

June 5, 2018
File: 160950528

Attention: Ms. Emilee O’Leary, Regional Environmental Assessment Coordinator
Ministry of the Environment and Climate Change
Technical Support Section
5775 Yonge Street, 8th Floor
North York, ON M2M 4J1

Dear Ms. O’Leary,

**Reference: Durham York Energy Centre, MOECC Data Validation Review of Q3 & Q4 2017
Quarterly Reports (July to September 2017 and October to December 2017)**

The Ministry of the Environment and Climate Change (MOECC) conducted a review and issued a comment letter (dated April 20, 2018) regarding the Q3 and Q4 2017 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 Q3 CONTINUOUS PARAMETERS

MOECC Comment #1 (page 2 of 6): *While reviewing the wind rose for the Rundle station, a discrepancy was found when comparing the wind rose shown in Figure 4-1 of the quarterly report with that of the wind rose prepared by the ministry as shown in Figure 1 below.*

Please revisit the quarterly wind rose for the Rundle station to ensure validity and accuracy in the representation of wind patterns for Q3.

Stantec Response: The wind rose for the Rundle Road Station presented by the MOECC plots the wind speed/direction data with barbs at a very high resolution (every 5 degrees) relative to the more conventional wind rose resolution shown in Figure 4-1 of the Q3 report. The discrepancy noted by the MOECC is simply due to this difference in the presentation format. The same data presented in Figure 4-1 of the Q3 report is re-plotted in Figure 1-1 below with the finest resolution (barbs every ten degrees) that the Lakes Environmental software package that Stantec utilizes is capable of plotting, and shows a wind rose very similar to that in Figure 1 of the MOECC comment letter (reproduced in Figure 1-2 below). We therefore confirm that Figure 4-1 of the Q3 report accurately represents the validated data presented in the Q3 report and associated attachments.

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Figure 1-1 Wind Rose for Q3 at the Rundle Road Station Plotted at a Finer Resolution

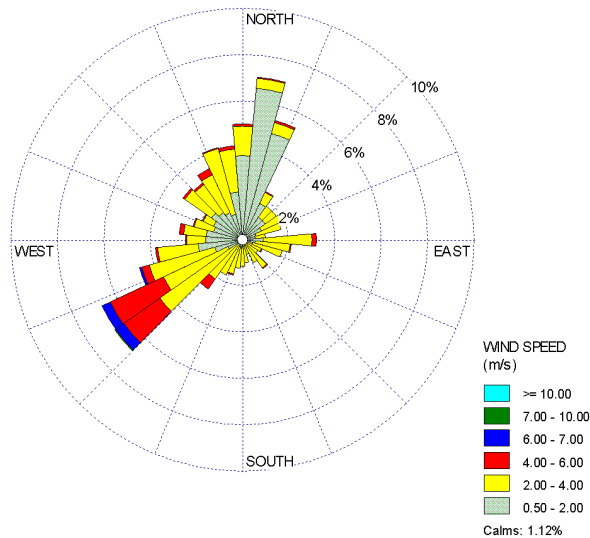
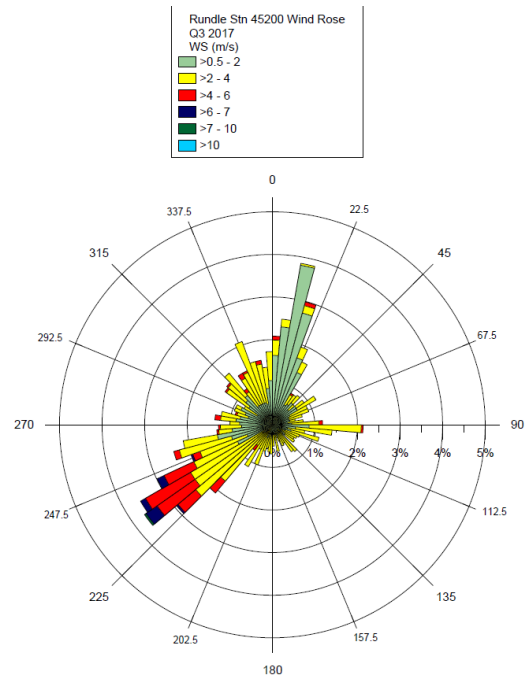


Figure 1-2 Wind Rose as Presented by the MOECC (Figure 1 of Comment Letter)



MOECC Comment #2 (page 2 of 6): While reviewing the 24-hour average $PM_{2.5}$ pollution rose, there were some discrepancies[sic] noted in the wind direction as illustrated in Figure 2. Please revisit the $PM_{2.5}$ pollution rose at the Rundle station and clarify that the wind direction is accurate.

Stantec Response: Stantec has reviewed the Q3 pollution rose presented for the Rundle station for 24-hour $PM_{2.5}$ measurements and has confirmed that Figure 4-6 is correct. The MOECC pollution rose provided in the comment letter appears to use 1-hour average $PM_{2.5}$ measurements and 1-hour average wind direction data (see the comparison between the three pollution roses shown in Table 1-1 below). The pollution roses presented in the quarterly reports for $PM_{2.5}$ use 24-hour average concentrations and vector-averaged 24-hour wind direction data.

MOECC Comment #3 (page 3 of 6): With respect to $PM_{2.5}$, the data is deemed to be valid; however the above noted discrepancies in regards to the pollution rose must be clarified.

Stantec Response: As noted in the response to MOECC Comment #2 above, the $PM_{2.5}$ pollution rose and data are valid.

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Table 1-1 Comparison of PM_{2.5} Pollution Roses for the Rundle Station - MOECC Analysis, Q3 Report and Validated Hourly Data

Figure 4-6 of Q3 Report (using 24-hour Average PM _{2.5} Data)	
Ministry Pollution Rose (Figure 2 of Comment Letter)	
Stantec - Pollution Rose of Validated Q3 Data with 1- hour Average PM _{2.5} Data and 1-hour Average Wind Direction Data	

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2.0 Q3 – OTHER COMMENTS

MOECC Comment (page 3 of 6): When reviewing Appendix F edit logs for PM_{2.5} at the Courtice station, edit # 60 records the incorrect start and end dates. The dates should read 26-Aug-17 and 27-Aug-17 not 26-Jul-17 and 27-Jul-17. Please re-visit and correct this entry.

Stantec Response: Edit #60 describes PM_{2.5} data that was invalidated between 5-Jul-17 and 6-Jul-17 due to the Sharp pump not operating during this period and is consistent with the Courtice July PM_{2.5} data presented in Appendix E. No correction is required.

MOECC Comment (page 3 of 6): The reason and date provided for edit # 73 at the Courtice station for PM_{2.5} are incorrect, as the reason provided does not match with the start and end date/times. Please re-visit and correct this entry.

Stantec Response: Edit log entry #73 for PM_{2.5} at Courtice applies to 26-Aug-17 to 27-Aug-17 rather than 26-July-17 to 27-July-17. The reason (data review) is valid for this time in August. The Courtice PM_{2.5} edit log has been revised with this correction and is provided in Attachment 1.

MOECC Comment (page 4 of 6): The reason provided for edits # 83 and #84 are not valid, the date referenced in the reason does not match the start and end date/times. Please revisit and correct this entry.

Stantec Response: The MOECC does not specify which station or instrument is being referred to in this comment but is believed to refer to Rundle Road Station PM_{2.5}. In reviewing comment #83 for this station/instrument, it was noted that data was said to be invalidated on 28-Jul-17 at 14:00. The edit action for this item should be "Data Review" with the reason being "Potential malfunction with nephelometer stabilizing error being displayed. Data reviewed and deemed valid.". The reason provided for Edit #84 for this station should read "Offset of 0.4 µg/m³ applied due to zero drift" rather than an offset of 1.1.

The Rundle Road PM_{2.5} edit log has been revised to address these typographic errors and is provided in Attachment #2.

MOECC Comment (page 4 of 6): Please revisit and correct the maximum value reported in Table 4-4 for BaP at the Rundle station.

Stantec Response: The maximum B(a)P concentration measured at the Rundle Road Station during Q3 2017 should be 1.13E-01, not 1.13E-02. A revised version of Table 4-4 is provided in Attachment #3.

MOECC Comment (page 4 of 6): Please revisit the maximum values reported in Table 4-6 for the Dioxins and Furans at the Courtice station. It appears September 28th, 2017 values may not have been incorporated in the calculation.

Stantec Response: Stantec has revised Table 4.6 to include Dioxins and Furans sampling from 28-Sep-17. The revised table is provided in Attachment 4.

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3.0 Q4 NON-CONTINUOUS PARAMETERS

MOECC Comment #1 (page 4 of 6): While reviewing Table 4-6 "Source Contribution Analysis – Quarter 4 2017 B(a)P Exceedances" a discrepancy was found with the reported Wind Direction. Figure 1 displays the wind roses for Dec 9th 2017, created by MOECC TSS, utilizing the submitted validated continuous meteorological data. Our wind rose shows that the winds were blowing from the west and southwest. However Table 4-6 indicates that the winds were blowing from the northeast. Please provide the Met data used to determine the wind direction on December 9th 2017.

Stantec Response: The typographic error in Table 4-6 has been updated to report the correct wind direction (west-southwest) occurring during the Dec 9th B(a)P exceedance at Courtice and Rundle. The revised Table 4-6 is provided in Attachment 5 of this letter.

MOECC Comment #2 (page 5): Please revisit the minimum values reported in Table 4-3 for the TSP/Metals at Courtice and Rundle stations. It appears December 27th, 2017 values may not have been incorporated in the calculation.

Stantec Response: Table 4-3 has been revised to include TSP/Metals measurements from 27-Dec-17 and is included in this letter as Attachment 6.

MOECC Comment #3 (page 5): Please revisit and correct the minimum values reported in Table 4-5 for total PAH at the Courtice station.

Stantec Response: The minimum total PAH measured at Courtice has been updated in Table 4-5 to correspond with the data presented in Appendix H. A revised Table 4-5 is provided in Attachment 7 of this letter.

MOECC Comment #4 (page 5 of 6): Please review the elapsed time readings found in the field data sheets for DF/PAH for the December 21st 2017 start date.

Stantec Response: It has been confirmed that the December 21, 2017 PAH sampling terminated at 2305.07 hours at Rundle, instead of 3305.07 hours as indicated on the Rundle Field Sheet. The concentration calculations associated with this sampling event were based on the 2305.07 hours termination time (estimated total sampling duration of 24.46 hours).

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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,

Stantec Consulting Ltd.



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Attachments:

Attachment 1 – Courtice Q3 PM_{2.5} Edit Log

Attachment 2 – Rundle Q3 PM_{2.5} Edit Log

Design with community in mind

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Attachment 3 – Q3 Table 4-4 Summary of Ambient Measured PAH Concentrations

Attachment 4 – Q3 Table 4-6 Summary of Ambient Measured Dioxins and Furans Concentrations

Attachment 5 – Q4 Table 4-6 Source Contribution Analysis for B(a)P Exceedances

Attachment 6 – Q4 Table 4-3 Summary of Ambient Measured TSP and Metals Concentrations

Attachment 7 – Q4 Table 4-5 Summary of Ambient Measured PAH Concentrations

Attachment 1
Courtice Q3 PM_{2.5} Edit Log

Project Name	Durham York Energy Centre Ambient Air Monitoring Program							
Contact	Greg Crooks / Connie Lim / Brian Bylhouwer		Phone:	905-944-7777		E-mail:	greg.crooks@stantec.com, connie.lim@stantec.com, brian.bylhouwer@stantec.com	
Station number:	N/A		Station Name:	Courtice WPCP Station				
Station address:	Courtice Water Pollution Control Plant		Emitter Address:	The Region of Durham, 605 Rossland Rd, Whitby, ON				
Pollutant or parameter:	PM _{2.5}	Instrument make & model:		Thermo Sharp 5030 Synchronized Hybrid Ambient Real-time Particulate Monitor			Serial Number:	E-1569
Data edit period	Start date:	1-Jul-17	End date:	30-Sep-17			Time Zone : EST	
Edit #	Edit date	Editor's Name	Edit Action	Starting		Ending		Reason
				Date (dd/mm/yyyy)	Hour (xx:xx)	Date (dd/mm/yyyy)	Hour (xx:xx)	
51	3-Aug-17	TH	Invalidate minute data	27-Jul-17	22:08	27-Jul-17	22:08	Elevated concentration observed during filter tape advance
52	3-Aug-17	TH	Invalidate minute data	28-Jul-17	00:06	31-Jul-17	16:06	Invalidate concentration peaks during filter tape advances at 00:09, 08:09 and 16:09
53	3-Aug-17	TH	Invalidate minute data	13-Jul-17	13:22	13-Jul-17	13:25	Zero check
54	3-Aug-17	TH	Invalidate minute data	20-Jul-17	11:17	20-Jul-17	11:25	Zero check
55	8-Aug-17	TH	Invalidate minute data	27-Jul-17	11:00	27-Jul-17	11:10	Monthly calibration
56	8-Aug-17	TH	Invalidate	27-Jul-17	10:00	27-Jul-17	10:00	Monthly calibration
57	8-Aug-17	TH	Invalidate	1-Jul-17	08:00	1-Jul-17	08:00	Check for debris
58	8-Aug-17	TH	Invalidate	4-Jul-17	10:00	4-Jul-17	10:00	Zero check
59	8-Aug-17	TH	Zero correction	27-Jun-17	10:00	4-Jul-17	09:00	Offset of 1.2 µg/m³ applied due to zero drift.
60	8-Aug-17	TH	Invalidate	5-Jul-17	07:00	6-Jul-17	07:00	Pump was off. Invalidate data
61	8-Aug-17	TH	Invalidate	26-Jul-17	13:00	26-Jul-17	14:00	Remove monitor and install original
62	10-Aug-17	TH	Zero correction	26-Jul-17	15:00	27-Jul-17	09:00	Offset of 1.0 µg/m³ applied due to zero drift.
63	20-Oct-17	TH	Invalidate	27-Jul-17	09:00	27-Jul-17	10:00	Zero check
64	7-Oct-17	BB	Data review	11-Jul-17	08:00	11-Jul-17	12:00	Elevated levels of up to 28 µg/m³ were measured. Concentrations were also high at Oshawa in the two hours prior, when winds were northerly. At the time of elevated concentrations, winds were southwesterly. The data was deemed valid.
65	7-Oct-17	BB	Data review	27-Jul-17	07:00	27-Jul-17	14:00	Elevated levels of up to 18 µg/m³ were measured without a corresponding trend at the Rundle or Oshawa Stations. Winds were westerly - potential emission sources in this direction include agricultural activities. The data was deemed valid.
66	7-Oct-17	BB	Invalidate	30-Aug-17	14:00	30-Aug-17	15:00	Monthly Calibration
67	7-Oct-17	BB	Zero correction	27-Jul-17	11:00	1-Aug-17	09:00	Offset of -0.2 µg/m³ applied due to zero drift.
	7-Oct-17	BB	Invalidate	1-Aug-17	09:00	1-Aug-17	10:00	Zero check
68	7-Oct-17	BB	Invalidate	2-Aug-17	07:00	2-Aug-17	13:00	Pump turned off. Data invalidated
69	7-Oct-17	BB	Zero correction	1-Aug-17	11:00	8-Aug-17	10:00	Offset of 4.2 µg/m³ applied due to zero drift.
	7-Oct-17	BB	Invalidate	8-Aug-17	10:00	8-Aug-17	11:00	Zero check
70	7-Oct-17	BB	Invalidate	14-Aug-17	11:00	14-Aug-17	12:00	Zero check. Data invalidated
71	7-Oct-17	BB	Invalidate	21-Aug-17	10:00	21-Aug-17	11:00	Zero check. Data invalidated
72	7-Oct-17	BB	Invalidate	24-Aug-17	11:00	24-Aug-17	12:00	Zero check. Data invalidated
73	7-Oct-17	BB	Data review	26-Aug-17	21:00	27-Aug-17	05:00	Elevated levels of up to 256 µg/m³ were measured without a corresponding trend at the Rundle or Oshawa Stations. Winds were north-northeasterly. Fire was reported at the DYEC, and was likely primary contributor to elevated concentrations. The data was deemed valid.
74	9-Oct-17	BB	Data review	24-Sep-17	11:00	24-Sep-17	14:00	Elevated levels of up to 32 µg/m³ were measured without a corresponding trend at Oshawa and lower concentrations at Rundle. Elevated Concentrations of NOx were also measured at this time, indicating a potential local combustion source. Winds were westerly during this time. Potential emission sources in this direction include agricultural activities. The data was deemed valid.
75	9-Oct-17	BB	Zero correction	30-Aug-17	16:00	5-Sep-17	10:00	Offset of -0.6 µg/m³ applied due to zero drift.
	9-Oct-17	BB	Invalidate	5-Sep-17	11:00	5-Sep-17	12:00	Zero check
76	9-Oct-17	BB	Invalidate	26-Sep-17	13:00	26-Sep-17	14:00	Calibration
77	9-Oct-17	BB	Invalidate	19-Sep-17	13:00	19-Sep-17	14:00	Monthly Calibration
78	9-Oct-17	BB	Invalidate	29-Sep-17	09:00	29-Sep-17	10:00	Quarterly Audit
79	10-Oct-17	BB	Invalidate	14-Sep-17	11:00	14-Sep-17	12:00	Zero check. Data invalidated
80	10-Oct-17	BB	Invalidate	18-Sep-17	11:00	18-Sep-17	12:00	Zero check. Data invalidated
81	10-Oct-17	BB	Invalidate	26-Sep-17	11:00	26-Sep-17	12:00	Zero check. Data invalidated

Examples of Acceptable Edit Actions:

Add offset of
Delete hours
Zero Correction
Slope Correction
Manual data entry for missing, but collected data
Invalidating span & zero check data
Invalidating data due to equipment malfunctions and power failures.
Invalidating data when instrumentation off-line
Marking data as out-of-range
Test

Attachment 2
Rundle Q3 PM_{2.5} Edit Log

Project Name		Durham York Energy Centre Ambient Air Monitoring Program			Phone:		905-944-7777		E-mail:		greg.crooks@stantec.com, connie.lim@stantec.com, brian.bylhouwer@stantec.com			
Contact		Greg Crooks / Connie Lim / Brian Bylhouwer												
Station number:		45200			Station Name:		Rundle Road Station							
Station address:		Rundle Road / Baseline Road			Emitter Address:		The Region of Durham, 605 Rossland Rd, Whitby, ON							
Pollutant or parameter:		PM _{2.5}			Instrument make & model:		Thermo Sharp 5030 Synchronized Hybrid Ambient Real-time		Serial Number:		E-1569			
Data edit period		Start date:		1-Jul-17		End date:		30-Sep-17		Time Zone : EST				
Edit #		Edit date		Editor's Name		Edit Action		Starting		Ending		Reason		
								Date (dd-mm-yy) Hour (xxxx)		Date (dd-mm-yy) Hour (xxxx)				
74		3-Aug-17		TH		Invalidate minute data		1-Jul-17 00:09		31-Jul-17 16:09		Invalidate concentration peaks during filter tape advances at 00:09, 08:09 and 16:09		
75		3-Aug-17		TH		Invalidate minute data		13-Jul-17 13:55		13-Jul-17 14:03		Zero check		
76		3-Aug-17		TH		Invalidate minute data		20-Jul-17 08:25		20-Jul-17 08:38		Zero check		
77		3-Aug-17		TH		Invalidate minute data		26-Jul-17 10:49		26-Jul-17 11:05		Maintenance of unit		
78		9-Aug-17		TH		Invalidate minute data		27-Jul-17 07:50		27-Jul-17 07:59		Monthly calibration		
79		10-Aug-17		TH		Invalidate		4-Jul-17 08:00		4-Jul-17 08:00		Zero check		
80		10-Aug-17		TH		Zero correction		27-Jun-17 13:00		4-Jul-17 07:00		Offset of 1.0 µg/m³ applied due to zero drift.		
81		10-Aug-17		TH		Invalidate		27-Jul-17 08:00		27-Jul-17 08:00		Monthly calibration		
82		10-Aug-17		TH		Invalidate		28-Jul-17 08:00		28-Jul-17 08:00		Leak check		
83		10-Aug-17		TH		Data Review		28-Jul-17 14:00		28-Jul-17 14:00		Potential malfunction with nephelometer stabilizing error being displayed. Data reviewed and deemed valid.		
84		10-Aug-17		TH		Zero correction		20-Jul-17 09:00		27-Jul-17 07:00		Offset of 0.4 µg/m³ applied due to zero drift.		
85		4-Oct-17		BB		Data review		28-Jul-17 17:00		29-Jul-17 03:00		Elevated levels of 16 µg/m³ were measured without a corresponding trend at the Courtice or Oshawa Stations. Winds were northerly during this time. Potential emission sources in this direction include local roads and businesses, and agricultural activity. Minute data was reviewed and measurements were reasonably consistent throughout this time period. Therefore, the data was deemed valid.		
86		4-Oct-17		BB		Invalidate		28-Jul-17 08:00		28-Jul-17 08:00		Leak check		
87		7-Oct-17		BB		Invalidate		29-Aug-17 13:00		29-Aug-17 15:00		Monthly calibration		
88		7-Oct-17		BB		Data review		10-Aug-17 01:00		10-Aug-17 09:00		Elevated levels of 29 µg/m³ were measured without a corresponding trend at the Courtice or Oshawa Stations. Winds were northerly during this time. Potential emission sources in this direction include local roads and businesses, and agricultural activity. Minute data was reviewed and measurements were reasonably consistent throughout this time period. Therefore, the data was deemed valid.		
89		7-Oct-17		BB		Invalidate		1-Aug-17 07:00		1-Aug-17 08:00		Zero check		
90		7-Oct-17		BB		Zero correction		1-Aug-17 09:00		8-Aug-17 11:00		Offset of 1.1 µg/m³ applied due to zero drift.		
91		7-Oct-17		BB		Invalidate		14-Aug-17 07:00		14-Aug-17 08:00		Zero check		
92		7-Oct-17		BB		Zero correction		8-Aug-17 13:00		14-Aug-17 07:00		Offset of -1.0 µg/m³ applied due to zero drift.		
93		7-Oct-17		BB		Invalidate		21-Aug-17 14:00		21-Aug-17 15:00		Zero check		
94		7-Oct-17		BB		Invalidate		24-Aug-17 09:00		24-Aug-17 10:00		Zero check		
95		7-Oct-17		BB		Data review		19-Aug-17 02:00		19-Aug-17 06:00		Repeating values of 0.2 µg/m³ were investigated. Measurements fluctuated, but appear as 0.2 µg/m³ due to round off.		
96		9-Oct-17		BB		Invalidate		26-Sep-17 11:00		26-Sep-17 12:00		Calibration		
97		9-Oct-17		BB		Invalidate		19-Sep-17 10:00		19-Sep-17 11:00		Monthly Calibration		
98		9-Oct-17		BB		Invalidate		29-Sep-17 11:00		29-Sep-17 12:00		Quarterly Audit		
99		9-Oct-17		BB		Data review		4-Sep-17 19:00		4-Sep-17 22:00		Elevated levels of 28 µg/m³ were measured without a corresponding trend at the Courtice or Oshawa Stations. Winds were southerly during this time. Potential emission sources in this direction include Highway 401, local roads and businesses, and agricultural activity. Minute data was reviewed and measurements were reasonably consistent throughout this time period. Therefore, the data was deemed valid.		
100		9-Oct-17		BB		Data review		16-Sep-17 18:00		16-Sep-17 20:00		Elevated levels of 27 µg/m³ were measured without a corresponding trend at the Courtice or Oshawa Stations. Winds were northerly during this time. Potential emission sources in this direction include local roads and businesses, and agricultural activity. Minute data was reviewed and measurements were reasonably consistent throughout this time period. Therefore, the data was deemed valid.		
101		9-Oct-17		BB		Invalidate		5-Sep-17 15:00		5-Sep-17 16:00		Zero Check. Data invalidated.		
102		10-Oct-17		BB		Invalidate		14-Sep-17 09:00		14-Sep-17 09:00		Zero check		
103		10-Oct-17		BB		Zero correction		5-Sep-17 17:00		14-Sep-17 08:00		Offset of 1.4 µg/m³ applied due to zero drift.		
		10-Oct-17		BB		Invalidate		18-Sep-17 14:00		18-Sep-17 15:00		Zero check		
		10-Oct-17		BB		Zero correction		14-Sep-17 10:00		18-Sep-17 13:00		Offset of -1.3 µg/m³ applied due to zero drift.		
		10-Oct-17		BB		Invalidate		26-Sep-17 09:00		26-Sep-17 10:00		Zero Check. Data invalidated.		

Examples of Acceptable Edit Actions:

Add offset of
Delete hours
Zero Correction
Slope Correction
Manual data entry for missing, but collected data
Invalidating span & zero check data
Invalidating data due to equipment malfunctions and power failures.
Invalidating data when instrumentation off-line
Marking data as out-of-range
Test

Attachment 3
Q3 Table 4-4 Summary of Ambient
Measured PAH Concentrations

Table 4-4 Summary of Measured Ambient PAH Concentrations

Contaminant	Units	MOECC Standards	HHRA Health Based Criteria	Courtice WPCP (Predominately Upwind)			Rundle Road (Predominately Downwind)		
				Maximum	Minimum	No. of Exceedances	Maximum	Minimum	No. of Exceedances
Benzo(a)pyrene	ng/m ³	0.05 ^A 5 ^B 1.1 ^C	1	8.14E-02	1.24E-02 ^F	1 0 0	1.13E-01	1.15E-02 ^F	1 0 0
1-Methylnaphthalene	ng/m ³	12,000	-	1.97E+01	3.44E+00	0	2.94E+01	3.09E+00	0
2-Methylnaphthalene	ng/m ³	10,000	-	3.35E+01	5.91E+00	0	6.92E+01	5.60E+00	0
Acenaphthene	ng/m ³	-	-	1.70E+01	1.91E+00	-	4.41E+01	1.93E+00	-
Acenaphthylene	ng/m ³	3,500	-	7.63E-01	7.06E-02 ^F	0	7.18E-01	7.28E-02 ^F	0
Anthracene	ng/m ³	200	-	6.02E-01	9.89E-02 ^F	0	3.11E+00	1.15E-01 ^F	0
Benzo(a)anthracene	ng/m ³	-	-	1.10E-01 ^F	7.06E-02	-	1.15E-01 ^F	7.06E-02 ^F	-
Benzo(a)fluorene	ng/m ³	-	-	2.20E-01 ^F	1.41E-01 ^F	-	3.95E-01	1.46E-01 ^F	-
Benzo(b)fluoranthene	ng/m ³	-	-	1.10E-01 ^F	7.06E-02 ^F	-	1.15E-01 ^F	7.06E-02 ^F	-
Benzo(b)fluorene	ng/m ³	-	-	2.20E-01 ^F	1.41E-01 ^F	-	2.29E-01 ^F	1.41E-01 ^F	-
Benzo(e)pyrene	ng/m ³	-	-	2.20E-01 ^F	1.41E-01 ^F	-	2.29E-01 ^F	1.41E-01 ^F	-
Benzo(g,h,i)perylene	ng/m ³	-	-	1.10E-01 ^F	7.06E-02 ^F	-	1.15E-01 ^F	7.06E-02 ^F	-
Benzo(k)fluoranthene	ng/m ³	-	-	1.10E-01 ^F	7.06E-02 ^F	-	1.15E-01 ^F	7.06E-02 ^F	-
Biphenyl	ng/m ³	-	-	9.67E+00	1.49E+00	-	1.42E+01	9.48E-01	-
Chrysene	ng/m ³	-	-	1.10E-01 ^F	7.06E-02 ^F	-	1.15E-01 ^F	7.06E-02 ^F	-
Dibenz(a,h)anthracene ^D	ng/m ³	-	-	1.10E-01 ^F	7.06E-02 ^F	-	1.15E-01 ^F	7.06E-02 ^F	-
Dibenzo(a,c) anthracene + Picene ^D	ng/m ³	-	-	2.20E-01 ^F	1.41E-01 ^F	-	2.23E-01 ^F	1.37E-01 ^F	-
Fluoranthene	ng/m ³	-	-	2.64E+00	5.34E-01	-	1.39E+01	4.22E-01	-
Indeno (1,2,3-cd)pyrene	ng/m ³	-	-	1.10E-01 ^F	7.06E-02 ^F	-	1.15E-01 ^F	7.06E-02 ^F	-
Naphthalene	ng/m ³	22,500	22,500	9.22E+01	1.60E+01	0	8.54E+01	1.05E+01	0
o-Terphenyl	ng/m ³	-	-	2.20E-01 ^F	1.41E-01 ^F	-	2.29E-01 ^F	1.41E-01 ^F	-
Perylene	ng/m ³	-	-	2.20E-01 ^F	1.41E-01 ^F	-	2.29E-01 ^F	1.41E-01 ^F	-
Phenanthrene	ng/m ³	-	-	1.64E+01	2.81E+00	-	6.98E+01	2.24E+00	-
Pyrene	ng/m ³	-	-	1.16E+00	1.08E-01 ^F	-	5.59E+00	1.15E-01 ^F	-
Tetralin	ng/m ³	-	-	4.88E+00	9.60E-01	-	3.84E+00	9.61E-01	-
Total PAH ^E	ng/m ³	-	-	1.97E+01	3.44E+00	-	3.09E+02	2.91E+01	-

A. Ontario Ambient Air Quality Criteria. The standard for benzo(a)pyrene (B(a)P) is for B(a)P as a surrogate for PAHs.

B. O. Reg. 419/05 Schedule 6 Upper Risk Thresholds.

C. O. Reg. 419/05 24 Hour Guideline.

D. Based on laboratory analyses, dibenzo(a,c)anthracene co-elutes with dibenz(a,h)anthracene. Picene elutes after dibenz(a,h)anthracene.

E. The reported total PAH is the sum of all analyzed PAH species.

F. Measured concentration was less than the laboratory method detection limit.

Attachment 4
Q3 Table 4-6 Summary of Ambient
Measured Dioxins and Furans
Concentrations

Table 4-6 Summary of Measured Ambient Dioxins and Furans Concentrations

Contaminant	Units	MOECC Standards	HHRA Health Based Criteria	Courtfice WPCP (Predominately Upwind)			Rundle Road (Predominately Downwind)		
				Maximum	Minimum	No. of Exceedances	Maximum	Minimum	No. of Exceedances
2,3,7,8-Tetra CDD *	pg/m ³	-	-	4.47E-03 ^A	4.22E-03 ^A	N/A	4.69E-03 ^A	3.84E-03	N/A
1,2,3,7,8-Penta CDD	pg/m ³			7.12E-03 ^A	4.45E-03 ^A		8.38E-03 ^A	4.11E-03	
1,2,3,4,7,8-Hexa CDD	pg/m ³			2.93E-02 ^A	4.70E-03 ^A		3.72E-02 ^A	4.39E-03	
1,2,3,6,7,8-Hexa CDD	pg/m ³			6.46E-02 ^A	4.70E-03 ^A		8.24E-02 ^A	4.25E-03	
1,2,3,7,8,9-Hexa CDD	pg/m ³			1.17E-01 ^A	4.30E-03 ^A		1.47E-01 ^A	3.84E-03	
1,2,3,4,6,7,8-Hepta CDD	pg/m ³			1.35E+00 ^A	4.73E-03		1.67E+00	1.37E-02	
Octa CDD	pg/m ³			4.85E+00	2.41E-02		7.87E+00	3.59E-02	
Total Tetra CDD	pg/m ³			2.42E-02 ^A	4.22E-03 ^A		3.58E-02 ^A	4.60E-03	
Total Penta CDD	pg/m ³			2.72E-02 ^A	4.45E-03 ^A		5.91E-02 ^A	4.11E-03	
Total Hexa CDD	pg/m ³			6.09E-01 ^A	4.73E-03 ^A		7.76E-01 ^A	4.25E-03	
Total Hepta CDD	pg/m ³			2.47E+00 ^A	4.73E-03		3.15E+00	1.37E-02	
2,3,7,8-Tetra CDF **	pg/m ³			1.15E-02 ^A	4.30E-03 ^A		1.05E-02 ^A	4.25E-03	
1,2,3,7,8-Penta CDF	pg/m ³			4.69E-03 ^A	4.48E-03 ^A		4.97E-03 ^A	4.11E-03	
2,3,4,7,8-Penta CDF	pg/m ³			4.75E-03 ^A	4.48E-03 ^A		4.97E-03 ^A	4.11E-03	
1,2,3,4,7,8-Hexa CDF	pg/m ³			4.83E-03 ^A	4.48E-03 ^A		1.19E-02 ^A	3.84E-03	
1,2,3,6,7,8-Hexa CDF	pg/m ³			4.54E-03 ^A	4.26E-03 ^A		4.55E-03 ^A	3.70E-03	
2,3,4,6,7,8-Hexa CDF	pg/m ³			4.83E-03 ^A	4.55E-03 ^A		4.69E-03 ^A	3.98E-03	
1,2,3,7,8,9-Hexa CDF	pg/m ³			1.23E-02 ^A	4.75E-03 ^A		1.07E-02	4.25E-03	
1,2,3,4,6,7,8-Hepta CDF	pg/m ³			7.29E-02	3.87E-03		5.88E-02 ^A	3.70E-03	
1,2,3,4,7,8,9-Hepta CDF	pg/m ³			1.15E-02 ^A	4.48E-03 ^A		5.42E-03 ^A	4.60E-03	
Octa CDF	pg/m ³			7.12E-02 ^A	4.59E-03		1.11E-01 ^A	3.98E-03	
Total Tetra CDF	pg/m ³			1.15E-02 ^A	4.30E-03 ^A		6.99E-02	4.54E-03	
Total Penta CDF	pg/m ³			5.93E-03 ^A	4.55E-03 ^A		1.26E-02 ^A	4.45E-03	
Total Hexa CDF	pg/m ³			1.71E-02 ^A	4.73E-03 ^A		3.44E-02 ^A	3.98E-03	
Total Hepta CDF	pg/m ³			1.11E-01 ^A	4.45E-03		1.35E-01 ^A	4.25E-03	
TOTAL TOXIC EQUIVALENCY ^B	pg TEQ/m ³	0.1 1 ^C	-	5.15E-02	1.41E-02	0	6.47E-02	1.28E-02	0

A. Measured concentration was less than the laboratory method detection limit.
B. Total Toxicity Equivalent (TEQ) concentration contributed by all dioxins, furans and dioxin-like PCBs calculated as per O. Reg. 419/05 methodology using corresponding WHO₂₀₀₅ toxic equivalency factors (TEFs) and a value of half the minimum detection limit (MDL) substituted for concentrations less than the MDL.
C. O. Reg. 419/05 Schedule 6 Upper Risk Thresholds.
* CDD - Chloro Dibenzo-p-Dioxin, ** CDF - Chloro Dibenzo-p-Furan.

Attachment 5
Q4 Table 4-6 Source Contribution
Analysis for B(a)P Exceedances

Table 4-6 Source Contribution Analysis – Quarter 4 2017 B(a)P Exceedances

Date	Station	% above the MOECC B(a)P Criterion	Wind Direction (blowing from)	Potential Source Contributions
15-Nov-17	Rundle Road	50%	East-southeast	Highway 401, St. Mary's Cement, and a CP railroad are located upwind of the Rundle Road Station. Potential sources could be vehicle, locomotive, or other combustion exhaust emissions.
9-Dec-17	Courtice WPCP	15%	West-southwest	Land use in this direction is primarily agricultural. Potential sources could be agricultural activities.
	Rundle Road	120%	West-southwest	Land use in this direction is a mix of agricultural and commercial. Highway 418 construction activities were observed upwind of the Rundle Road Station during this quarter. Potential sources could be a nearby business with a poorly controlled combustion source operating, construction vehicle exhaust, or Highway 418 construction activities.

Attachment 6
Q4 Table 4-3 Summary of Ambient
Measured TSP and Metals
Concentrations

Table 4-3 Summary of Measured Ambient TSP/Metals Concentrations

Contaminant	Units	MOECC Criteria	HHRA Health Based Criteria	Courtice WPCP (Predominately Upwind)			Rundle Road (Predominately Downwind)			Fence Line		
				Maximum	Minimum	No. of Exceedances	Maximum	Minimum	No. of Exceedances	Maximum	Minimum	No. of Exceedances
Particulate	µg/m³	120	120	42.2	12.7	0	232	20.2	1	59.2	15.6	0
Total Mercury (Hg)	µg/m³	2	2	3.62E-05	6.39E-06 ^A	0	4.85E-05	5.94E-06 ^A	0	4.19E-05	6.12E-06 ^A	0
Aluminum (Al)	µg/m³	4.8	-	1.49E-01	1.77E-02	0	1.08E+00	3.69E-02	0	3.29E-01	5.53E-02	0
Antimony (Sb)	µg/m³	25	25	3.73E-03 ^A	3.20E-03 ^A	0	3.69E-03 ^A	2.97E-03 ^A	0	3.49E-03 ^A	3.05E-03 ^A	0
Arsenic (As)	µg/m³	0.3	0.3	2.24E-03 ^A	1.92E-03 ^A	0	2.21E-03 ^A	1.78E-03 ^A	0	2.10E-03 ^A	1.83E-03 ^A	0
Barium (Ba)	µg/m³	10	10	1.84E-02	3.32E-03	0	3.20E-02	4.43E-03	0	2.61E-02	6.04E-03	0
Beryllium (Be)	µg/m³	0.01	0.01	3.73E-04 ^A	3.20E-04 ^A	0	3.69E-04 ^A	2.97E-04 ^A	0	3.49E-04 ^A	3.05E-04 ^A	0
Bismuth (Bi)	µg/m³	-	-	2.24E-03 ^A	1.92E-03 ^A	-	2.21E-03 ^A	1.78E-03 ^A	-	2.10E-03 ^A	1.83E-03 ^A	-
Boron (B)	µg/m³	120	-	4.26E-03	1.92E-03 ^A	0	4.22E-03	1.78E-03 ^A	0	5.71E-03	1.83E-03 ^A	0
Cadmium (Cd)	µg/m³	0.025	0.025	7.45E-04 ^A	6.39E-04 ^A	0	7.38E-04 ^A	5.94E-04 ^A	0	2.31E-03	6.10E-04 ^A	0
Chromium (Cr)	µg/m³	0.5	-	1.86E-03 ^A	1.60E-03 ^A	0	4.51E-03	1.49E-03 ^A	0	7.65E-03	1.53E-03 ^A	0
Cobalt (Co)	µg/m³	0.1	0.1	7.45E-04 ^A	6.39E-04 ^A	0	7.38E-04 ^A	5.94E-04 ^A	0	6.99E-04 ^A	6.10E-04 ^A	0
Copper (Cu)	µg/m³	50	-	5.22E-02	3.45E-03	0	5.51E-02	5.76E-03	0	3.75E-02	4.42E-03	0
Iron (Fe)	µg/m³	4	-	5.21E-01	1.32E-01	0	2.17E+00	1.01E-01	0	9.47E-01	2.15E-01	0
Lead (Pb)	µg/m³	0.5	0.5	1.09E-02	9.59E-04 ^A	0	1.30E-02	9.76E-04 ^A	0	8.66E-03	9.32E-04 ^A	0
Magnesium (Mg)	µg/m³	-	-	2.43E-01	5.84E-02	-	1.76E+00	9.76E-02	-	5.66E-01	8.52E-02	-
Manganese (Mn)	µg/m³	0.4	-	2.21E-02	3.62E-03	0	7.74E-02	3.84E-03	0	4.06E-02	8.20E-03	0
Molybdenum (Mo)	µg/m³	120	-	1.12E-03 ^A	9.59E-04 ^A	0	3.53E-03	9.55E-04 ^A	0	3.49E-03	9.19E-04 ^A	0
Nickel (Ni)	µg/m³	0.2	-	1.12E-03 ^A	9.59E-04 ^A	0	2.69E-03	8.91E-04 ^A	0	2.29E-03	9.16E-04 ^A	0
Phosphorus (P)	µg/m³	-	-	5.16E-02	7.99E-03 ^A	-	1.13E-01	8.67E-03 ^A	-	5.33E-02	8.73E-03 ^A	-
Selenium (Se)	µg/m³	10	10	3.73E-03 ^A	3.20E-03 ^A	0	3.69E-03 ^A	2.97E-03 ^A	0	3.49E-03 ^A	3.05E-03 ^A	0
Silver (Ag)	µg/m³	1	1	1.86E-03 ^A	1.60E-03 ^A	0	1.85E-03 ^A	1.49E-03 ^A	0	1.75E-03 ^A	1.53E-03 ^A	0
Strontium (Sr)	µg/m³	120	-	5.00E-03	1.36E-03	0	7.54E-02	3.25E-03	0	1.38E-02	2.38E-03	0
Thallium (Tl)	µg/m³	-	-	3.73E-03 ^A	3.20E-03 ^A	-	3.69E-03 ^A	2.97E-03 ^A	-	3.49E-03 ^A	3.05E-03 ^A	-
Tin (Sn)	µg/m³	10	10	3.73E-03 ^A	3.20E-03 ^A	0	3.69E-03 ^A	2.97E-03 ^A	0	3.49E-03 ^A	3.05E-03 ^A	0
Titanium (Ti)	µg/m³	120	-	9.59E-03	3.20E-03 ^A	0	6.46E-02	3.25E-03 ^A	0	2.08E-02	3.06E-03 ^A	0
Vanadium (V)	µg/m³	2	1	1.86E-03 ^A	1.60E-03 ^A	0	3.43E-03	1.49E-03 ^A	0	1.75E-03 ^A	1.53E-03 ^A	0
Zinc (Zn)	µg/m³	120	-	2.46E-01	1.35E-02	0	2.95E-01	1.10E-02	0	1.83E-01	1.07E-02	0
Zirconium (Zr)	µg/m³	20	-	1.86E-03 ^A	1.60E-03 ^A	0	1.85E-03 ^A	1.49E-03 ^A	0	1.75E-03 ^A	1.53E-03 ^A	0
Total Uranium (U)	µg/m³	1.5	-	1.68E-04 ^A	1.44E-04 ^A	0	1.66E-04 ^A	1.34E-04 ^A	0	1.57E-04 ^A	1.37E-04 ^A	0

A. Measured concentration was less than the laboratory method detection limit.

Attachment 7
Q4 Table 4-5 Summary of Ambient
Measured PAH Concentrations

Table 4-5 Summary of Measured Ambient PAH Concentrations

Contaminant	Units	MOECC Criteria	HHRA Health Based Criteria	Courtice WPCP (Predominately Upwind)			Rundle Road (Predominately Downwind)		
				Maximum	Minimum	No. of Exceedances	Maximum	Minimum	No. of Exceedances
Benzo(a)pyrene	ng/m ³	0.05 ^A 5 ^B 1.1 ^C	1	5.77E-02	8.00E-03	1 0 0	1.10E-01	9.45E-03	2 0 0
1-Methylnaphthalene	ng/m ³	12,000	-	6.73E+00	1.99E+00	0	9.51E+00	2.58E+00	0
2-Methylnaphthalene	ng/m ³	10,000	-	1.14E+01	3.20E+00	0	1.77E+01	4.11E+00	0
Acenaphthene	ng/m ³	-	-	3.86E+00	5.26E-01	-	8.49E+00	8.17E-01	-
Acenaphthylene	ng/m ³	3,500	-	2.99E-01 ^F	6.83E-02 ^F	0	1.18E+00	7.22E-02 ^F	0
Anthracene	ng/m ³	200	-	2.99E-01	6.83E-02 ^F	0	4.01E-01	7.14E-02 ^F	0
Benzo(a)anthracene	ng/m ³	-	-	1.10E-01 ^F	6.83E-02 ^F	-	1.13E-01 ^F	7.14E-02 ^F	-
Benzo(a)fluorene	ng/m ³	-	-	2.19E-01 ^F	1.37E-01 ^F	-	2.27E-01 ^F	1.43E-01 ^F	-
Benzo(b)fluoranthene	ng/m ³	-	-	1.10E-01 ^F	6.83E-02 ^F	-	4.36E-01	7.14E-02 ^F	-
Benzo(b)fluorene	ng/m ³	-	-	2.19E-01 ^F	1.37E-01 ^F	-	2.27E-01 ^F	1.43E-01 ^F	-
Benzo(e)pyrene	ng/m ³	-	-	2.19E-01 ^F	1.37E-01 ^F	-	2.27E-01 ^F	1.43E-01 ^F	-
Benzo(g,h,i)perylene	ng/m ³	-	-	1.10E-01 ^F	6.83E-02 ^F	-	1.13E-01 ^A	7.14E-02 ^F	-
Benzo(k)fluoranthene	ng/m ³	-	-	1.10E-01 ^F	6.83E-02 ^F	-	1.13E-01 ^A	7.14E-02 ^F	-
Biphenyl	ng/m ³	-	-	3.57E+00	1.07E+00	-	4.83E+00	1.28E+00	-
Chrysene	ng/m ³	-	-	1.10E-01 ^F	6.83E-02 ^F	-	1.13E-01 ^A	7.14E-02 ^F	-
Dibenz(a,h)anthracene ^D	ng/m ³	-	-	1.10E-01 ^F	6.83E-02 ^F	-	1.13E-01 ^A	7.14E-02 ^F	-
Dibenzo(a,c) anthracene + Picene ^D	ng/m ³	-	-	2.19E-01 ^F	1.37E-01 ^F	-	2.27E-01 ^A	1.43E-01 ^F	-
Fluoranthene	ng/m ³	-	-	9.92E-01	3.14E-01	-	2.07E+00	3.94E-01	-
Indeno (1,2,3-cd)pyrene	ng/m ³	-	-	1.10E-01 ^F	6.83E-02 ^F	-	1.13E-01 ^A	7.14E-02 ^F	-
Naphthalene	ng/m ³	22,500	22,500	3.16E+01	1.20E+01	0	5.09E+01	1.46E+01	0
o-Terphenyl	ng/m ³	-	-	2.19E-01 ^F	1.37E-01 ^F	-	2.27E-01 ^A	1.43E-01 ^F	-
Perylene	ng/m ³	-	-	2.19E-01 ^F	1.37E-01 ^F	-	2.27E-01 ^A	1.43E-01 ^F	-
Phenanthrene	ng/m ³	-	-	4.54E+00	1.10E+00	-	1.01E+01	1.63E+00	-
Pyrene	ng/m ³	-	-	5.12E-01	6.83E-02 ^F	-	8.97E-01	7.14E-02 ^F	-
Tetralin	ng/m ³	-	-	2.27E+00	9.04E-01	-	1.95E+00	1.05E+00	-
Total PAH ^E	ng/m ³	-	-	6.10E+01	2.30E+01	-	9.11E+01	3.00E+01	-

A. Ontario Ambient Air Quality Criteria. The standard for benzo(a)pyrene (B(a)P) is for B(a)P as a surrogate for PAHs.

B. O. Reg. 419/05 Schedule 6 Upper Risk Thresholds.

C. O. Reg. 419/05 24 Hour Guideline.

D. Based on laboratory analyses, dibenzo(a,c)anthracene co-elutes with dibenz(a,h)anthracene. Picene elutes after dibenz(a,h)anthracene.

E. The reported total PAH is the sum of all analyzed PAH species.

F. Measured concentration was less than the laboratory method detection limit.