter at Rundle Station, it was noticed that selected PAHs were significantly greater by a factor of 10 and in a few cases a factor of 100 compared to the first and second quarter concentrations. As illustrated in Figure 1, the individual PAHs that had elevated readings were 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, biphenyl, naphthalene and phenanthrene. Based on a spot check of the Lab Certificate Analysis, the concentrations which were reported appear to be in the correct units (ng/m³). However, a rationale in the annual report as to why these readings were significantly greater during the third quarter compared to the first and second quarter of 2016 must be discussed in the annual report.*



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Figure 1 Selected 24-hour PAHs Measurements at Rundle Station during 2016



Stantec Response: During the data validation process for the Q3 report, Stantec confirmed with the analytical laboratory that the units for these data were correct. Although concentrations of these contaminants are higher than Q1 and Q2 measurements, they were still below their applicable MOECC criteria. These PAHs can be generated from a variety of activities including combustion sources such as vehicle exhaust or domestic heating, and earth movement (construction, agriculture, etc.). Stantec personnel observed mobile construction equipment (excavators, bulldozers, haul trucks, etc.) associated with Highway 418 construction activities operating in the area from August to the end of Q3. This timing is consistent with the elevated concentrations of these individual PAHs measured at the Rundle Road Station in Q3 relative to Q1 and Q2. As seen in **Figure 2**, which plots the concentrations of these individual PAHs over all of 2016, elevated levels of these PAHs correspond with the period for which Highway 418 mobile equipment were observed to be operating. Winds at the Rundle Road Station in Q3 were blowing predominately from the west-southwest – a direction for which the Highway 418 construction activities would be upwind of the Rundle Road Station.

For August 4, 2016, when the highest levels of these PAHs were measured, the wind directionality was highly variable, with winds blowing from all compass quadrants over the course of the day. There are therefore numerous potential contributors to this measurement including Highway 418 construction, Highway 401, a CN rail line, local roads and residences, agricultural activities, etc.

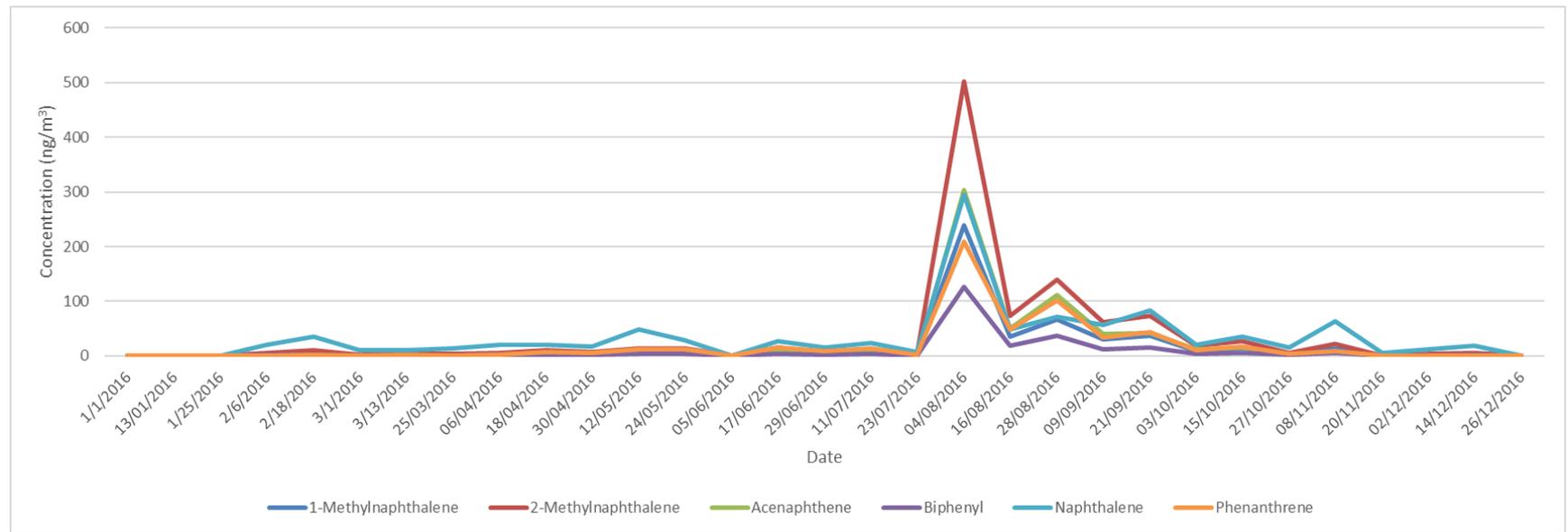
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Figure 2: Measured 24-Hour Average PAH Concentrations for 2016 at the Rundle Road Station





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We trust that this letter has addressed the MOECC's questions and comments. Please contact the undersigned if you would like to discuss further.

Regards,

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