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April 27, 2016
File: 160950528

Attention: Ms. Emilee O'Leary
Regional Environmental Assessment Coordinator
Technical Support Section
5775 Yonge Street, 8th Floor
North York, Ontario M2M 4J1

Dear Ms. O'Leary,

Reference: Durham York Energy Centre, MOECC Data Validation Review of Q3 and Q4 2015 Quarterly Reports (July 2015 to December 2015)

The Ministry of the Environment and Climate Change (MOECC) conducted a data validation review and issued a comment letter (dated March 22, 2016) for the Q3 and Q4 2015 quarterly reports (July 2015 to December 2015) for the Durham York Energy Centre project. As requested by the MOECC, this letter is an addendum to these two reports and provides our responses to the MOECC's comments.

1.0 GENERAL COMMENTS (JULY TO DECEMBER 2015)

MOECC General Comments, Section 1 (page 1 of 4) - The MOECC has requested that monthly calibration trends for the SO₂, NO_x and PM_{2.5} monitors be provided, including the auto zero and auto span trends. This data has been attached in **Attachment A**. Table A1 summarizes the zero drift in ppb (except for PM_{2.5} which is in µg/m³) and span level as a percentage of the span gas concentration. Table A2 summarizes the monthly auto zero and auto span trends for the SO₂ and NO_x monitors. The minimum, maximum and median concentrations are presented as well as the overall standard deviation.

All monthly external calibrations were within MOECC requirements for acceptable zero drift and span concentration. The instrument auto-calibrations are intended for use in examining trends in daily changes in levels rather than for comparison to MOECC external calibration requirements. Span auto-calibration levels will be dependent on the instrument perm tube output on that day.

2.0 PM_{2.5} COMMENTS (JULY TO DECEMBER 2015)

2.1 PM_{2.5} COMMENTS, NOTE 1, FIVE BULLET POINTS (PAGES 1 & 2 OF 4)

The MOECC has requested clarification on five discrepancies between the edit logs and the edits done to the raw data with respect to the July 25th to September 9th relative humidity issues at Courtice. These included:



Reference: Durham York Energy Centre, MOECC Data Validation Review of Q3 and Q4 2015 Quarterly Reports (July 2015 to December 2015)

- Invalidated PM_{2.5} data on August 4, 2015 between 2:00 and 6:00 at the Courtice WPCP station was not included in the edit log.
- Invalidated PM_{2.5} data on August 20, 2015 between 00:00 and 10:00 at the Courtice WPCP station was incorrectly entered into the edit logs as being between 00:00 and 12:00.
- Invalidated PM_{2.5} data at the Courtice WPCP station from August 29, 2015 at 22:00 to August 30, 2015 at 2:00 was incorrectly entered into the edit logs as being between August 29, 2015 at 22:00 and August 30, 2015 at 3:00.
- The invalidated Courtice WPCP station PM_{2.5} data from September 6, 2015 at 21:00 to September 7, 2015 at 6:00 was incorrectly entered into the edit logs as being between September 6, 2015 at 21:00 and September 17, 2015 at 6:00.
- Invalidated Courtice WPCP station PM_{2.5} data from September 8, 2015 between 3:00 and 11:00 was incorrectly entered into the edit logs as being between 3:00 and 12:00

The discrepancies identified above by the MOECC were all due to typographical errors when the reviewer was manually entering descriptions of his/her validation actions into the Courtice station edit log. These discrepancies did not affect the measurement data or the measurement results presented in the Q3 report. The edit log has been updated accordingly for all these issues and a revised version is provided with this addendum. For all future submissions entries into the instrument edit logs and report tables will be double-checked by a peer reviewer to ensure they have been entered correctly.

2.2 MOECC PM_{2.5} COMMENTS, SECTION 2 (PAGE 2 OF 4)

The MOECC requested that the third quarter edit log for Courtice PM_{2.5} should indicate that the missing data between September 23rd at 13:00 and September 30th at 23:00 was a result of the instrument being down for annual maintenance and to specify what annual maintenance was performed.

As requested, additional details regarding the actions taken during annual maintenance have also been included in the edit log which is provided with this addendum. The annual maintenance included: cleaning the air inlet system, rebuilding the vacuum pump, cleaning the ambient temperature/ relative humidity shield, and calibration of the ambient temperature, pressure, flow, analog output and proportional counter.

2.3 MOECC PM_{2.5} COMMENTS, SECTION 3 (PAGE 2 OF 4)

The MOECC requested that Table 3-3 of the fourth quarterly report should indicate that as a result of a sample pump issue at the Courtice WPCP station, PM_{2.5} data between October 29, 2015 and November 3, 2015 was not collected.

As requested, Table 3-3 of the 2015 Q4 report has been revised to indicate that the data collected during this timeframe was invalidated.



Reference: Durham York Energy Centre, MOECC Data Validation Review of Q3 and Q4 2015 Quarterly Reports (July 2015 to December 2015)

2.4 MOECC PM_{2.5} COMMENTS, SECTION 4 (PAGE 2 OF 4)

The MOECC noted that Table 3-3 of the fourth quarterly report should indicate that as a result of instrument issues at the Courtice WPCP station, the data from November 6 – November 12, 2015 data was invalidated. MOECC also noted that the time frame for this event was incorrectly entered as starting on November 5th rather than November 6th.

As requested, Table 3-3 has been updated to indicate that the data was invalidated due to instrument issues and the typographical error in the date has been corrected.

2.5 MOECC PM_{2.5} COMMENTS, SECTION 5 (PAGE 2 OF 4)

The MOECC requested an explanation of the reported PM_{2.5} concentration of -0.4 µg/m³ at the Courtice WPCP station on December 13, 2015 at 10:00.

As noted in the edit log for this instrument (for the period December 11th to 14th), due an incorrect instrument setting on the analog output channel to the external data logger, the PM_{2.5} measurements used in the data validation and reporting were downloaded directly from the monitor's internal memory and manually entered into the data analysis spreadsheet. This negative value was overlooked during this manual data replacement/validation process and should have been reported as value of zero. A more robust data validation process to identify negative readings during manual replacement of data will be implemented to avoid similar issues in the future.

The reading of -0.4 µg/m³ has been replaced with 0.0 µg/m³. This minor revision to the validated data did not affect any results tables in the quarterly report.

2.6 MOECC PM_{2.5} COMMENTS, SECTION 6 (PAGE 2 OF 4)

The MOECC requested clarification on the validity of the measured Courtice WPCP Station PM_{2.5} concentrations since measured values were consistently reporting as 0.2 µg/m³ for the following time frames:

- October 1, 2015 at 00:00 and October 4, 2015 at 23:00.
- October 22 at 9:00 and October 24 at 11:00
- November 12 at 15:00 and November 14 at 22:00

In the initial data validation process, these hours were not invalidated since the measurements did fluctuate slightly (when not rounded to a single decimal place) and concentrations at the Oshawa AQHI and Rundle Stations were relatively low.

2.6.1 October 1, 2015 at 00:00 and October 4, 2015 at 23:00

During this period the wind was blowing from north-northeasterly to east-southeasterly directions (18° to 107°) with wind speeds between 8.9 and 30.4 km/hr.



Reference: Durham York Energy Centre, MOECC Data Validation Review of Q3 and Q4 2015 Quarterly Reports (July 2015 to December 2015)

Review of the data at the Oshawa AQHI monitoring station in the same time period shows the measured PM_{2.5} concentrations were relatively low ranging between 2 and 5 µg/m³ and averaging 2.8 µg/m³. The concentrations at Rundle for the same time period varied between 0.7 and 17.5 µg/m³ with an average of 4.2 µg/m³.

Annual maintenance and calibration on the PM_{2.5} monitor had been performed on this monitor on September 30, 2015 and had met all required calibration criteria. Based on the relatively low concentrations at the other two stations and recent annual maintenance/calibration confirming its performance, Stantec sees no justification to invalidate these readings and the measured concentrations were likely due to low ambient PM_{2.5} in the area.

2.6.2 October 22 at 9:00 and October 24 at 11:00

The wind direction during in this time period was largely from the northwesterly and southeasterly directions with wind speeds varying from 2.7 to 26 km/hr.

The Oshawa AQHI monitoring station during the same time period measured PM_{2.5} concentrations between 2 and 15 µg/m³, averaging 3.7 µg/m³ and the Rundle station measured PM_{2.5} concentrations between 0.4 and 23.1 µg/m³, averaging 5.9 µg/m³.

Monthly calibration of this monitor had been performed on October 19, 2015 and met all calibration criteria. A Stantec technician was on site on October 23, 2015 and noted no issues (i.e. no status or error messages) with the PM_{2.5} monitor. Since both the Oshawa AQHI and the Rundle Station also measured relatively low concentrations on average and no instrument error/ status messages occurred during this period, there does not appear to be sufficient justification to invalidate this data.

2.6.3 November 12 at 15:00 and November 14 at 22:00

Winds were generally from the southwesterly to northwesterly directions (228° to 306°) with wind speeds ranging from 7.4 to 35.3 km/hr during this November period.

During the same period, the Oshawa AQHI monitoring station measured PM_{2.5} concentrations between 2 and 16 µg/m³, averaging 5.1 µg/m³ overall. At the Rundle station, PM_{2.5} concentrations ranged from 1.1 to 9.2 µg/m³, averaging 3.2 µg/m³.

During this period, the unit was in good working order as it had been recently reinstalled on November 12, 2015 following manufacturer repairs. Since the measured PM_{2.5} concentrations at Rundle and Oshawa were generally low over the same period, Stantec considers the PM_{2.5} measurements in the considered time frame to be valid and were a result of low ambient PM_{2.5} levels.



Reference: Durham York Energy Centre, MOECC Data Validation Review of Q3 and Q4 2015 Quarterly Reports (July 2015 to December 2015)

2.7 MOECC PM_{2.5} COMMENTS, SECTION 7, (PAGE 2 OF 4)

The MOECC noted that elevated concentrations of PM_{2.5} at the Courtice WPCP station were reported on; September 1st at 20:00, September 2nd at 4:00; and, December 23rd at 9:00 and has requested clarification if these times corresponded to any particular events at the DYEC.

During these 3 hours the wind directions were 112°, 332°, and 262° respectively. The wind was not blowing in a direction from which the DYEC might possibly have been influencing the monitoring station for any of these hours.

An area of land at the Courtice WPCP was open cut to take fill material to another regional site during the early September period. The area was also graded and seeded in the same time frame and may have contributed to elevated PM_{2.5} levels in the general area. Site personnel suffering from allergies also noted during this time period that the pollen count from surrounding fields was relatively high. The December period did not correspond to any noted operations at the Courtice WPCP.

3.0 SO₂ COMMENTS (JULY TO DECEMBER 2015)

3.1 MOECC SO₂ COMMENTS, SECTION 1, FIRST BULLET POINT (PAGE 3 OF 4) –

The MOECC noted and requested explanation of instrument readings of 0 µg/m³ for SO₂ for multiple consecutive hours between:

- August 1st at 0:00 and August 10th at 14:00 at Rundle.
- October 1st at 0:00 and October 19th at 9:00, with the exception of 13 hours, at Courtice.
- October 4th at 12:00 and October 8th at 8:00 at Rundle

3.1.1 August 1 at 0:00 to August 10 at 14:00 at the Rundle station.

The raw hourly data, edit logs and station log book were reviewed for this period. The instrument drifted slightly negative (less than -1 ppb) after the monthly calibration on July 31. During a station visit on August 10, the zero offset was adjusted. Since the drift was well within the MOECC acceptable range of ±5 ppb for zero drift, no off-set adjustment was applied to the data and the negative values were reported as zeros.

3.1.2 October 1 at 0:00 and October 19 at 9:00 at Courtice

The zero readings recorded between October 1 and 19 were due to instrument negative drift. The SO₂ monitor was removed on September 23 for annual maintenance and re-installed on September 30th.

A zero offset was not applied to the data for this period during Stantec's initial data validation process, as the zero drift and span concentration based on the monthly calibrations performed on September 30th and October 19th for this period were 0.231 ppb and -0.54% and were well within



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Reference: Durham York Energy Centre, MOECC Data Validation Review of Q3 and Q4 2015 Quarterly Reports (July 2015 to December 2015)

the acceptable ranges for zero drift (± 5 ppb) and span concentration ($\pm 10\%$) and negative readings automatically reported to zero.

In reviewing the raw hourly SO₂ data for this period in response to the MOECC enquiry, Stantec noted that between October 1 and 8; the instrument zero appeared to have drifted approximately -7 ppb by October 8th with drifts of less than -5 ppb occurring after the 8th. As the negative drift was noted to be higher than ± 5 ppb range for zero drift, a zero offset has been applied to the SO₂ data between October 1 and October 8. Stantec will update its data validation procedures to plot and review the trends in the raw data to identify any instances where instrument zero drift larger than ± 5 ppb may have occurred in between the monthly external calibrations and apply offsets as required.

Updated 2015 Q4 edit logs have been included in **Attachment B**.

3.1.3 October 4th at 12:00 and October 8th at 8:00 at Rundle

Stantec reviewed the raw hourly data, edit logs and station log book for this period. The instrument was removed on September 30 for annual maintenance and reinstalled on Oct 2. A slight negative drift (less than -1.5 ppb) occurred during this period. Zero drifts are typical after reinstallation as the instrument warms and stabilizes. Since the zero drift was well within the acceptable MOECC criteria of ± 5 ppb, no off-set adjustment was applied to the data and the negative concentration values were reported as zeros.

3.2 MOECC SO₂ COMMENTS, SECTION 2 (PAGE 3 OF 4)

Readings of 0 $\mu\text{g}/\text{m}^3$ were noted on November 16 between 6:00 to 9:00 and 11:00 to 17:00 at Courtice. The monitor was restarted that day due to a fault warning, however there were no error messages. MOECC suggested that additional comments should be made to indicate whether the fault warning had affected the data or contributed to the multiple 0 $\mu\text{g}/\text{m}^3$ concentrations reported for the day.

During Stantec's data validation process for the quarterly report, these hours were not invalidated as there was no error message associated with the fault warning. The zero readings were due to a slight negative drift of the instrument over that time period. Also, the SO₂ concentrations during this period were at similar levels compared with the Rundle Road station data. On November 16, the Rundle station measured SO₂ concentrations between 0.9 and 2.5 ppb, and Courtice station measured -0.6 to 3.7 ppb. Stantec saw no justification to invalidate the data at that time.

Stantec has conducted additional detailed data review in response to the MOECC enquiry. Due to multiple negative readings noted between November 15 at 21:00 and November 18 at 8:00, as well as the low flow warning and a subsequent pump failure on November 18, it is suspected that the fault warning on November 16 may have been related to intermittent pump operation over these two days. The SO₂ data starting from November 15 21:00 to November 18 8:00 has been invalidated and an updated 2015 Q4 edit log has been included in **Attachment B** of this



Reference: Durham York Energy Centre, MOECC Data Validation Review of Q3 and Q4 2015 Quarterly Reports (July 2015 to December 2015)

addendum. Tables 3-3 and 4-2 the Q4 report have been revised and included in **Attachments C and E**.

3.3 MOECC SO₂ COMMENTS, SECTION 3 (PAGE 3 OF 4)

Readings of 0 µg/m³ were noted on Nov 18 between 2:00 to 8:00 and 16:00 to 23:00 at Courtice. Low flow and low lamp output warnings were recorded for that day. MOECC suggested that additional comments should be made to indicate whether these warnings had affected the data or contributed to the multiple zero µg/m³ concentrations report for the day. As noted in Table 3-3 of the Q4 report, the SO₂ pump diaphragm failed and was replaced and reinstalled on the morning of November 18.

As described in the section above, Stantec conducted additional review of the data and the SO₂ data on November 18 prior to 8:00 has now been invalidated. The 0 µg/m³ readings on November 18 from 16:00 to 23:00 were due to zero drift as the instrument stabilized after re-installation and calibration. Since the zero drift (less than -0.5 ppb) was well within the acceptable MOECC criteria of ±5 ppb, no off-set adjustment was applied to the data and the negative concentration values were reported as zeros.

3.4 MOECC SO₂ COMMENTS, SECTION 4 (PAGE 3 OF 4)

On July 3rd between 8:00 and 10:00 at Rundle, readings of 0 µg/m³ were reported. On July 2, a UV lamp warning was noted, and on July 3, the UV lamp was adjusted. Upon detailed review of the data, no data issues were identified. The UV lamp warning is an indication that the lamp is outside the optimal settings of the output, however, it does not affect the data as the analyzer adjusts for the lamp output. A comment has been added to Table 3-4 in the Q3 report.

3.5 MOECC SO₂ COMMENTS, SECTION 5 (PAGE 3 OF 4)

Between October 29 and November 6th at Rundle, a UV lamp warning was noted and the lamp was adjusted. Upon detailed review of the data, no data issues were identified. As described above, the UV lamp warning is unlikely to have affected the data. A comment has been added to Table 3-4 in the Q4 report.

4.0 NO₂ COMMENTS (JULY TO DECEMBER 2015)

4.1 MOECC NO₂ COMMENTS, SECTION 1 (PAGE 3 OF 4)

The MOECC noted instrument readings of 0 µg/m³ for NO_x for multiple consecutive hours during a number of days:

- On August 1 between 7:00 and 19:00 at Courtice
- On August 5 between 8:00 and 19:00 at Courtice
- On August 16 at 23:00 and August 17 at 23:00 at Courtice



Reference: Durham York Energy Centre, MOECC Data Validation Review of Q3 and Q4 2015 Quarterly Reports (July 2015 to December 2015)

Stantec conducted a detailed review of the NO_x data, edit logs, calibration data, and station log book for these periods. The instrument drifted slightly negative (less than -3.5 ppb for NO_x and less than -1.1 ppb for NO) during the above noted times. As this is within the MOECC's criteria for acceptable drift of ±5 ppb, no off-set adjustment was applied to the data and the negative concentration values were reported as zeros.

4.2 MOECC NO₂ COMMENTS, SECTION 2 (PAGE 3 OF 4)

The MOECC noted that on December 31st between 15:00 and 19:00 at Courtyce, the sum of NO and NO₂ hourly concentrations differed by over 3 ppb from the NO_x concentrations for these hours.

The differences in the NO, NO₂, and NO_x measurements was determined to be due to a loose data cable connection between the monitor and data logger. During Stantec's data validation process for the Q4 2015 report, it was not readily apparent that there was an issue, since the difference in concentrations was relatively small, NO, NO₂ and NO_x do not always balance exactly, and the issue only occurred for a short time duration. Differences in NO, NO₂, and NO_x measurements were subsequently noted in January and March in 2016 during validation of the Q1 2016 data, at which time the issue with the monitor was rectified. Additional details regarding this will be provided in the Q1 2016 report.

The affected NO₂ data on December 31, 2015 have been replaced by subtracting NO from NO_x. Relative to the previously reported values, the mean NO₂ 1-hour average concentration for December decreases by a minor amount from 14.7 to 14.6 µg/m³. An updated 2015 Q4 edit log is included in **Attachment B** and an updated Table 4-2 (Summary of Ambient CAC Monitoring Data) is provided in **Attachment E**.

5.0 COMMENTS REGARDING STATION OPERATION

5.1 MOECC STATION OPERATION COMMENTS, SECTION 1 (PAGE 4 OF 4)

The MOECC has commented that the station log books should be regularly maintained and updated with equipment repairs, equipment changes, station visits, audits, calibrations, observations, and maintenance requirements.

To address this issue Stantec will implement the following measures:

- All Stantec and Valley Environmental Services (VES) staff involved in the project have reviewed the requirements for data entry in the station log book, as required in the Ambient Monitoring Quality Assurance Plan (QA Plan). Moving forward, the level of detail and timeliness of the log book entries will be improved. The station log book is the primary information source on the operation of the instruments in the shelter and all data/discussion of equipment maintenance, repair and calibration must be entered into the log book at the time of the action.



Reference: Durham York Energy Centre, MOECC Data Validation Review of Q3 and Q4 2015 Quarterly Reports (July 2015 to December 2015)

- The Stantec project manager will review the log book monthly to ensure that log book entries are up-to-date and have adequate detail. VES (and the Region) will be notified if data entries by their staff are inadequate with respect to QA Plan requirements and provide comments on any remedial actions to be taken to rectify any issue(s).
- Stantec has also implemented an annual review of the QA Plan by all staff and sub consultants working on the project. All personnel will now be required to provide written certification on an annual basis that they have reviewed and will comply with the requirements of the QA Plan.

5.2 MOECC STATION OPERATION COMMENTS, SECTION 2 (PAGE 4 OF 4)

The MOECC commented that the general upkeep of the station should be improved which Stantec will address by implementing additional measures for the general upkeep of the stations. Stantec field staff and VES have been informed to remove all debris and litter upon leaving the station on every site visit. Stantec field staff will also clean and sweep the station on a monthly basis or as required. The station checklist and maintenance checklist have been updated to include these items to ensure compliance and document the activities.

5.3 MOECC STATION OPERATION COMMENTS, SECTION 3 (PAGE 4 OF 4)

MOECC commented that the power issue identified at the Courtice WPCP station should be addressed. Power is supplied to the station from the Courtice WPCP Chemical Dosing Building located next to the monitoring station. Occasional surges or low voltage levels in the power supply from the WPCP to the monitoring station at times results in the monitors momentarily shutting down and restarting. These events typically occur for no more than a few minutes and due to their brief nature, no monitoring data is normally lost (a warning message will however, be generated by the monitor).

To rectify the power issue at this site may require the Region to modify the Chemical Dosing Building power system. The Region will review this issue with the Courtice WPCP staff to determine if there is a simple solution. If the solution would require shutting down the building's power system (and the monitoring station) for an extended period of time to effect modifications, than addressing this issue may not be feasible at this time.

5.4 MOECC STATION OPERATION COMMENTS, SECTION 4 (PAGE 4 OF 4)

The MEOCC commented that data monitoring disruption should be kept to a minimum with regularly scheduled maintenance to avoid data loss. Calibration and maintenance on all monitoring equipment at the stations are scheduled monthly which follows or exceeds the recommended calibration schedule listed in the MOE Operations Manual. The CEMS data are downloaded and reviewed every weekday for anomalous data. Instruments that do not appear to be functioning normally are investigated and addressed.



Reference: Durham York Energy Centre, MOECC Data Validation Review of Q3 and Q4 2015 Quarterly Reports (July 2015 to December 2015)

As discussed in Section 5.1 above, measures have been taken to ensure that the station log books are kept up to date with sufficient details of equipment maintenance, calibration and repairs. Stantec has also implemented a monthly maintenance checklist for Stantec field staff and VES to record all maintenance items performed that month.

Stantec and VES will continue to check and maintain all equipment in a timely fashion to minimize instrument downtime and disruption. Data recovery rates for all instruments typically meet or exceed MOECC guidelines.

6.0 SUMMARY OF RESPONSES

Based on a detailed review of the Courtice WPCP Station PM_{2.5} data in response to the MOECC requests for clarification, seven edits were made to the 2015 Q3 and Q4 instrument edit logs, two edits were made to Table 3-3 in the 2015 Q4 report and one edit was made to one hour of measurement data (that had no significant effect on the monitoring data results).

For the MOECC's SO₂ data comments, two edits were made to the 2015 Q4 instrument edit logs, three edits to Tables 3-3 and 3-4 in the Q3 and Q4 reports, and edits were made to the Oct 1 - 8 and Nov 15 - 18 data for the Courtice WPCP Station.

To address the NO₂ data comments for the Courtice WPCP Station, one edit was made to the 2015 Q4 instrument edit log, one edit was made to Table 3-3 of the Q4 report, and edits made to the monitoring data on Dec 31st.

The following attachments have been included that incorporate the edits noted above:

Attachment A - Summary of the monthly calibration trends for the SO₂, NO_x and PM_{2.5} monitors;

Attachment B - Updated 2015 Q3/Q4 Courtice WPCP Station edit logs;

Attachment C - Updated 2015 Q3 Table 3-4, 2015 Q4 Table 3-3 and 2015 Q4 Table 3-4;

Attachment D - Updated PM_{2.5} monthly summary table for December 2015, SO₂ monthly summary tables for October and November 2015, and the NO₂ monthly summary table for December 2015; and,

Attachment E - Updated Table 4-2 - Summary of Ambient CAC Monitoring Data.



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Reference: Durham York Energy Centre, MOECC Data Validation Review of Q3 and Q4 2015 Quarterly Reports (July 2015 to December 2015)

Relative to the previously reported values, the following revisions were made:

Sulphur Dioxide

- The SO₂ data recovery rate for the Courtice WPCP Station between October and December 2015 changed from 99.4% to 96.6%,
- The mean SO₂ 1-hour average concentration for October increased from 1.0 to 1.8 µg/m³,
- The mean SO₂ 1-hour average concentration for November decreased from 2.2 to 1.8 µg/m³,
- The mean SO₂ level for the Q4 period increased from 2.2 to 2.4 µg/m³,
- The standard deviation for the period decreased from 5.8 to 5.5 µg/m³.

Nitrogen Dioxide

- The mean NO₂ 1-hour average concentration for December decreased from 14.7 to 14.6 µg/m³, but there was no change in the data recovery rate.

No significant revisions were made to the PM_{2.5} data provided in the Q3/Q4 2015 reports and the PM_{2.5} data recovery rate remained unchanged.

No changes were made to the Q3 2015 data. The minor edits to the Q4 2015 data did not affect the results or conclusions of the Q4 2015 report with regard to ambient PM_{2.5}, SO₂ and NO₂ levels.

Regards,

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Reference: Durham York Energy Centre, MOECC Data Validation Review of Q3 and Q4 2015 Quarterly Reports (July 2015 to December 2015)

Attachment: Attachment A – Calibration Trends
Attachment B – Updated Station Edit Logs
Attachment C - Summary of Instrument Issues
Attachment D - Updated Monthly Summaries
Attachment E - Summary of Ambient CAC Monitoring Data

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ATTACHMENT A

**MONTHLY CALIBRATION, AUTO ZERO AND SPAN TRENDS FOR SO₂, NO_x AND PM_{2.5}
MONITORS (JULY TO DECEMBER 2015)**

Attachment A - Monthly Calibration Auto Zero and Span Trends for SO₂, NO_x and PM_{2.5} Monitors (July to December 2015)

Table A1 - Monthly Calibration Trends (July to December 2015)

Monthly Calibration Date	Monthly Calibration Trends (Q3/Q4 2015)																	
	Courtice									Rundle								
	Zero Drift (ppb) ^A				Zero Drift (µg/m ³) ^B	Span Drift (% of range) ^C				Zero Drift (ppb) ^A				Zero Drift (µg/m ³) ^B	Span Drift (% of range) ^C			
	SO ₂	NO _x	NO	NO ₂	PM _{2.5}	SO ₂	NO _x	NO	NO ₂	SO ₂	NO _x	NO	NO ₂	PM _{2.5}	SO ₂	NO _x	NO	NO ₂
3-Jul-15 ^D	-	0.1	0.1	0	-	-	-9.3	-8.9	0.3	-	0.3	0.1	0.2	-	-	-10.9	-11.8	0.9
31-Jul-15	1.4	3	0.1	2.8	0.5	-6.1	1.5	-0.2	1.7	0.2	0.1	0.6	-0.5	1.2	4.7	-0.9	1.7	-2.7
20-Aug-15	0.7	-2.6	-1.3	-1.3	0.5	-3.4	-5.5	-5.5	0.0	0.6	-0.6	-1	0.3	1.1	-4.9	-1.5	-2.4	0.7
23-Sep-15	0.4	0	1	-1	0.3	2.1	-7.3	-7.5	0.0	0.6	0.4	0.4	0	1.5	-0.3	2.0	1.0	-0.1
19-Oct-15	0.2	2	2.1	0.1	1.4	-0.5	-3.3	-3.0	-0.3	0.2	1.9	0.6	1.3	0.7	9.3	2.7	4.7	-2.1
18-Nov-15	-0.5	1	0.8	0.3	0.7	3.1	-1.5	-0.4	-1.2	0.4	-0.2	0	-0.2	0.4	3.4	-3.7	-3.7	0.0
11-Dec-15	-0.2	0	-0.2	0.2	1.1	-0.3	-8.2	-8.4	0.3	0.3	0.6	0.2	0.3	0.1	3.4	-2.2	-1.7	0.0

Notes:

A - Allowable NO/NO_x/NO₂/SO₂ zero drift = +/-5 ppb

B - Allowable PM_{2.5} zero drift = -0.5 to 4 µg/m³

C - Allowable NO/NO_x/NO₂/SO₂ span drift = +/-10%

D - The monthly NO_x calibration on June 30, 2015 at both sites was not used because the NO_x certification had expired. Calibrated NO_x with a new bottle on July 3, 2015

E - NO/NO_x/NO₂ and SO₂ calibration gas concentrations: 0/400/800 ppb

Table A2 - Autocalibration Trends (July to December 2015)

Autocalibration Trends - Monthly Summary (Q3/Q4 2015)																	
Month	Parameter	Courtice								Rundle							
		Zero (ppb) ^A				Span (ppb) ^B				Zero (ppb) ^A				Span (ppb) ^B			
		SO ₂	NO _x	NO	NO ₂	SO ₂	NO _x	NO ^C	NO ₂	SO ₂	NO _x	NO	NO ₂	SO ₂	NO _x	NO ^C	NO ₂
July	Minimum	0.6	-2.5	-0.5	-0.5	796	451	7.6	445	0.4	0.4	0.4	0.4	457	359	5.7	358
	Maximum	1.0	0.9	0.6	0.6	830	517	11.6	507	1.9	3.0	1.7	1.7	686	406	9.2	401
	Median	0.7	0.2	0.0	0.0	800	501	10.2	491	0.7	1.0	1.1	1.1	466	393	7.0	389
	Standard Deviation	0.1	0.6	0.3	0.3	8	15	0.8	15	0.3	0.6	0.3	0.3	61	12	0.8	11
August	Minimum	-3.2	-3.3	-1.4	-1.4	790	485	8.7	475	-0.3	0.5	0.2	0.2	641	384	5.5	379
	Maximum	0.8	1.6	1.3	1.3	839	528	13.2	516	1.5	6.1	2.2	2.2	686	405	7.8	400
	Median	-1.2	-2.0	-0.2	-0.2	827	511	10.2	501	0.6	1.1	0.9	0.9	677	394	6.8	389
	Standard Deviation	1.0	1.4	0.7	0.7	18	12	1.2	11	0.4	1.0	0.6	0.6	17	5	0.7	5
September	Minimum	-1.3	-0.6	-0.5	-0.5	726	457	10.6	447	-0.3	0.5	1.4	1.4	624	382	6.8	376
	Maximum	1.7	1.5	1.7	1.7	799	522	12.9	510	2.1	2.4	2.6	2.6	653	441	8.7	434
	Median	0.6	0.4	0.6	0.6	738	498	11.9	486	1.3	1.5	1.8	1.8	641	396	7.2	390
	Standard Deviation	0.7	0.5	0.5	0.5	27	15	0.6	14	0.6	0.5	0.3	0.3	8	19	0.4	19
October	Minimum	0.1	-0.2	-0.4	-0.4	647	369	5.7	363	-0.5	1.0	0.9	0.9	481	433	7.0	427
	Maximum	1.5	3.3	2.7	2.7	1051	430	8.4	425	2.8	7.4	2.4	2.4	620	466	9.5	459
	Median	0.6	2.6	0.8	0.8	1050	396	7.1	390	1.3	3.8	1.7	1.7	497	450	8.7	443
	Standard Deviation	0.4	1.3	0.8	0.8	179	15	0.9	15	0.9	2.1	0.4	0.4	42	9	0.7	9
November	Minimum	0.6	-0.7	-0.9	-0.9	624	404	5.0	399	1.2	1.0	1.1	1.1	552	440	6.9	435
	Maximum	1.4	1.7	1.2	1.2	1050	433	6.6	427	9.6	3.0	2.6	2.6	862	485	8.7	479
	Median	1.1	0.8	0.4	0.4	672	414	6.1	409	1.9	1.6	1.8	1.8	609	459	7.8	453
	Standard Deviation	0.2	0.7	0.5	0.5	83	6	0.5	6	2.0	0.5	0.3	0.3	68	10	0.4	10
December	Minimum	0.2	-0.8	-0.8	-0.8	635	408	5.5	403	0.5	0.6	0.5	0.5	608	450	6.5	444
	Maximum	2.6	1.5	0.8	0.8	677	456	7.3	451	2.1	4.0	2.4	2.4	932	490	8.6	483
	Median	1.1	0.0	0.2	0.2	659	443	6.1	436	1.2	1.4	1.4	1.4	627	475	7.5	469
	Standard Deviation	0.6	0.6	0.3	0.3	10	15	0.4	15	0.3	0.9	0.5	0.5	120	10	0.5	10

Notes:

A - Zero autocalibrations will provide approximate values due to the brief period for which the instrument is challenged with zero air and the instrument response time.

B - Span autocalibrations will vary depending on the perm tube concentration (perm tube accuracy is +/- 25%).

C - The NO_x monitor spans using NO₂. As a result, NO spans are approximately 0ppb

ATTACHMENT B

2015 Q3/Q4 REPORT - UPDATED COURTICE WPCP STATION EDIT LOGS

EDIT LOG TABLE

Durham York Energy Centre Ambient Air Monitoring Program									
Project Name		Durham York Energy Centre Ambient Air Monitoring Program							
Contact		Greg Crooks / Connie Lim / Tim Hung		Phone: 905-944-7777		E-mail: greg.crooks@stantec.com, connie.lim@stantec.com, tim.hung@stantec.com			
Station number:		N/A		Station Name:		Courtice WPCP Station (Upwind)			
Station address:		The Region of Durham, 605 Rossland Rd, Whitby, ON							
Pollutant or parameter:		SO2		Instrument make & model:		Teledyne Monitor Labs Sulphur Dioxide Analyzer Model T100		Serial Number: 565	
Data edit period		Start date: 1-Jan-15		End date: 31-Dec-15		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)		
1	7-Apr-15	Timothy Hung	Invalidate	23-Jan-15	12:00	23-Jan-15	12:00	Monthly calibration	
2	7-Apr-15	Timothy Hung	Invalidate	27-Feb-15	11:00	27-Feb-15	11:00	Monthly calibration	
3	7-Apr-15	Timothy Hung	Invalidate	26-Mar-15	07:00	26-Mar-15	08:00	Monthly calibration	
4	13-Apr-15	Timothy Hung	Invalidate	31-Mar-15	13:00	31-Mar-15	16:00	Invalidate the time when there was a power outage as provided by treatment plant personnel	
5	17-Apr-15	Timothy Hung	Invalidate	4-Mar-15	10:00	4-Mar-15	12:00	MOE Audit	
6	2-Jun-15	Timothy Hung	Invalidate	23-Apr-15	13:00	23-Apr-15	14:00	Monthly calibration	
7	2-Jun-15	Timothy Hung	Invalidate	11-May-15	10:00	11-May-15	12:00	Monthly calibration	
8	13-Jul-15	Timothy Hung	Invalidate	13-May-15	08:00	13-May-15	14:00	Power outage	
9	13-Jul-15	Timothy Hung	Invalidate	29-Jun-15	11:00	29-Jun-15	13:00	Monthly calibration	
10	13-Jul-15	Timothy Hung	Invalidate	30-Jun-15	08:00	30-Jun-15	11:00	MOE Audit	
11	30-Sep-15	Connie Lim	Replace	17-Jul-15	10:00	17-Jul-15	15:00	Missing data from 10:00 - 12:51 on Jul 17 minute file. Replace with hourly data.	
11	30-Sep-15	Connie Lim	Replace	9-Jul-15	09:00	9-Jul-15	10:00	Missing data from 9:15 - 10:30 on Jul 9 minute file. Replace with hourly data.	
12	30-Sep-15	Connie Lim	Invalidate	31-Jul-15	10:00	31-Jul-15	12:00	Monthly calibration	
13	30-Sep-15	Connie Lim	Invalidate	20-Aug-15	10:00	20-Aug-15	11:00	Monthly calibration	
14	30-Sep-15	Connie Lim	Invalidate	31-Aug-15	08:00	31-Aug-15	09:00	MOE Audit	
15	30-Sep-15	Connie Lim	Invalidate	23-Sep-15	10:00	23-Sep-15	12:00	Monthly calibration	
16	30-Sep-15	Connie Lim	Invalidate	23-Sep-15	13:00	30-Sep-15	23:00	Monitor removed for annual maintenance	
17	4-Dec-15	Connie Lim	Replace	22-Oct-15	20:00	23-Oct-15	12:00	Missing minute data from 10/22 20:39 to 10/23 1:41, and from 10/23 2:23 to 12:42. Replace with hourly data.	
	13-Jan-16	Connie Lim	Invalidate	22-Oct-15	22:00	22-Oct-15	23:00	Auto calibration hour	
18	13-Jan-16	Connie Lim	Invalidate	19-Oct-15	10:00	19-Oct-15	12:00	Monthly calibration	
19	13-Jan-16	Connie Lim	Invalidate	18-Nov-15	09:00	18-Nov-15	12:00	Monthly calibration. Replace pump diaphragm.	
20	13-Jan-16	Connie Lim	Invalidate	11-Dec-15	13:00	11-Dec-15	14:00	Monthly calibration	
21	13-Jan-16	Connie Lim	Invalidate	12-Dec-15	16:00	12-Dec-15	16:00	Missing data from 15:47 to 16:25 in the minute file. Invalidate hour 16 due to low recovery rate for the hour.	
22	19-Jan-16	Timothy Hung	Invalidate	14-Dec-15	10:00	14-Dec-15	11:00	MOECC Audit	
23	26-Jan-16	Timothy Hung	Invalidate	23-Oct-15	08:00	23-Oct-15	08:00	Originally missing data was replaced with hourly data for this concentration. This hour spiked up to 21.86ug/m3 which is 10x greater than the readings before and after this hour (2.521 ug/m3 and 2.27ug/m3)	
24	29-Mar-16	Connie Lim	Invalidate	15-Nov-15	21:00	18-Nov-16	08:00	Invalidate data due to fault warning, low flow warning and pump diaphragm failure.	
25	30-Mar-16	Connie Lim	Apply offset to data	1-Oct-15	00:00	8-Oct-15	09:00	SO2 drift on October 8 greater than -5ppb	

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

EDIT LOG TABLE

Project Name		Durham York Energy Centre Ambient Air Monitoring Program						
Contact		Greg Crooks / Connie Lim / Tim Hung		Phone:	905-944-7777	E-mail:	greg.crooks@stantec.com, connie.lim@stantec.com, tim.hung@stantec.com	
Station number:		N/A		Station Name:		Courtice WPCP Station		
Station address:		Courtice Water Pollution Control Plant The Region of Durham, 605 Rosland Rd, Whitby, ON						
Pollutant or parameter:		NOx		Instrument make & model:		API Model 200E Chemiluminescence Analyzer		
Data edit period		Start date: 1-Jan-15		End date: 31-Dec-15		Serial Number: 675		
Edit #		Edit date		Editor's Name		Edit Action		
						Time Zone : EST		
						Starting		
						Ending		
						Reason		
				Date (dd/mm/yyyy)		Date (dd/mm/yyyy)		
				Hour (xx:xx)		Hour (xx:xx)		
1	7-Apr-15	Timothy Hung	Invalidate	23-Jan-15	12:00	23-Jan-15	12:00	Monthly calibration
2	7-Apr-15	Timothy Hung	Invalidate	27-Feb-15	11:00	27-Feb-15	11:00	Monthly calibration
3	7-Apr-15	Timothy Hung	Invalidate	26-Mar-15	07:00	26-Mar-15	08:00	Monthly calibration
4	13-Apr-15	Timothy Hung	Invalidate	31-Mar-15	13:00	31-Mar-15	16:00	Invalidate the time when there was a power outage as provided by treatment plant personnel
5	17-Apr-15	Timothy Hung	Invalidate	4-Mar-15	10:00	4-Mar-15	12:00	MOE Audit
6	2-Jun-15	Timothy Hung	Invalidate	23-Apr-15	13:00	23-Apr-15	14:00	Monthly calibration
7	2-Jun-15	Timothy Hung	Invalidate	11-May-15	10:00	11-May-15	12:00	Monthly calibration
8	13-Jul-15	Timothy Hung	Invalidate	13-May-15	08:00	13-May-15	14:00	Power outage
9	13-Jul-15	Timothy Hung	Invalidate	29-Jun-15	11:00	29-Jun-15	13:00	Monthly calibration
10	13-Jul-15	Timothy Hung	Invalidate	30-Jun-15	08:00	30-Jun-15	11:00	MOE Audit
11	30-Sep-15	Connie Lim	Invalidate	3-Jul-15	07:00	3-Jul-15	08:00	Calibration
12	30-Sep-15	Connie Lim	Replace	17-Jul-15	10:00	17-Jul-15	15:00	Missing data from 10:00 - 12:51 on Jul 17 in minute file. Replace with hourly data.
13	30-Sep-15	Connie Lim	Replace	9-Jul-15	09:00	9-Jul-15	10:00	Missing data from 9:15 - 10:30 on Jul 9 minute file. Replace with hourly data.
14	30-Sep-15	Connie Lim	Invalidate	31-Jul-15	10:00	31-Jul-15	12:00	Monthly calibration
15	30-Sep-15	Connie Lim	Invalidate	20-Aug-15	10:00	20-Aug-15	11:00	Monthly calibration
16	30-Sep-15	Connie Lim	Invalidate	31-Aug-15	08:00	31-Aug-15	08:00	MOE Audit
17	30-Sep-15	Connie Lim	Invalidate	23-Sep-15	10:00	23-Sep-15	12:00	Monthly calibration
18	30-Sep-15	Connie Lim	Invalidate	23-Sep-15	13:00	30-Sep-15	23:00	Monitor removed for annual maintenance
19	4-Dec-15	Connie Lim	Replace	22-Oct-15	20:00	23-Oct-15	12:00	Missing minute data from 10/22 20:39 to 10/23 1:41, and from 10/23 2:23 to 12:42. Replace with hourly data.
20	13-Jan-16	Connie Lim	Invalidate	19-Oct-15	10:00	19-Oct-15	13:00	Monthly calibration
21	13-Jan-16	Connie Lim	Invalidate	18-Nov-15	09:00	18-Nov-15	10:00	Monthly calibration
22	13-Jan-16	Connie Lim	Invalidate	11-Dec-15	14:00	11-Dec-15	15:00	Monthly calibration
23	13-Jan-16	Connie Lim	Invalidate	12-Dec-15	16:00	12-Dec-15	16:00	Missing data from 15:47 to 16:25 in the minute file. Invalidate hour 16 due to low recovery rate for the hour.
24	19-Jan-16	Timothy Hung	Invalidate	14-Dec-15	10:00	14-Dec-15	11:00	MOECC Audit
25	30-Mar-16	Connie Lim	Replace	31-Dec-15	10:00	31-Dec-15	23:00	NO2, NOx and NO not adding up suspected due to loose connection between monitor and logger, and affecting NO2 readings. NO2 data replaced by NOx - NO.

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

EDIT LOG TABLE

Project Name												
Durham York Energy Centre Ambient Air Monitoring Program												
Contact		Greg Crooks / Connie Lim / Tim Hung	Phone:	905-944-7777		E-mail:	greg.crooks@stantec.com, connie.lim@stantec.com, tim.hung@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:		PM2.5	Instrument make & model:		Thermo Sharp 5030 Synchronized Hybrid Ambient Real-time Particulate Monitor			Serial Number:		E-1569		
Data edit period		Start date:	1-Jan-15	End date:	31-Dec-15		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)					
1	7-Apr-15	Timothy Hung	Invalidate	23-Jan-15	12:00	23-Jan-15	12:00	Monthly calibration				
2	7-Apr-15	Timothy Hung	Invalidate	27-Feb-15	11:00	27-Feb-15	11:00	Monthly calibration				
3	7-Apr-15	Timothy Hung	Invalidate	26-Mar-15	07:00	26-Mar-15	08:00	Monthly calibration				
4	13-Apr-15	Timothy Hung	Invalidate	31-Mar-15	13:00	31-Mar-15	16:00	Invalidate the time when there was a power outage as provided by treatment plant personnel				
5	17-Apr-15	Timothy Hung	Invalidate	4-Mar-15	10:00	4-Mar-15	12:00	MOE Audit				
6	2-Jun-15	Timothy Hung	Invalidate	23-Apr-15	13:00	23-Apr-15	14:00	Monthly calibration				
7	2-Jun-15	Timothy Hung	Invalidate	11-May-15	10:00	11-May-15	12:00	Monthly calibration				
8	13-Jul-15	Timothy Hung	Invalidate	13-May-15	08:00	13-May-15	14:00	Power outage				
9	13-Jul-15	Timothy Hung	Invalidate	29-Jun-15	11:00	29-Jun-15	13:00	Monthly calibration				
10	13-Jul-15	Timothy Hung	Invalidate	30-Jun-15	08:00	30-Jun-15	11:00	MOE Audit				
11	30-Sep-15	Connie Lim	Invalidate	20-Aug-15	10:00	20-Aug-15	11:00	Monthly calibration				
12	30-Sep-15	Connie Lim	Invalidate	31-Aug-15	08:00	31-Aug-15	08:00	MOE Audit				
13	30-Sep-15	Connie Lim	Invalidate	23-Sep-15	10:00	23-Sep-15	12:00	Monthly calibration				
14	30-Sep-15	Connie Lim	Invalidate	23-Sep-15	13:00	30-Sep-15	23:00	Monitor removed for annual maintenance. Clean air inlet system, rebuild the vacuum pump, clean the ambient temperature/ relative humidity shield and assembly, calibrate the ambient temperature, pressure, flow, analog output and proportional counter				
15	2-Nov-15	Connie Lim	Invalidate	25-Jul-15	21:00	26-Jul-15	06:00	Invalidate elevated PM readings as the high humidity and high temperatures recorded during these time periods suggested water accretion on the filter tape.				
				3-Aug-15	03:00	3-Aug-15	11:00					
				4-Aug-15	02:00	4-Aug-15	06:00					
				4-Aug-15	21:00	5-Aug-15	03:00					
				16-Aug-15	06:00	16-Aug-15	06:00					
				16-Aug-15	22:00	17-Aug-15	02:00					
				17-Aug-15	23:00	18-Aug-15	07:00					
				18-Aug-15	22:00	19-Aug-15	03:00					
				20-Aug-15	00:00	20-Aug-15	10:00					
				29-Aug-15	22:00	30-Aug-15	02:00					
				30-Aug-15	23:00	31-Aug-15	05:00					
				1-Sep-15	21:00	2-Sep-15	00:00					
				2-Sep-15	22:00	3-Sep-15	07:00					
				4-Sep-15	00:00	4-Sep-15	00:00					
				5-Sep-15	21:00	6-Sep-15	07:00					
				6-Sep-15	21:00	7-Sep-15	06:00					
				8-Sep-15	03:00	8-Sep-15	11:00					
				8-Sep-15	23:00	9-Sep-15	06:00					
16	4-Dec-15	Connie Lim	Replace	22-Oct-15	20:00	23-Oct-15	12:00	Missing minute data from 10/22 20:39 to 10/23 1:41, and from 10/23 2:23 to 12:42. Replace with hourly data.				
17	13-Jan-16	Connie Lim	Invalidate	19-Oct-15	11:00	19-Oct-15	13:00	Monthly calibration				
18	13-Jan-16	Connie Lim	Invalidate	18-Nov-15	09:00	18-Nov-15	13:00	Monthly calibration				
19	13-Jan-16	Connie Lim	Invalidate	11-Dec-15	13:00	11-Dec-15	13:00	Monthly calibration				
20	13-Jan-16	Connie Lim	Invalidate	12-Dec-15	16:00	12-Dec-15	16:00	Missing data from 15:47 to 16:25 in the minute file. Invalidate hour 16 due to low recovery rate for the hour.				
21	13-Jan-16	Connie Lim	Invalidate	29-Oct-15	03:00	3-Nov-15	09:00	Error status due to power surge. Reset monitor.				
22	13-Jan-16	Connie Lim	Invalidate	6-Nov-15	08:00	12-Nov-15	13:00	Inlet heater and motherboard failure. Replaced under warranty.				
23	13-Jan-16	Connie Lim	Replace	11-Dec-15	13:00	14-Dec-15	09:00	Output unit from monitor to datalogger incorrectly set to mass instead of concentration. Replace hourly data downloaded directly from the monitor.				
24	19-Jan-16	Timothy Hung	Invalidate	14-Dec-15	10:00	14-Dec-15	11:00	MOECC Audit				
25	31-Mar-16	Timothy Hung	Replace	13-Dec-15	10:00	13-Dec-15	10:00	Manually entered negative concentration reported as 0ug/m3				

- 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

EDIT LOG TABLE

Project Name Durham York Energy Centre Ambient Air Monitoring Program								
Contact Greg Crooks / Connie Lim / Tim Hung		Phone: 905-944-7777		E-mail: greg.crooks@stantec.com, connie.lim@stantec.com, tim.hung@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: Temperature		Instrument make & model: Campbell Scientific Model HMP60		Serial Number:				
Data edit period		Start date: 1-Jan-15		End date: 31-Dec-15		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)	
1	4-Dec-15	Connie Lim	Replace	22-Oct-15	20:00	23-Oct-15	12:00	Missing minute data from 10/22 20:39 to 10/23 1:41, and from 10/23 2:23 to 12:42. Replace with hourly data.
2	13-Jan-16	Connie Lim	Invalidate	12-Dec-15	16:00	12-Dec-15	16:00	Missing data from 15:47 to 16:25 in the minute file. Invalidate hour 16 due to low recovery rate for the hour.

EDIT LOG TABLE

Project Name Durham York Energy Centre Ambient Air Monitoring Program								
Contact Greg Crooks / Connie Lim / Tim Hung		Phone: 905-944-7777		E-mail: greg.crooks@stantec.com, connie.lim@stantec.com, tim.hung@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: Rainfall		Instrument make & model: Texas Electronic TE525M		Serial Number:				
Data edit period		Start date: 1-Jan-15		End date: 31-Dec-15		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)	
1	13-Jul-15	Timothy Hung	Invalidate data	28-Jun-15	18:00	30-Jun-15	23:00	Rain gauge cable to data logger cut down by lawn mower. Still being repaired, however, for the purposes of the Q2 report, data has been invalidated up to the end of Q2 (June 30, 2015)
2	4-Dec-15	Connie Lim	Replace	22-Oct-15	20:00	23-Oct-15	12:00	Missing minute data from 10/22 20:39 to 10/23 1:41, and from 10/23 2:23 to 12:42. Replace with hourly data.
3	13-Jan-16	Connie Lim	Invalidate	12-Dec-15	16:00	12-Dec-15	16:00	Missing data from 15:47 to 16:25 in the minute file. Invalidate hour 16 due to low recovery rate for the hour.

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

EDIT LOG TABLE

Project Name		Durham York Energy Centre Ambient Air Monitoring Program							
Contact		Greg Crooks / Connie Lim / Tim Hung		Phone:	905-944-7777	E-mail:	greg.crooks@stantec.com, connie.lim@stantec.com, tim.hung@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:		Relative Humidity		Instrument make & model:			Campbell Scientific Model HMP60		
Data edit period		Start date:		31-Dec-15		Ending		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)				
1		4-Dec-15	Connie Lim	Replace	22-Oct-15	20:00	23-Oct-15	12:00	Missing minute data from 10/22 20:39 to 10/23 1:41, and from 10/23 2:23 to 12:42. Replace with hourly data.
2		13-Jan-16	Connie Lim	Invalidate	12-Dec-15	16:00	12-Dec-15	16:00	Missing data from 15:47 to 16:25 in the minute file. Invalidate hour 16 due to low recovery rate for the hour.

EDIT LOG TABLE

Project Name		Durham York Energy Centre Ambient Air Monitoring Program							
Contact		Greg Crooks / Connie Lim / Tim Hung		Phone:	905-944-7777	E-mail:	greg.crooks@stantec.com, connie.lim@stantec.com, tim.hung@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:		Atmospheric Pressure		Instrument make & model:			Campbell Scientific Model CS106		
Data edit period		Start date:		31-Dec-15		Ending		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)				
1		4-Dec-15	Connie Lim	Replace	22-Oct-15	20:00	23-Oct-15	12:00	Missing minute data from 10/22 20:39 to 10/23 1:41, and from 10/23 2:23 to 12:42. Replace with hourly data.
2		13-Jan-16	Connie Lim	Invalidate	12-Dec-15	16:00	12-Dec-15	16:00	Missing data from 15:47 to 16:25 in the minute file. Invalidate hour 16 due to low recovery rate for the hour.

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

EDIT LOG TABLE

Project Name	Durham York Energy Centre Ambient Air Monitoring Program							
Contact	Lisa Heatherington	Phone:	N/A	E-mail:	Lisa.Hetherington@Durham.ca			
Station number:	N/A		Station Name:	Courtice WPCP Station				
Station address:	Courtice Water Pollution Control Plant	Emitter Address:	The Region of Durham, 605 Rosland Rd, Whitby, ON					
Pollutant or parameter:	Wind Speed/Wind direction	Instrument make & model:	N/A			Serial Number:		
Data edit period	Start date:	1-Jan-15	End date:	31-Dec-15	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)	

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

ATTACHMENT C

2015 Q3 REPORT - UPDATED TABLE 3-4 SUMMARY OF INSTRUMENT ISSUES
2015 Q4 REPORT - UPDATED TABLE 3-3 SUMMARY OF INSTRUMENT ISSUES
2015 Q4 REPORT - UPDATED TABLE 3-4 SUMMARY OF INSTRUMENT ISSUES

Table 3-4 Summary of Instrument Issues at Rundle Road Station (Predominately Downwind)

Parameter	Issues	Time Frame	Remedial Action
SO ₂	UV Lamp warning	Noted on July 2, 2015	Adjusted lamp to within specified operating range. No data issues identified.
NO _x	None		
PM _{2.5}	Warning message - Plateau check error during filter change.	Noted on September 2, 2015	Reset system
Other	N/A		

Table 3-3 Summary of Instrument Issues at Courtyce WPCP Station (Predominately Upwind)

Parameter	Issues	Time Frame	Remedial Action
SO ₂	Fault indicated, but no error message.	November 16, 2015	Restarted monitor to clear fault.
	Low flow and low lamp output warnings.	November 18, 2015	SO ₂ pump diaphragm failed. Replaced diaphragm and cleaned insect debris from lamp chamber. Data between Nov 15 th and 18 th invalidated as it may potentially have been affected by the pump issue.
NO _x	Suspected loose connection between monitor and datalogger, affecting NO ₂ readings.	December 31, 2015	Connection repaired. Affected NO ₂ readings were replaced by deriving NO ₂ concentrations from the NO _x - NO concentrations.
	Sample flow warning	Noted on November 3, 2015	Likely from power surge. Cleared monitor - no data issues identified.
	Sample flow, ozone and reaction cell warning	November 16, 2015	Cleared message. No data issues identified.
PM _{2.5}	Sample pump issue, likely caused by a power surge.	October 29 - November 3, 2015	Reset monitor. The PM _{2.5} data collected during this period was invalidated due to this issue
	High internal relative humidity warning.	November 6 - November 12, 2015	Inlet heater failed and issue with motherboard. Both were replaced under warranty by CDNOVA. The PM _{2.5} data collected during this period was invalidated due to this issue.
Other	N/A		

**Table 3-4 Summary of Instrument Issues at Rundle Road Station
(Predominately Downwind)**

Parameter	Issues	Time Frame	Remedial Action
SO ₂	UV lamp warning	October 29 - November 6, 2015	Adjusted lamp to within specified operating range. No data issues identified.
NO _x	Time on monitor was incorrect.	November 19 - November 24, 2015	Adjusted clock. No issue with data.
PM _{2.5}	None		
Other	N/A		

ATTACHMENT D

2015 Q4 REPORT - UPDATED PM2.5 DECEMBER SUMMARY

2015 Q4 REPORT - UPDATED SO2 OCTOBER SUMMARY

2015 Q4 REPORT - UPDATED SO2 NOVEMBER SUMMARY

2015 Q4 REPORT - UPDATED NO2 DECEMBER SUMMARY

PM _{2.5} - COURTYCE December 2015 (µg/m ³)																														
Day	Hour																				Count	Maximum	Minimum	Average						
	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300						
1	5.9	6.6	6.7	6.9	6.4	14.4	24.5	29.6	34.5	8.6	6.5	1.6	1.1	1.2	1.1	1.4	1.6	3.4	3.0	2.8	3.4	2.7	3.6	2.6	24	34.5	1.1	7.5		
2	4.2	3.0	7.0	4.2	6.8	6.6	7.2	7.6	6.8	7.3	7.2	4.8	1.5	1.5	0.4	0.4	0.9	2.5	2.1	0.4	0.6	0.7	1.6	3.3	24	7.6	0.2	3.5		
3	4.0	5.0	4.9	3.7	3.0	3.8	3.7	3.5	3.4	4.8	1.9	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	24	5.0	0.2	1.9		
4	0.4	1.9	2.0	4.0	9.2	10.9	7.6	12.9	17.5	16.9	14.3	11.2	9.4	6.5	4.3	2.8	5.5	7.7	7.6	7.6	8.6	8.3	10.6	11.4	24	17.5	0.4	8.3		
5	12.3	14.7	16.4	21.3	35.5	37.7	33.3	26.0	29.3	35.7	42.7	34.3	28.3	27.4	24.8	22.5	23.2	22.7	21.5	18.7	17.4	18.4	19.0	18.2	24	42.7	12.3	25.0		
6	17.8	14.6	13.0	16.4	19.7	20.9	21.6	20.8	19.5	16.8	15.6	14.4	16.6	18.3	16.1	16.6	19.7	21.7	22.7	28.8	38.3	31.8	22.2	12.2	24	38.3	12.2	19.8		
7	9.8	11.9	17.2	21.1	22.3	23.9	23.7	24.2	24.1	23.0	24.1	24.2	22.2	23.4	20.5	20.8	22.6	21.7	21.5	29.7	32.5	36.3	35.5	36.6	24	36.6	9.8	23.9		
8	36.8	37.2	28.7	21.1	14.3	8.3	8.2	6.1	7.7	7.6	6.2	5.3	4.3	5.2	7.2	12.8	12.8	10.4	14.4	14.9	13.1	15.4	21.3	22.8	24	37.2	4.3	14.3		
9	14.2	16.5	16.9	16.7	16.5	16.9	19.6	22.3	20.7	11.6	7.5	8.1	9.7	12.2	12.4	11.0	6.8	4.4	6.8	6.8	8.4	13.1	23.4	27.1	24	27.1	4.4	13.7		
10	27.4	30.2	19.7	15.2	11.7	16.1	22.4	28.6	29.7	29.1	28.3	29.5	30.1	28.8	30.2	32.8	28.8	22.2	15.3	7.5	4.2	5.7	6.4	7.1	24	32.8	4.2	21.1		
11	8.0	7.4	6.6	6.9	7.7	10.6	12.5	12.4	11.2	12.2	9.1	4.9	2.6	C	5.9	3.6	1.3	0.8	1.3	1.4	1.8	3.6	6.6	6.4	23	12.5	0.8	6.3		
12	7.2	9.9	13.0	12.3	13.2	12.8	10.7	10.1	11.6	12.7	12.6	6.5	2.4	1.5	3.0	3.8	3.9	7.5	10.5	10.8	6.4	6.9	5.4	4.5	24	13.2	1.5	8.3		
13	4.4	5.1	3.1	2.7	2.8	1.3	1.1	0.7	1.1	2.1	0.0	1.6	0.9	0.9	0.8	2.9	11.2	17.8	10.6	23.9	12.0	15.0	21.6	15.9	24	23.9	0.0	6.6		
14	12.3	12.0	12.7	12.7	15.0	14.5	16.0	16.6	15.8	16.3	A	A	8.7	14.1	16.8	21.5	14.1	7.8	5.6	4.8	0.2	0.2	0.2	0.2	22	21.5	0.2	10.8		
15	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	22	0.2	0.2	0.2		
16	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	7.1	28.1	8.4	0.2	5.5	0.3	4.6	10.5	3.7	0.2	0.2	0.2	0.2	0.2	0.2	24	28.1	0.2	3.0		
17	0.7	2.4	4.3	4.8	6.9	8.2	7.7	7.2	2.8	2.0	1.8	2.4	1.5	2.4	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	24	8.2	0.2	2.4		
18	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.1	0.5	0.2	0.9	3.4	4.3	4.9	4.9	6.2	11.4	6.6	2.9	2.6	0.2	0.2	24	11.4	0.2	2.2		
19	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	24	0.2	0.2	0.2		
20	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	1.0	2.8	2.0	2.8	5.9	3.4	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	24	5.9	0.2	0.9		
21	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.2	2.0	2.9	3.4	3.5	3.5	3.6	3.1	3.4	3.4	3.7	5.4	6.1	7.2	7.7	8.6	24	8.6	0.2	2.9		
22	10.5	11.6	11.9	8.7	7.0	8.6	6.8	7.1	7.0	7.4	6.9	5.1	3.9	4.8	4.4	6.8	10.2	9.9	12.2	12.8	15.7	16.2	13.0	15.3	24	16.2	3.9	9.3		
23	17.4	17.5	15.8	10.9	9.1	11.7	13.6	20.2	31.6	141.3	77.4	57.1	36.8	5.4	5.9	2.6	0.7	1.0	1.7	2.3	1.4	0.3	0.2	0.2	24	141.3	0.2	20.1		
24	0.2	0.2	0.4	0.2	0.2	0.2	0.2	0.2	0.6	0.8	0.7	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	24	0.8	0.2	0.3		
25	0.2	0.2	1.5	1.4	1.8	4.1	4.2	3.6	2.2	2.3	4.6	3.4	0.3	0.8	5.1	5.5	0.5	1.8	2.1	4.2	8.5	5.9	6.3	4.5	24	8.5	0.2	3.1		
26	5.7	8.6	4.4	3.4	3.2	2.9	0.3	0.2	0.2	0.6	0.2	0.2	0.2	0.2	0.8	7.9	5.1	0.2	0.2	0.5	1.7	2.6	12.3	11.1	24	12.3	0.2	3.0		
27	27.4	0.6	0.7	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	24	27.4	0.2	1.3		
28	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	6.8	1.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	24	6.8	0.2	0.5		
29	34.5	81.0	46.4	12.4	0.2	0.2	0.2	0.2	0.2	48.4	51.6	49.6	19.2	1.1	0.2	0.2	0.2	0.3	1.7	3.2	1.3	1.6	1.7	3.6	24	81.0	0.2	15.0		
30	4.1	3.7	7.6	4.0	6.0	4.5	1.9	2.9	4.8	7.9	8.7	7.2	6.8	3.0	3.3	5.2	2.6	10.0	17.9	12.6	8.7	6.0	10.6	9.4	24	17.9	1.9	6.6		
31	11.8	12.4	11.3	10.1	9.9	8.7	9.8	1.9	4.7	0.7	0.2	0.2	0.7	0.5	1.0	1.1	0.5	0.2	0.2	0.2	0.3	2.3	5.1	9.6	24	12.4	0.2	4.3		
Count	31	31	31	31	31	31	31	31	31	31	30	30	31	30	31	31	31	31	31	31	31	31	31	31	741	31	30	31		
Maximum	36.8	81.0	46.4	21.3	35.5	37.7	33.3	29.6	34.5	141.3	77.4	57.1	36.8	28.8	30.2	32.8	28.8	22.7	22.7	29.7	38.3	36.3	35.5	36.6	24	141.3	21.3	42.1		
Minimum	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	22	0.2	0.0	0.2		
Average	8.8	10.2	8.8	7.2	7.4	8.0	8.3	8.6	9.3	13.8	12.0	9.6	6.9	6.1	5.8	6.4	6.2	6.1	6.3	6.7	6.3	6.6	7.6	7.5	24	24	2	7.9		
#>900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Percentiles	10		20		30		40		50		60		70		80		90		95		99		100			RegsAcceptable	Desirable	Violations	Maximum	
Data	0.2		0.2		0.3		1.9		3.8		6.6		9.4		14.1		21.7		28.8		44.9		141.3			Hour			141.3	
																											Day			25.0
																											Month			7.9
Notes	C - Calibration / Span Cycle NA - No Data Available T - Test A - MOE Audit M - Equipment Malfunction / Down R - Rate of Change																													

SO ₂ - COURTICE																															
October 2015																															
(µg/m ³)																															
Day	Hour																							Count	Maximum	Minimum	Average	Hrs>690	Days>275		
	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200							2300	
1	3.4	19.3	0.0	0.4	0.0	0.3	0.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	24	19.3	0.0	1.0	0	0	
2	0.0	0.0	0.0	0.0	0.0	0.0	16.6	14.0	16.5	18.9	15.6	12.3	8.1	8.2	7.9	11.8	6.1	6.2	20.4	23.6	19.9	14.8	16.4	14.4	24	23.6	0.0	10.5	0	0	
3	4.8	4.3	4.8	4.2	3.5	3.2	4.0	2.4	2.5	2.9	2.1	5.3	2.1	2.2	1.6	2.1	1.8	1.4	1.2	1.5	1.2	1.4	1.6	1.5	24	5.3	1.2	2.7	0	0	
4	1.2	1.4	1.3	1.3	5.9	1.3	0.8	0.8	0.7	0.8	0.6	0.6	0.7	0.6	0.5	0.7	0.3	11.2	11.0	2.0	6.0	7.2	4.4	5.1	24	11.2	0.3	2.8	0	0	
5	1.8	7.9	11.1	5.9	3.9	2.3	3.4	8.3	5.9	5.5	21.4	23.8	4.8	4.7	11.8	3.7	1.7	1.0	1.2	1.3	1.6	0.9	5.5	1.3	24	23.8	0.9	5.9	0	0	
6	0.8	0.9	0.6	0.4	0.7	1.1	1.3	0.9	0.4	0.3	0.1	0.2	0.2	0.3	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.6	1.5	24	1.5	0.0	0.4	0	0	
7	1.3	0.4	0.3	0.3	0.2	0.5	0.9	3.0	2.2	1.5	2.0	2.8	2.7	1.6	3.9	2.1	1.6	0.8	0.3	0.0	0.0	0.4	0.2	0.0	24	3.9	0.0	1.2	0	0	
8	1.5	0.0	0.0	5.1	11.4	16.3	25.3	8.2	5.8	17.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	25.3	0.0	3.8	0	0	
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.0	0.0	0.0	0	0	
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	1.0	0.0	0.0	0	0	
11	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.7	0.7	1.6	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	1.6	0.0	0.2	0	0	
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.0	0.0	0.0	0	0	
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.0	0.0	0.0	0	0	
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.0	0.0	0.0	0	0	
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.0	0.0	0.0	0	0	
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.0	0.0	0.0	0	0	
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.0	0.0	0.0	0	0	
18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.0	0.0	0.0	0	0	
19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	C	C	C	1.8	2.3	2.4	2.3	2.0	2.0	1.9	2.5	2.1	1.9	1.9	21	2.5	0.0	1.1	0	0	
20	1.8	1.8	1.9	1.8	1.7	1.8	2.0	1.9	1.8	2.1	2.8	3.4	3.6	3.0	2.9	2.3	1.9	1.9	1.8	1.2	1.3	1.2	1.3	1.7	24	3.6	1.2	2.0	0	0	
21	1.5	1.3	2.6	1.8	2.1	1.9	2.1	1.5	7.1	3.7	2.2	1.3	1.4	2.3	8.9	8.5	2.5	1.8	1.5	1.7	1.8	2.0	2.0	3.8	24	8.9	1.3	2.8	0	0	
22	2.0	2.0	1.9	1.9	2.0	1.8	1.9	1.5	1.5	1.2	1.2	1.1	1.1	0.9	0.9	1.2	0.7	0.9	0.5	0.6	0.4	0.5	C	C	22	2.0	0.4	1.3	0	0	
23	0.7	0.8	0.4	0.6	0.5	0.7	1.9	7.2	R	6.4	4.7	3.3	2.9	2.9	1.0	0.6	0.5	1.9	6.8	4.1	5.0	3.5	1.3	0.9	23	7.2	0.4	2.5	0	0	
24	0.7	0.9	0.8	0.7	1.1	1.0	1.6	1.3	1.1	1.1	1.1	1.1	1.1	1.2	1.1	1.2	1.0	1.1	1.2	1.3	1.4	1.1	1.2	1.1	24	1.6	0.7	1.1	0	0	
25	1.1	1.2	1.1	1.0	1.1	0.6	0.7	1.0	1.1	1.2	1.1	1.0	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.5	0.5	4.3	1.9	24	4.3	0.4	1.0	0	0	
26	2.5	1.8	3.3	2.0	2.4	1.8	3.9	4.7	2.8	9.4	1.9	1.1	0.6	0.7	0.6	0.6	0.9	1.0	8.1	4.0	1.2	0.5	0.2	0.0	24	9.4	0.0	2.3	0	0	
27	0.6	0.9	0.0	0.0	1.2	8.3	7.8	11.2	5.2	64.0	27.6	2.3	1.6	0.6	0.6	0.5	0.6	8.9	5.8	2.6	0.5	1.6	26.2	8.8	24	64.0	0.0	7.8	0	0	
28	8.8	1.9	1.2	1.2	0.7	0.8	0.6	0.6	0.5	0.5	0.5	0.8	7.0	5.6	3.7	8.4	2.3	2.1	1.9	1.7	1.3	1.4	1.3	1.2	24	8.8	0.5	2.3	0	0	
29	1.2	1.2	1.5	1.3	1.3	1.2	1.1	1.2	1.3	1.1	1.2	1.1	1.2	1.0	1.1	0.9	0.5	0.5	0.9	0.8	1.0	1.1	1.2	1.2	24	1.5	0.5	1.1	0	0	
30	1.1	1.2	0.9	1.5	1.7	1.5	1.4	1.8	3.2	3.7	2.1	1.7	2.1	2.0	2.1	1.9	0.9	0.4	0.7	2.1	0.9	6.3	1.1	1.4	24	6.3	0.4	1.8	0	0	
31	1.5	1.4	1.0	2.6	1.2	3.9	1.6	6.8	1.6	1.2	1.7	1.6	1.4	1.3	1.3	1.5	1.4	0.9	0.7	0.2	0.3	0.3	0.4	0.4	24	6.8	0.2	1.5	0	0	
Count	31	31	31	31	31	31	31	31	30	31	30	30	30	31	31	31	31	31	31	31	31	31	30	30	738	31	30	31			
Maximum	8.8	19.3	11.1	5.9	11.4	16.3	25.3	14.0	16.5	64.0	27.6	23.8	8.1	8.2	11.8	11.8	6.1	11.2	20.4	23.6	19.9	14.8	26.2	14.4	24	64.0	5.9	17.5			
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21	0.0	0.0	0.0			
Average	1.2	1.6	1.1	1.1	1.4	1.6	2.5	2.6	2.1	4.7	3.0	2.2	1.4	1.3	1.7	1.6	0.9	1.4	2.1	1.7	1.5	1.5	2.4	1.6	24	8	0	1.8			
#>900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Percentiles		10		20		30		40		50		60		70		80		90		95		99		100							Maximum
Data		0.0		0.0		0.0		0.1		0.7		1.1		1.5		2.0		4.5		8.2		20.2		64.0							64.0
Notes	C - Calibration / Span Cycle NA - No Data Available T - Test A - MOE Audit M - Equipment Malfunction / Down R - Rate of Change																														

SO ₂ - COURTICE																															
November 2015																															
(µg/m ³)																															
Day	Hour																							Count	Maximum	Minimum	Average	Hrs>690	Days>275		
	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200							2300	
1	0.5	0.4	0.4	0.5	0.4	0.4	0.6	0.5	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.7	0.0	0.2	0	0	
2	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.0	0.0	0.0	1.1	0.0	0.3	1.3	2.3	2.5	2.2	1.2	1.0	1.1	1.1	1.0	1.4	1.3	24	2.5	0.0	0.8	0	0	
3	2.8	2.0	2.7	4.3	2.6	2.1	2.4	4.2	3.4	3.3	2.8	1.9	2.9	3.1	3.9	4.9	3.7	7.9	8.7	10.2	3.3	17.6	6.4	4.4	24	17.6	1.9	4.7	0	0	
4	3.8	3.7	2.8	2.3	1.9	1.6	1.4	1.9	5.1	3.1	3.6	2.0	1.9	1.4	1.5	1.2	1.1	2.6	6.2	6.0	2.9	2.1	1.9	3.9	24	6.2	1.1	2.7	0	0	
5	2.1	2.7	4.4	4.9	3.2	2.4	3.8	5.8	4.7	2.8	3.7	4.3	2.6	3.8	8.2	4.8	2.9	2.5	2.1	4.7	4.0	5.8	3.2	4.2	24	8.2	2.1	3.9	0	0	
6	3.1	3.0	3.0	2.3	1.8	1.9	1.7	1.7	1.4	1.6	1.4	1.4	1.8	1.7	1.5	1.2	1.1	1.1	1.1	1.1	0.9	1.1	0.9	24	3.1	0.9	1.6	0	0		
7	1.0	1.0	0.8	0.7	1.0	1.1	1.0	0.9	1.0	1.1	0.6	1.0	1.0	0.9	0.6	0.8	0.7	0.6	0.6	0.5	0.4	0.4	0.5	0.4	24	1.1	0.4	0.8	0	0	
8	0.5	0.5	0.4	0.4	0.5	0.4	0.4	0.5	0.4	0.5	1.1	0.6	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.2	0.2	0.2	24	1.1	0.1	0.3	0	0	
9	0.2	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.1	24	0.2	0.1	0.1	0	0	
10	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	24	0.2	0.0	0.1	0	0	
11	0.2	0.1	0.1	8.7	16.7	16.4	15.8	16.0	15.8	16.0	15.7	16.1	16.2	15.6	15.2	15.2	15.6	15.6	32.8	39.6	24.3	23.1	32.9	25.2	24	39.6	0.1	17.0	0	0	
12	22.2	17.7	16.8	15.9	15.9	16.1	15.9	15.5	15.9	15.8	15.7	15.8	15.3	7.4	0.2	0.5	0.6	0.8	0.4	1.0	0.8	0.7	0.7	0.5	24	22.2	0.2	9.5	0	0	
13	0.3	0.2	0.4	0.5	0.5	0.4	0.3	0.1	0.1	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.5	0.0	0.1	0	0	
14	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.3	0.0	0.0	0	0	
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.2	0.3	1.4	4.6	7.4	6.9	4.0	2.2	1.1	0.0	M	M	M	21	7.4	0.0	1.4	0	0	
16	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	0	0.0	0.0	0.0	0	0	
17	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	0	0.0	0.0	0.0	0	0	
18	M	M	M	M	M	M	M	M	M	C	C	C	C	0.5	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11	0.5	0.0	0.0	0	0	
19	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.2	0.0	0.0	0	0	
20	0.0	0.0	0.0	0.8	0.2	0.0	0.5	0.8	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.2	1.6	24	1.6	0.0	0.3	0	0	
21	2.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	2.0	0.0	0.1	0	0	
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	1.9	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	1.9	0.0	0.2	0	0	
23	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.3	0.0	0.0	0.3	0.2	0.0	1.5	1.4	0.8	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	1.5	0.0	0.3	0	0	
24	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.0	1.0	1.2	2.1	1.6	1.5	0.8	0.3	0.0	0.0	0.0	0.4	0.0	0.3	0.0	0.0	0.0	24	2.1	0.0	0.4	0	0	
25	0.0	4.2	0.0	0.3	4.2	1.4	0.0	1.0	2.3	2.2	14.5	8.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	14.5	0.0	1.7	0	0	
26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.0	0.0	0.0	0	0	
27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.3	0.0	0.0	0	0	
28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.2	0.0	1.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	1.3	0.0	0.1	0	0	
29	0.2	0.0	0.0	0.0	0.0	0.0	0.8	2.7	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.9	9.9	6.1	2.7	5.1	4.4	0.6	0.3	1.0	24	9.9	0.0	1.5	0	0	
30	0.0	0.1	1.3	2.3	1.6	1.5	0.5	0.3	0.7	4.0	1.9	2.1	2.5	1.4	2.1	3.0	2.9	6.3	5.9	4.2	3.0	2.1	2.2	0.5	24	6.3	0.0	2.2	0	0	
31																									0	0.0	0.0		0	0	
Count	27	27	27	27	27	27	27	27	27	27	27	27	27	28	28	28	28	28	28	28	28	27	27	27	656	28	27	27			
Maximum	22.2	17.7	16.8	15.9	16.7	16.4	15.9	16.0	15.9	16.0	15.7	16.1	16.2	15.6	15.2	15.2	15.6	15.6	32.8	39.6	24.3	23.1	32.9	25.2	24	39.6	15.2	19.7			
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0				
Average	1.4	1.4	1.2	1.6	1.9	1.7	1.8	2.0	2.0	1.9	2.4	2.1	1.8	1.5	1.5	1.6	1.7	1.8	2.3	2.7	1.6	2.1	1.9	1.6	21	5	0	1.9			
#>900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Percentiles		10		20		30		40		50		60		70		80		90		95		99		100							
Data		0.0		0.0		0.0		0.0		0.2		0.5		1.0		2.1		4.3		15.2		19.7		39.6							
Notes	C - Calibration / Span Cycle NA - No Data Available T - Test A - MOE Audit M - Equipment Malfunction / Down R - Rate of Change																														

NO ₂ - COURTYARD																														
December 2015																														
December (µg/m ³)																														
Day	Hour																							Count	Maximum	Minimum	Average	Hrs>400	Days>200	
	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300						
1	13.7	13.5	13.2	16.8	13.6	28.8	25.5	27.9	30.9	18.2	17.1	6.0	7.9	8.3	9.2	10.6	15.0	23.1	15.4	12.5	9.5	13.7	12.5	12.5	24	30.9	6.0	15.6	0	0
2	9.4	22.8	29.3	20.5	26.8	28.3	24.8	30.1	36.8	37.8	33.8	22.8	13.3	13.6	10.5	13.9	20.7	33.7	33.8	16.2	31.6	19.8	31.4	41.5	24	41.5	9.4	25.1	0	0
3	35.7	22.1	21.6	22.6	23.0	23.5	19.2	23.3	25.7	25.5	12.6	9.1	8.9	7.5	8.3	9.0	11.9	12.8	9.9	14.6	13.6	11.6	9.2	9.2	24	35.7	7.5	16.3	0	0
4	7.3	6.6	4.3	5.6	7.6	6.4	11.1	12.2	14.3	13.1	15.8	14.0	12.0	12.6	10.9	10.7	15.5	11.6	18.0	15.3	18.4	19.4	14.1	17.4	24	19.4	4.3	12.3	0	0
5	18.2	10.9	12.9	23.1	31.8	15.1	20.4	15.2	14.6	22.0	30.1	24.4	20.6	21.8	20.9	15.4	19.5	18.2	17.6	23.1	7.9	10.5	9.5	12.5	24	31.8	7.9	18.2	0	0
6	13.1	9.5	9.2	8.2	12.4	12.0	15.7	16.7	20.0	11.2	8.1	8.9	11.3	11.0	7.5	10.6	14.1	14.8	28.4	31.2	30.4	30.0	29.5	40.4	24	40.4	7.5	16.8	0	0
7	45.3	44.4	40.6	38.0	36.4	37.8	38.4	39.8	40.3	39.8	44.3	39.8	43.6	42.3	37.4	42.3	26.2	19.9	24.0	55.5	46.8	48.5	42.8	38.4	24	55.5	19.9	39.7	0	0
8	36.6	37.2	43.2	41.1	41.0	13.6	12.6	7.4	7.6	7.4	5.7	5.6	5.1	5.7	5.4	6.8	6.8	6.2	6.2	6.7	9.8	9.9	10.2	14.0	24	43.2	5.1	14.7	0	0
9	13.3	15.0	14.4	14.3	15.2	16.7	41.3	43.4	42.4	23.2	10.2	10.1	15.6	18.8	23.0	22.0	19.2	9.1	10.4	10.9	9.2	8.2	6.4	6.7	24	43.4	6.4	17.5	0	0
10	7.0	8.1	15.9	19.5	12.4	11.0	11.3	9.1	8.4	7.9	11.1	11.3	11.9	14.9	16.5	25.8	23.8	15.7	11.2	8.8	7.9	9.4	8.3	8.0	24	25.8	7.0	12.3	0	0
11	7.3	7.0	6.7	6.3	5.9	6.1	5.0	5.3	5.5	4.9	4.7	4.5	3.3	C	C	C	22.2	21.0	24.4	26.7	27.0	25.1	34.9	35.4	21	35.4	3.3	13.8	0	0
12	33.3	35.5	32.1	27.9	26.3	27.3	23.9	22.4	20.6	21.5	23.5	22.1	20.5	17.4	20.2	20.1	NA	25.4	24.6	22.7	22.3	23.2	20.9	19.3	23	35.5	17.4	24.0	0	0
13	18.7	16.2	14.3	13.5	17.5	16.0	16.4	18.7	22.4	27.0	14.5	15.8	20.1	15.5	13.9	22.3	19.6	23.0	19.2	25.8	25.3	22.8	31.2	29.3	24	31.2	13.5	20.0	0	0
14	28.2	24.1	22.3	24.3	22.5	25.2	25.8	28.9	28.5	27.1	A	A	11.9	15.6	14.9	16.3	17.8	14.6	8.7	4.5	9.5	10.6	3.8	6.5	22	28.9	3.8	17.8	0	0
15	5.1	4.3	5.6	4.7	6.1	6.1	6.4	9.7	14.3	14.2	6.3	4.8	4.2	5.1	5.8	5.9	8.8	8.9	6.9	6.9	5.9	5.0	6.2	8.5	24	14.3	4.2	6.9	0	0
16	11.0	5.5	5.4	4.3	5.6	10.3	13.9	11.8	12.6	16.2	21.2	12.7	5.1	9.4	4.2	9.1	29.9	15.8	2.4	3.0	3.1	3.7	4.6	7.0	24	29.9	2.4	9.5	0	0
17	7.5	9.2	9.1	7.1	7.2	21.7	13.1	15.2	10.5	9.0	7.6	7.7	7.1	13.0	13.5	10.5	16.9	30.4	26.5	16.6	15.7	13.4	8.3	7.9	24	30.4	7.1	12.7	0	0
18	6.8	5.2	6.4	8.2	4.5	7.0	12.6	9.2	12.6	14.7	13.4	12.1	6.8	9.9	11.8	18.5	19.1	16.1	19.9	16.9	14.1	14.9	6.3	9.5	24	19.9	4.5	11.5	0	0
19	9.8	8.7	6.1	7.5	6.0	7.1	9.1	7.3	8.1	7.1	6.7	5.6	6.5	5.8	7.3	5.3	7.0	7.6	7.4	6.1	6.1	7.8	7.8	6.0	24	9.8	5.3	7.1	0	0
20	5.7	4.8	2.5	2.8	4.0	4.4	5.8	9.1	18.1	19.0	3.7	5.6	5.4	3.8	6.5	5.6	4.2	4.5	4.2	5.0	5.5	5.6	5.8	7.1	24	19.0	2.5	6.2	0	0
21	7.2	6.0	4.7	5.1	4.4	4.3	3.9	3.0	4.9	4.7	3.9	4.2	5.1	5.2	5.4	5.9	4.8	4.0	8.9	6.0	4.0	3.9	4.8	4.9	24	8.9	3.0	5.0	0	0
22	4.0	4.1	6.4	4.1	3.8	19.8	9.9	22.6	21.2	36.2	36.5	17.6	13.8	8.2	8.1	11.3	17.7	19.7	17.0	14.5	14.8	20.9	11.1	16.7	24	36.5	3.8	15.0	0	0
23	29.5	33.9	30.3	33.4	27.2	27.2	24.1	26.5	23.2	33.8	34.6	27.5	30.0	15.8	29.7	24.6	10.8	10.0	12.7	8.8	17.5	9.5	7.7	8.0	24	34.6	7.7	22.3	0	0
24	8.7	5.9	4.1	3.9	3.8	3.1	2.1	2.3	2.7	2.8	3.5	3.6	4.1	2.7	2.8	3.1	2.9	3.9	5.6	4.4	3.3	3.6	3.9	15.5	24	15.5	2.1	4.3	0	0
25	16.4	13.8	9.0	7.7	6.4	5.8	7.7	6.8	7.3	15.3	18.0	19.4	13.2	14.5	20.0	21.7	7.8	11.3	10.8	29.0	31.7	14.4	8.4	12.7	24	31.7	5.8	13.7	0	0
26	8.5	5.0	5.4	5.7	7.9	6.5	7.1	6.3	5.0	10.2	7.4	7.7	6.6	5.3	4.4	14.2	17.4	9.4	6.4	16.4	29.7	18.3	26.9	8.7	24	29.7	4.4	10.3	0	0
27	15.4	4.1	4.0	3.5	3.7	5.4	4.6	4.3	4.1	2.9	3.7	3.8	3.0	2.8	2.7	3.8	4.9	5.4	9.1	3.2	3.5	2.0	2.6	2.3	24	15.4	2.0	4.4	0	0
28	2.6	1.2	2.3	1.7	4.5	3.3	4.8	4.1	3.5	3.2	3.4	2.9	3.0	11.6	5.7	5.7	6.1	6.9	6.8	6.3	4.7	5.1	6.6	5.3	24	11.6	1.2	4.6	0	0
29	12.2	32.8	26.5	11.1	3.7	5.9	8.2	5.3	4.1	29.2	35.1	36.9	24.5	19.7	16.5	16.8	25.1	22.9	22.3	27.6	17.3	32.9	24.4	25.8	24	36.9	3.7	20.3	0	0
30	25.6	19.9	31.8	26.0	31.1	17.4	7.9	8.7	11.0	14.8	16.3	13.6	15.6	9.9	10.2	17.7	11.7	16.9	50.9	35.4	28.0	18.7	28.2	25.2	24	50.9	7.9	20.5	0	0
31	21.4	20.1	16.8	13.6	13.7	13.9	22.8	17.9	26.0	14.5	13.4	15.0	16.3	13.1	9.0	10.8	8.0	8.9	6.8	5.8	5.0	4.8	10.8	16.0	24	26.0	4.8	13.5	0	0
Count	31	31	31	31	31	31	31	31	31	31	30	30	31	30	30	30	30	31	31	31	31	31	31	31	738	31	30	31		
Maximum	45.3	44.4	43.2	41.1	41.0	37.8	41.3	43.4	42.4	39.8	44.3	39.8	43.6	42.3	37.4	42.3	29.9	33.7	50.9	55.5	46.8	48.5	42.8	41.5	24	55.5	29.9	42.5		
Minimum	2.6	1.2	2.3	1.7	3.7	3.1	2.1	2.3	2.7	2.8	3.4	2.9	3.0	2.7	2.7	3.1	2.9	3.9	2.4	3.0	3.1	2.0	2.6	2.3	21	8.9	1.2	2.7		
Average	15.6	14.7	14.7	13.9	14.1	14.1	14.7	15.2	16.4	17.2	15.5	13.2	12.1	12.0	12.1	13.9	14.5	14.6	15.4	15.7	15.5	14.4	14.2	15.4	24	30	6	14.6		
#>900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
Percentiles		10		20		30		40		50		60		70		80		90		95		99		100						Maximum
Hour																														55.5
Day																														39.7
Month																														14.6
Data		4.2		5.7		7.1		9.1		11.8		14.6		17.9		22.8		29.5		35.8		43.5		55.5						
Notes	C - Calibration / Span Cycle NA - No Data Available T - Test A - MOE Audit M - Equipment Malfunction / Down R - Rate of Change																													

ATTACHMENT E
DATA 2015 Q4 REPORT - UPDATED TABLE 4-2 SUMMARY
OF AMBIENT CAC MONITORING

Table 4-2 Summary of Ambient CAC Monitoring Data – October to December 2015

Pollutant	Averaging Period	AAQC / Schedule 3 / HHRA Health-Based Standards			Courtice WPCP Station (Predominately Upwind)		Rundle Road Station (Predominately Downwind)	
		ppb	µg/m ³		Concentration (ppbv)	Concentration (µg/m ³)	Concentration (ppbv)	Concentration (µg/m ³)
SO ₂	1	250	690	Maximum	22.8	64.0	12.6	33.6
				Minimum	0.0	0.0	0.0	0.0
				Mean (October)	0.7	1.8	0.8	2.2
				Mean (November)	0.7	1.8	1.5	4.3
				Mean (December)	1.2	3.5	0.5	1.3
				Mean (Period)	0.9	2.4	0.9	2.6
				Standard Deviation	2.0	5.5	1.2	3.4
				# of Exceedances	0	0	0	0
	24	100	275	Maximum	7.1	19.7	8.3	22.4
				Minimum	0.0	0.0	0.0	0.0
				Mean (October)	0.7	1.8	0.8	2.1
				Mean (November)	0.7	1.8	1.6	4.3
				Mean (December)	1.3	3.6	0.5	1.3
				Mean (Period)	0.9	2.4	0.9	2.6
Standard Deviation				1.2	3.4	1.1	3.0	
# of Exceedances				0	0	0	0	

Table 4-2 Summary of Ambient CAC Monitoring Data – October to December 2015

Pollutant	Averaging Period	AAQC / Schedule 3 / HHRA Health-Based Standards			Courtice WPCP Station (Predominately Upwind)		Rundle Road Station (Predominately Downwind)	
		ppb	µg/m ³		Concentration (ppbv)	Concentration (µg/m ³)	Concentration (ppbv)	Concentration (µg/m ³)
PM _{2.5}	24	N/A	28 ^A	Maximum	-	26.5	-	30.5
				Minimum	-	0.2	-	0.9
				Mean (October)	-	3.2	-	5.2
				Mean (November)	-	6.8	-	10.3
				Mean (December)	-	8.0	-	9.9
				Mean (Period)	-	6.0	-	8.5
				Standard Deviation	-	6.5	-	6.3
				# of Exceedances	-	N/A	-	N/A
NO ₂	1	200 ^B	400 ^B	Maximum	37.8	74.3	31.6	64.9
				Minimum	0.0	0.1	1.0	0.0
				Mean (October)	6.1	12.1	6.2	12.0
				Mean (November)	9.7	19.5	8.7	17.5
				Mean (December)	7.2	14.6	8.6	17.2
				Mean (Period)	7.6	15.4	7.8	15.6
				Standard Deviation	6.2	12.6	5.1	10.2
				# of Exceedances	0	0	0	0
	24	100 ^B	200 ^B	Maximum	22.2	45.6	19.1	38.8
				Minimum	1.7	3.4	1.3	1.8
				Mean (October)	6.2	12.3	6.2	12.1
				Mean (November)	9.6	19.2	8.7	17.5
				Mean (December)	7.3	14.4	8.5	16.7
				Mean (Period)	7.7	15.3	7.9	15.5
Standard Deviation	4.3	8.7	3.7	7.4				

Table 4-2 Summary of Ambient CAC Monitoring Data – October to December 2015

Pollutant	Averaging Period	AAQC / Schedule 3 / HHRA Health-Based Standards			Courtice WPCP Station (Predominately Upwind)		Rundle Road Station (Predominately Downwind)	
		ppb	µg/m ³		Concentration (ppbv)	Concentration (µg/m ³)	Concentration (ppbv)	Concentration (µg/m ³)
				# of Exceedances	0	0	0	0
NO _x	1	NA	NA	Maximum	74.3	100	64.1	85.7
				Minimum	0.0	0.0	0.6	0.0
				Mean (October)	3.2	4.2	3.0	3.8
				Mean (November)	5.3	6.9	4.3	5.6
				Mean (December)	2.7	3.6	3.1	4.0
				Mean (Period)	3.7	4.9	3.4	4.5
				Standard Deviation	7.3	9.6	4.4	5.9
				# of Exceedances	N/A	N/A	N/A	N/A
	24	NA	NA	Maximum	22.3	28.9	15.9	21.4
				Minimum	0.0	0.0	1.0	0.7
				Mean (October)	3.3	4.3	3.1	3.8
				Mean (November)	5.2	6.9	4.2	5.6
				Mean (December)	2.8	3.6	3.1	4.0
				Mean (Period)	3.8	4.9	3.5	4.5
				Standard Deviation	4.3	5.6	2.2	2.9
# of Exceedances				N/A	N/A	N/A	N/A	

Table 4-2 Summary of Ambient CAC Monitoring Data – October to December 2015

Pollutant	Averaging Period	AAQC / Schedule 3 / HHRA Health-Based Standards			Courtice WPCP Station (Predominately Upwind)		Rundle Road Station (Predominately Downwind)	
		ppb	µg/m ³		Concentration (ppbv)	Concentration (µg/m ³)	Concentration (ppbv)	Concentration (µg/m ³)
NO _x	1	200 ^B	400 ^B	Maximum	95.4	196.8	93.5	191.7
				Minimum	0.1	0.1	0.6	0.0
				Mean (October)	9.2	18.4	7.5	14.6
				Mean (November)	14.8	29.8	11.1	22.3
				Mean (December)	9.7	19.5	10.1	20.4
				Mean (Period)	11.2	22.5	9.6	19.1
				Standard Deviation	12.4	25.2	8.3	16.7
				# of Exceedances	0	0	0	0
	24	100 ^B	200 ^B	Maximum	42.0	83.1	31.9	65.9
				Minimum	1.8	3.5	1.1	1.8
				Mean (October)	9.4	18.8	7.6	14.7
				Mean (November)	14.6	29.5	11.1	22.3
				Mean (December)	9.8	19.4	10.1	19.9
				Mean (Period)	11.3	22.5	9.6	19.0
Standard Deviation				8.2	16.6	5.4	10.9	
# of Exceedances				0	0	0	0	

Note:

- A. Canadian Ambient Air Quality Standard for Respirable Particulate Matter. The Respirable Particulate Matter Objective is referenced to the 98th percentile over 3 consecutive years.
- B. As per current version (April 2012) of Reg 419 Summary of Standards and Guidelines, the air standard for NO_x is compared to a monitored NO_x concentration, although the Reg419 Schedule 3 standard for NO_x is based on health effects of NO₂.
- C. NO has no regulatory criteria.