



Stantec Consulting Ltd.
401 Wellington Street West, Suite 100
Toronto ON M5V 1E7
Tel: (416) 596-6686
Fax: (416) 596-6680

May 17, 2016
File: 160950528

Attention: **Mr. Greg Borchuk, P.Eng.**
Project Manager, EFW
Waste Management Services

The Region of Durham
605 Rossland Rd.,
Whitby, ON L1N 6A3

Dear Mr. Borchuk,

Reference: Q4 2015 Ambient Air Quality Monitoring Report for the Durham York Energy Centre – Crago Road Station

Please find attached with this letter the Q4 2015 quarterly report for the Durham York Energy Centre (DYEC) Crago Road Station.

This quarterly report provides a summary of the measurements collected at this station during October to December 2015 (calendar Quarter 4 of 2015). All equipment operated well during this measurement period.

On December 2 and December 12, measured 24-hour average PM_{2.5} concentrations were relatively high, at 42.9 µg/m³ and 44.4 µg/m³, respectively. Wind directions on these two days were from the north and the east. On both of these days, the DYEC was not in operation. There was a boiler outage (Boiler 1) from November 26 and December 15, and a second boiler outage from November 21, to December 13.

Regional Council has requested that 98th percentile PM_{2.5} data also be provided along with the quarterly reports, which is provided in Table 1 below. A comparison to the Canadian Ambient Air Quality Standard (CAAQS) for PM_{2.5} requires averaging the 98th percentile daily average levels in each of three consecutive years. The values presented in Table 1 corresponds to the 98th percentile over the first year of monitoring at this station (November 2014-October 2015) and the first 2-months (November and December 2015) of the second year. An additional one year and 9-months of additional data will be required in order to provide an explicit comparison to the current CAAQS criteria of 28 µg/m³. Please note that for explicit comparison to the CAAQS for PM_{2.5}, use of annual data based on calendar years is required, rather than annual periods based on the start of the monitoring presented in Table 1. Also, to be statistically significant, a minimum of 2-years of data is required for an initial comparison, with 3-years of data required for explicit comparison. Therefore, the data in Table 1 should be considered preliminary and is included to



May 17, 2016
Mr. Greg Borchuk, P.Eng.
Project Manager, EFW
Waste Management Services

Page 2 of 2

Reference: Q4 2015 Ambient Air Quality Monitoring Report for the Durham York Energy Centre – Crago Road Station

provide an initial indication of ambient PM_{2.5} levels with respect to the CAAQS until 3-calendar years of data have been collected.

Table 1 Summary of the 98th Percentile Daily Average PM_{2.5} Concentrations Measured to Date (µg/m³)

Period	Crago Road Monitoring Station
November 2014 – October 2015 (Year 1)	20.5
November 2015 – December 2015 (2-months of data)	42.9

Regards,

STANTEC CONSULTING LTD.

Gregory Crooks, M.Eng., P.Eng.
Principal, Environmental Services
Phone: (416) 598-7687
Fax: (416) 596-6680
gregory.crooks@stantec.com

c. Gio Anello, Region of Durham
Lindsay Waller, Region of Durham
Luis Carvalho, Region of York
Seth Dittman, Region of York
C. Lim, T. Hung, Stantec

mcs v:\01609\active\160950528\planning\report\final\2015\2015 q4 crago report\q4_2015_crago_rd_cover_final_17may16.docx

**Quarterly Ambient Air Quality
Monitoring Report for the Durham
York Energy Centre (Crago Road
Station) – October to December
2015**

Durham York Energy Centre



Prepared for:
The Regional Municipality of Durham
605 Rossland Rd
Whitby, ON L1N 6A3

Prepared by:
Stantec Consulting Ltd.
300W-675 Cochrane Dr.,
Markham, ON L3R 0B8

Project No.: 160950528

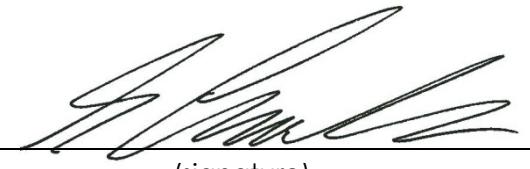
May 17, 2016

Sign-off Sheet

This document entitled Quarterly Ambient Air Quality Monitoring Report for the Durham York Energy Centre (Crago Road Station) – October to December 2015 was prepared by Stantec Consulting Ltd. for the account of The Regional Municipality of Durham. The material in it reflects Stantec's best judgment in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Stantec Consulting Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Prepared by 
(signature)

Timothy Hung, B.A.Sc.

Reviewed by 
(signature) --

Gregory Crooks M.Eng., P.Eng.

V:\01609\Active\160950528\planning\report\final\2015\2015 Q4 Crago Report\160950528_rpt_2015_Q4_Crago_Rd_Final_17_05_2016.docx

**QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE
(CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015**

Table of Contents

EXECUTIVE SUMMARY	I
ABBREVIATIONS	III
1.0 INTRODUCTION	1.1
1.1 BACKGROUND AND OBJECTIVES	1.1
1.2 LOCATION OF AMBIENT AIR QUALITY MONITORING STATION	1.2
2.0 KEY COMPONENTS ASSESSED	2.1
2.1 METEOROLOGY	2.1
2.2 AIR QUALITY CONTAMINANTS OF CONCERN	2.1
2.3 AIR QUALITY CRITERIA	2.1
3.0 INSTRUMENTATION SUMMARY	3.1
3.1 INSTRUMENTATION	3.1
3.2 INSTRUMENTATION ISSUES	3.2
3.3 INSTRUMENTATION RECOVERY RATES	3.2
4.0 SUMMARY OF AMBIENT MEASUREMENTS.....	4.1
4.1 METEOROLOGICAL DATA	4.1
4.2 CAC AMBIENT AIR QUALITY MEASUREMENTS	4.3
4.2.1 Sulphur Dioxide (SO ₂)	4.8
4.2.2 Nitrogen Dioxide (NO ₂)	4.10
4.2.3 Nitrogen Oxides (NO _x)	4.11
4.2.4 Particulate Matter Smaller than 2.5 Microns (PM _{2.5})	4.12
5.0 CONCLUSIONS.....	5.1
6.0 REFERENCES.....	6.1

**QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE
(CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015**

LIST OF TABLES

Table 2-1	Summary of Air Quality Criteria for CACs	2.2
Table 3-1	Summary of Continuous Ambient Air Quality Monitors	3.1
Table 3-2	Summary of Meteorological Equipment	3.2
Table 3-3	Summary of Instrument Issues at the Crago Road Station (Predominately Downwind)	3.2
Table 3-4	Summary of Data Recovery Rates for the Crago Road Station (Predominately Downwind) – October to December 2015.....	3.3
Table 4-1	Summary of Hourly Meteorological Measurements – July to September 2015.....	4.1
Table 4-2	Summary of Ambient CAC Monitoring Data – October to December 2015	4.4

LIST OF FIGURES

Figure 1-1	Durham York Energy Centre Site Location Plan	1.3
Figure 1-2	Location of Ambient Air Quality Monitoring Station.....	1.5
Figure 1-3	View of Crago Road Ambient Air Quality Monitoring Station	1.7
Figure 4-1	Wind Rose for October to December 2015	4.2
Figure 4-2	Comparison of NO ₂ / NO _x and SO ₂ Ambient Air Quality Monitoring Data to Applicable Criteria and Existing Stations.....	4.8
Figure 4-3	Pollution Rose of Measured Hourly Average SO ₂ Concentrations – October to December 2015	4.9
Figure 4-4	Pollution Roses of Measured Hourly Average NO ₂ – October to December 2015	4.11
Figure 4-5	Pollution Roses of Measured Hourly Average NO _x Concentrations – October to December 2015	4.12
Figure 4-6	Pollution Roses of Measured 24-Hour Average PM _{2.5} Concentrations – October to December 2015	4.13

**QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE
(CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015**

LIST OF APPENDICES

APPENDIX A	SO₂ DATA SUMMARIES AND TIME HISTORY PLOTS	A.1
APPENDIX B	NO₂ DATA SUMMARIES AND TIME HISTORY PLOTS.....	B.1
APPENDIX C	NO_x DATA SUMMARIES AND TIME HISTORY PLOTS	C.1
APPENDIX D	PM_{2.5} DATA SUMMARIES AND TIME HISTORY PLOTS	D.1
APPENDIX E	CONTINUOUS PARAMETER EDIT LOG	E.1

QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015

Executive Summary

The Regional Municipalities of Durham and York are constructing the Durham York Energy Centre (DYEC) which is an Energy from Waste (EFW) Facility intended to provide a long-term, sustainable solution to manage municipal solid waste remaining after diversion from the Regions. The facility commenced processing waste on February 13, 2015 and the facility was being commissioned throughout the period covered by this report.

As requested by the Regional Municipality of Durham (the Region), a third ambient air monitoring station located near the corner of Crago and Osborne Roads was installed in October/November 2014. This station, which is not part of the Ambient Air Quality Monitoring Plan - Durham York Residual Waste Study (Stantec, May 8, 2012), is operated following the same protocols as the other two stations (Courtice WPCP and Rundle Road Stations) already in operation. The plan developed for the Courtice WPCP and Rundle Road Stations was based on the Regional Council's mandate to provide ambient air quality monitoring in the area of the DYEC for a three year period. An ambient air quality monitoring and reporting program was also a requirement laid out in the Provincial Minister's Notice of Approval to Proceed with the Undertaking, detailed in Condition 11 of the Notice of Approval (MOECC, 2010). The air monitoring plan was also developed to satisfy the conditions of the Environmental Compliance Approval and the environmental mitigation and commitments set out in the Environmental Assessment (Jacques Whitford, 2009).

Since November 2014, the predominantly downwind Crago Road Station has measured the following air contaminants continuously:

- Sulphur Dioxide (SO_2);
- Nitrogen Oxides (NO_x); and,
- Particulate Matter smaller than 2.5 microns ($\text{PM}_{2.5}$);

Operation of non-continuous monitors at the third station was not started as per Section 1.2 of the Ambient Monitoring Plan (Stantec, 2012). When the EFW facility is fully operational, monitoring of non-continuous monitors will start (as specified in the Ambient Monitoring Plan). The following air contaminants will be measured non-continuously:

- Metals in total suspended particulate matter (TSP);
- Polycyclic Aromatic Hydrocarbons (PAHs); and,
- Dioxins and Furans.

The predominantly downwind Crago Road station also measures horizontal wind speed, wind direction, atmospheric temperature, relative humidity and rainfall.

QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015

This quarterly report provides a summary of the ambient air quality data collected at the Crago Road station for the period October to December 2015 (Calendar Quarter 4). All measured air quality parameters had above acceptable data recovery rates during this quarter.

Instrumentation recovery rates are presented in **Section 3.2** of this report.

The following observations and conclusions were made from a review of the measured ambient air quality monitoring data:

1. Measured levels of NO₂, SO₂ and PM_{2.5} were below the applicable O. Reg. 419/05 criteria or human health risk assessment (HHRA) health-based standards presented in **Table 2-1** of this report;
2. Since the Canadian Ambient Air Quality Standard (CAAQS) for PM_{2.5} is based on a 98th percentile level over 3 years, whereas the PM_{2.5} measurement period at the Crago Road station for this quarterly report was three months, there was insufficient data collected to determine with any certainty if exceedances of the CAAQS would occur. Therefore no comparison of the measured PM_{2.5} data during this quarter to the CAAQS was conducted for this report, as it would not be scientifically accurate or representative;
3. In summary, all monitored contaminants were below their applicable MOECC criteria for the monitoring data presented in this report. All measured levels of all monitored contaminants were below their applicable HHRA health-based standards.

**QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE
(CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015**

Abbreviations

AAQC	Ambient Air Quality Criteria
CAAQS	Canadian Ambient Air Quality Standard
CAC	Criteria Air Contaminants
D/Fs	Dioxins and Furans
DYEC	Durham York Energy Centre
EFW	Energy from Waste
MOECC	Ontario Ministry of the Environment and Climate Change
SO ₂	Sulphur Dioxide
NO _x	Nitrogen Oxides
PAH	Polycyclic aromatic hydrocarbons
Particulate	A particle of a solid or liquid that is suspended in air.
PCB	Polychlorinated biphenyl
PCDD/PCDF	Polychlorinated dibenzo-p-dioxins and dibenzofurans
PM	Particulate Matter
PM _{2.5}	Particulate Matter smaller than 2.5 microns
TEQ	Toxic equivalent quotient
TEQs	Toxic Equivalents
TSP	Total Suspended Particulate
WPCP	Water Pollution Control Plant

Elements

Cd	Cadmium
Hg	Mercury
Pb	Lead
Al	Aluminum
As	Arsenic
Be	Beryllium
Cr	Chromium
Cu	Copper
Mn	Manganese
Ni	Nickel
Ag	Silver
Tl	Thallium
Sn	Tin
V	Vanadium
Zn	Zinc

**QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE
(CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015**

Miscellaneous

°C	temperature in degrees Celsius
N/A	not available
%	percent
ppm	part per million
ppb	part per billion
ppt	part per trillion
min	minimum
max	maximum
µg/m ³	microgram per cubic metre

QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015

Introduction
May 17, 2016

1.0 INTRODUCTION

1.1 BACKGROUND AND OBJECTIVES

The Regional Municipalities of Durham and York are constructing the Durham York Energy Centre (DYEC) which is an Energy from Waste (EFW) Facility intended to provide a long-term, sustainable solution to manage municipal solid waste remaining after diversion from the Regions. The facility commenced processing waste on February 13, 2015 and the facility was being commissioned throughout the period covered by this report. The site location of the DYEC is shown in **Figure 1-1**.

As requested by the Regional Municipality of Durham (the Region), a third ambient air monitoring station located near the corner of Crago and Osborne Roads was installed. This station, which is not part of the Ambient Air Quality Monitoring Plan - Durham York Residual Waste Study (Stantec, May 8, 2012), is operated following the same protocols as the other two stations (Courtice WPCP and Rundle Road Stations) already in operation. The plan developed for the Courtice WPCP and Rundle Road Stations was based on the Regional Council's mandate to provide ambient air quality monitoring in the area of the DYEC for a three year period.

The purposes of the ambient air quality monitoring program are to:

1. Quantify any measureable ground level concentrations resulting from emissions from the DYEC cumulative to local air quality, including validating the predicted concentrations from the dispersion modelling conducted in the Environmental Assessment (Jacques Whitford, 2009);
2. Monitor concentration levels of EFW-related air contaminants in nearby residential areas; and,
3. Quantify background ambient levels of air contaminants in the area.

Since November 2014, the predominantly downwind Crago Road station has measured the following air contaminants continuously:

- Sulphur Dioxide (SO_2);
- Nitrogen Oxides (NO_x);
- Particulate Matter smaller than 2.5 microns ($\text{PM}_{2.5}$);

QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015

Introduction
May 17, 2016

Operation of the non-continuous monitors at the third station was not started as per Section 1.2 of the Ambient Monitoring Plan (Stantec, 2012). When the EFW facility is fully operational, monitoring of non-continuous monitors will start (as specified in the Ambient Monitoring Plan). The following air contaminants will be measured non-continuously:

- Metals in total suspended particulate matter (TSP);
- Polycyclic Aromatic Hydrocarbons (PAHs); and,
- Dioxins and Furans.

This quarterly report provides a summary of the ambient air quality data collected at this station for the period October to December 2015.

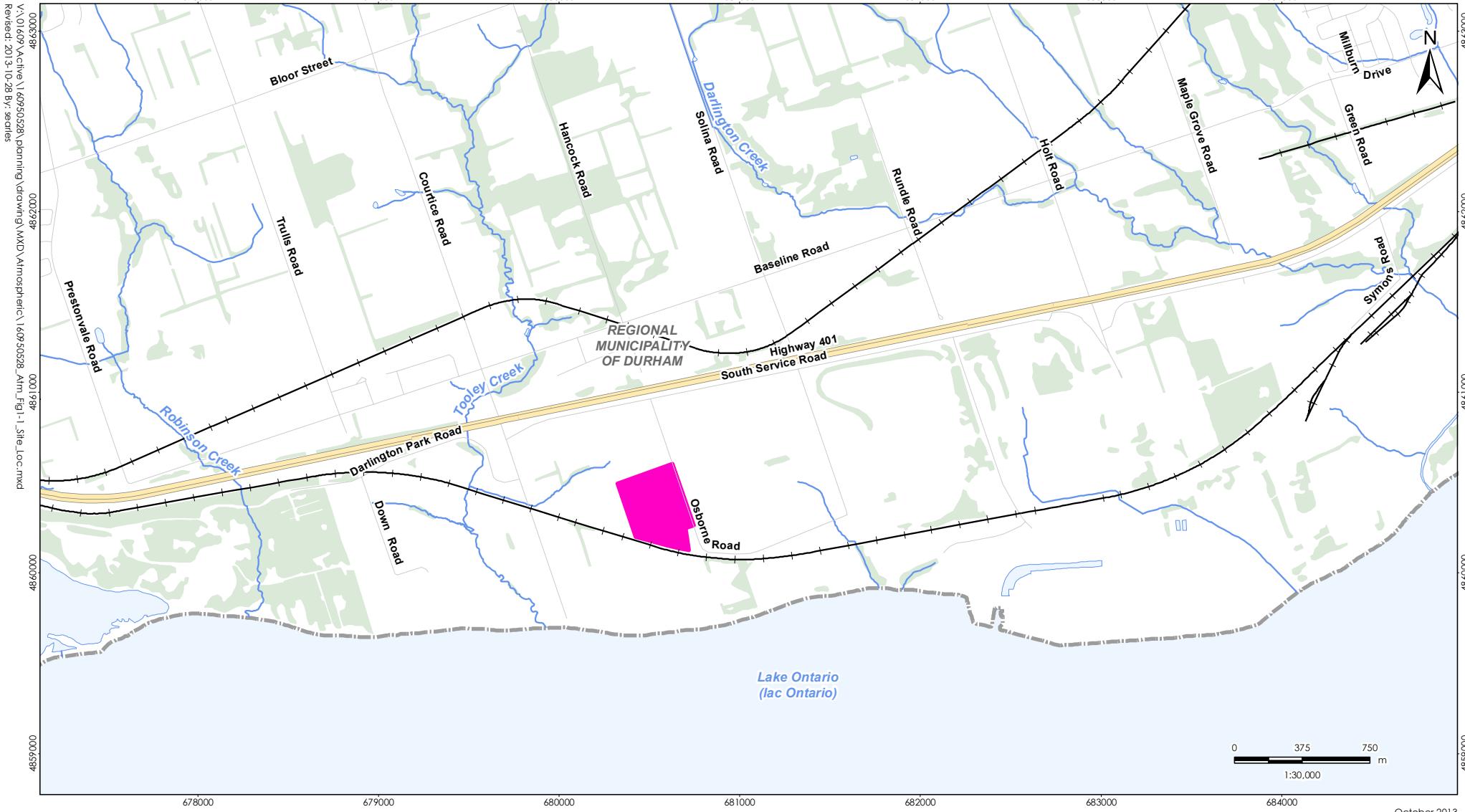
1.2 LOCATION OF AMBIENT AIR QUALITY MONITORING STATION

The selection of the site for the monitoring station was done in consultation with Durham/York representatives, with consideration of the location of the existing monitoring stations and general MOECC siting criteria. The final location of the monitoring station was influenced by the availability of electrical power, accessibility of each location, and security.

The selected location is sited east of the DYEC in the vicinity of the Darlington Hydro Upper and Lower Soccer Fields. The predominantly downwind Crago Road Station is located on the east side of Crago Road, north of Osborne Road. Its location is shown in **Figure 1-2**. The monitoring station measures all the air contaminants listed in **Section 1.1** and meteorological data. This station is referred to as the Crago Road Station.

A fourth Fence Line Station, which will measure non-continuous parameters (metals and total particulate matter) was installed in Q1 2016 and will run for a one-year period after commencement of full operation of the DYEC.

A photograph of the Crago Road ambient air quality monitoring station is shown in **Figure 1-3**.



October 2013
160950528



Notes

1. Coordinate System: NAD 1983 UTM Zone 17N

2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2013.

Legend

- Durham York Energy Centre Site
- Railway
- Road
- Highway
- Watercourse
- Waterbody
- Wooded Area



Client/Project

The Region of Durham
Durham York Energy Centre

Figure No.

1-1

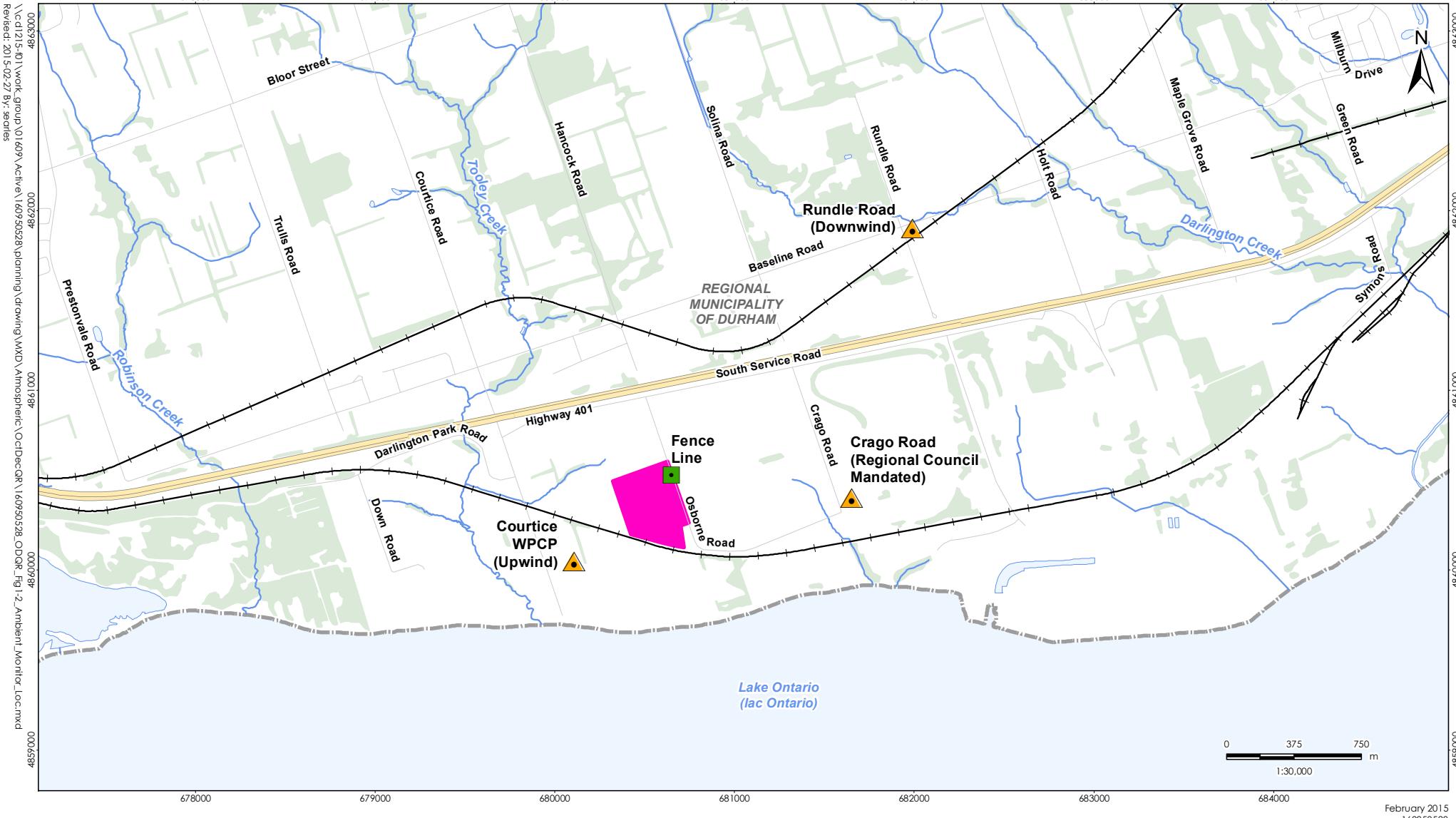
Title

Site Location Plan

**QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE
(CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015**

Introduction
May 17, 2016

[back of Figure 1-1]



Legend

- ▲ Station Location
- Fence Line Station Location
(Monitoring to begin after DYEC commissioning period)
- Durham York Energy Centre Site
- Railway
- Road
- Highway

- Watercourse
- Waterbody
- Wooded Area

Client/Project

The Region of Durham
Durham York Energy Centre

Figure No.

1-2

Title

Locations of Ambient Monitoring Stations

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N

2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2013.



**QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE
(CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015**

Introduction
May 17, 2016

[back of Figure 1-2]

**QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE
(CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015**

Introduction
May 17, 2016

Figure 1-3 View of Crago Road Ambient Air Quality Monitoring Station



QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015

Key Components Assessed
May 17, 2016

2.0 KEY COMPONENTS ASSESSED

2.1 METEOROLOGY

The following meteorological parameters are measured at the Crago Road monitoring station:

- Wind Speed and Direction @10-m
- Ambient Temperature @ 2-m
- Relative Humidity
- Rainfall

2.2 AIR QUALITY CONTAMINANTS OF CONCERN

The ambient air quality monitoring program for the DYEC includes the following contaminants specified in the Ambient Air Quality Monitoring Plan:

- Continuously monitored
 - Sulphur Dioxide (SO₂);
 - Nitrogen Oxides (NO_x); and,
 - Particulate Matter smaller than 2.5 microns (PM_{2.5}).
- Non-Continuously monitored
 - Metals in Total Suspended Particulate (TSP) matter;
 - Polycyclic Aromatic Hydrocarbons (PAHs); and,
 - Dioxins and Furans.

Operation of the non-continuous monitors at the Crago Road station was not started as per Section 1.2 of the Ambient Monitoring Plan (Stantec, 2012). When the EFW facility is fully operational, monitoring of non-continuous monitors will start (as specified in the Ambient Monitoring Plan). Therefore, the non-continuously monitored contaminants listed above were not monitored during this quarter.

2.3 AIR QUALITY CRITERIA

Two sets of standards were used for comparison to the air quality data as specified in the Ambient Air Monitoring Plan. The first set of standards is the limits reported in O.Reg.419/05 (Schedules 3 and 6). These are compliance based standards used throughout the province of Ontario. However, not all chemicals have O.Reg.419/05 criteria, or in some instances updated health-based standards were used in the human health risk assessment (HHRA) conducted in support of the Environmental Assessment (July 31, 2009) - December 10, 2009). These health-based values, which were reported in Table 7-2 (Summary of Inhalation TRVs and Inhalation Benchmarks Selected for CACs) and Table 7-3 (Inhalation TRVs and Inhalation Benchmarks for Selected COPCs) of the HHRA (Stantec, 2009) were used as the second set of standards.

QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015

Key Components Assessed
May 17, 2016

The previously applicable 24-hour average Canada-Wide Standard (CWS) for PM_{2.5} of 30 µg/m³ (98th percentile averaged over 3 consecutive years), has been superseded by a new Canadian Ambient Air Quality Standard (CAAQS) of 28 µg/m³ (98th percentile averaged over 3 consecutive years) as noted in **Table 2-1**. The proposed CAAQS 24-hour objective for 2020 is 27 µg/m³.

A summary of the relevant air quality criteria for the contaminants monitored in Q4 2015 is presented in **Table 2-1**.

Table 2-1 Summary of Air Quality Criteria for CACs

Contaminant	CAS	O. Reg 419/05 – Schedule 3/AAQC			HHRA Health-Based Standards		
		1-Hour (µg/m ³)	24-Hour (µg/m ³)	Other time Period (µg/m ³)	1-Hour (µg/m ³)	24-Hour (µg/m ³)	Annual (µg/m ³)
Sulphur dioxide	7446095	690	275		690	275	29
Nitrogen oxides ^A	10102-44-0	400	200		400	200	60

Contaminant	CAS	Canadian Ambient Air Quality Standards (CAAQS)			HHRA Health-Based Standards		
		1-Hour (µg/m ³)	24-Hour (µg/m ³)	Other time Period (µg/m ³)	1-Hour (µg/m ³)	24-Hour (µg/m ³)	Other time Period (µg/m ³)
PM _{2.5}	N/A		28 ^B	10 ^C		30 ^D	

Notes:

- A. The Schedule 3 standards for NO_x are based on health effects of NO₂, as NO₂ has adverse health effects at much lower concentrations than NO. Therefore the standard was compared to NO₂ in this report. However, as per the current April 2012 version of O. Reg. 419 Summary of Standards and Guidelines, the standard was also compared to the monitored NO_x.
- B. Canadian Ambient Air Quality Standards (CAAQS) for Respirable Particulate Matter and Ozone, effective by 2015 (CCME, 2012). The Respirable Particulate Matter Objective is referenced to the 98th percentile daily average concentration averaged over 3 consecutive years.
- C. Annual Canadian Ambient Air Quality Standard for Respirable Particulate Matter, effective by 2015. The Respirable Particulate Matter Objective is referenced to the 3-year average of the annual average concentrations.
- D. HHRA Health-Based Standard for PM_{2.5} was selected referencing CCME (2006).

QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAVO ROAD STATION) – OCTOBER TO DECEMBER 2015

Instrumentation Summary
May 17, 2016

3.0 INSTRUMENTATION SUMMARY

3.1 INSTRUMENTATION

The measurement program at the monitoring site includes both continuous and non-continuous monitors to sample air contaminant concentrations. The analyzers were set up between October to November 2014, and monitoring started on November 15, 2014.

Monitoring for respirable particulate matter (PM_{2.5}), nitrogen oxides (NO_x) and sulphur dioxide (SO₂) are conducted on a continuous basis. A summary of the continuous monitors and a brief description of their principle of operation are provided in **Table 3-1** below.

Table 3-1 Summary of Continuous Ambient Air Quality Monitors

Contaminant	Monitor	Principle of Operation	Range	Time Interval
PM _{2.5}	Thermo Sharp 5030 Synchronized Hybrid Ambient Real-time Particulate Monitor	Light Scattering Photometry / Beta Attenuation - Consists of a carbon14 source, detector and light scattering Nephelometer in a rack-mountable enclosure. The Thermo Sharp utilizes a continuous (non-step wise) hybrid mass measurement and a combination of beta attenuation and light scattering technology. The unit's filter tape is automatically advanced based upon a user defined frequency or particulate loading.	0-10 mg/m ³	1 minute
NO, NO ₂ , NO _x	API Model 200E Chemiluminescence Analyzer	Chemiluminescence - Uses a chemiluminescence detection principle and microprocessor technology for ambient continuous emissions monitoring (CEM). Measurements are automatically compensated for temperature and pressure changes.	0 – 1000 ppb	1 second
SO ₂	Teledyne Monitor Labs Sulphur Dioxide Analyzer Model T100	Pulsed Fluorescence - SO ₂ levels are measured based on the principle that SO ₂ has a strong ultraviolet (UV) absorption at a wavelength between 200 and 240 nanometres (nm). The absorption of photons at these wavelengths results in the emission of fluorescence photons at a higher wavelength. The amount of fluorescence measured is directly proportional to the concentration of SO ₂ .	0 – 1000 ppb	1 second

QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015

Instrumentation Summary
May 17, 2016

The predominantly downwind Crago Road Station measures horizontal wind speed, wind direction, atmospheric temperature, relative humidity and rainfall. The meteorological sensors at the Crago Road Station are mounted on an external 10-m aluminum tower and are logged using a digital data acquisition system (DAS). The meteorological equipment includes the following:

Table 3-2 Summary of Meteorological Equipment

Parameter	Equipment
Wind Speed/Wind Direction	Met One Instruments Inc. Model 034B
Temperature	Campbell Scientific Model CS 107
Relative Humidity	Campbell Scientific Model HMP60
Rainfall	Texas Electronic TE525M

A Campbell Scientific CRX1000 station data acquisition system is used to collect continuous instrument monitoring data and status codes from the ambient air quality monitors. Continuous station data is maintained in the data loggers, and data is viewed locally using a laptop and the relevant DAS software applications. Remote data transmission is accomplished by the periodic transmission of collected station air quality data via cellular phone.

3.2 INSTRUMENTATION ISSUES

A few instrumentation issues were encountered during this quarter. A summary of operational issues for each measurement parameter during the monitoring period is presented in **Table 3-3**.

**Table 3-3 Summary of Instrument Issues at the Crago Road Station
(Predominately Downwind)**

Parameter	Issues	Time Frame	Remedial Action
SO ₂	-	-	-
NOx	-	-	-
PM _{2.5}	Moisture leaking into monitor	October 29 – November 12, 2015	Sealed leak. All data intact.
Other	-	-	-

3.3 INSTRUMENTATION RECOVERY RATES

Data recovery rates for each continuous monitor at the monitoring station during Quarter 4 (October to December 2015) are presented in **Table 3-4**.

**QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE
(CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015**

Instrumentation Summary
May 17, 2016

**Table 3-4 Summary of Data Recovery Rates for the Crago Road Station
(Predominately Downwind) – October to December 2015**

Parameter	Valid Measurement Hours	Data Recovery Rate (%)
SO ₂	2200	99.6%
NO _x	2200	99.6%
PM _{2.5}	2192	99.3%
Temperature	2208	100.0%
Rainfall	2208	100.0%
Relative Humidity	2208	100.0%
Wind Speed/Direction	2208	100.0%
TSP/Metals	N/A ^	N/A ^
PAHs	N/A ^	N/A ^
Dioxins and Furans	N/A ^	N/A ^

Note:

- A. Monitoring of these parameters was not started for the period covered in this report.

QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015

Summary of Ambient Measurements
May 17, 2016

4.0 SUMMARY OF AMBIENT MEASUREMENTS

The following sections provide summaries of the validated data and the validation done on each parameter.

4.1 METEOROLOGICAL DATA

A summary of the maximum, minimum, arithmetic mean, and standard deviation of the hourly average meteorological parameters measured at the monitoring station for the October to December 2015 period are presented in **Table 4-1**.

Table 4-1 Summary of Hourly Meteorological Measurements – July to September 2015

Parameter	Crago Road Station (Predominately Downwind)	Units
Temperature	Max	19.3
	Min	-7.5
	Mean (October)	9.1
	Mean (November)	5.8
	Mean (December)	3.9
	Mean (Period)	6.3
	Standard Deviation	4.9
Rainfall	Max	10.5
	Min	0.0
	Mean (October)	0.16
	Mean (November)	0.04
	Mean (December)	0.05
	Mean (Period)	0.08
	Standard Deviation	0.54
Relative Humidity	Max	%
	Min	35.7
	Mean (October)	73.2
	Mean (November)	77.9
	Mean (December)	81.4
	Mean (Period)	77.5
	Standard Deviation	13.3

**QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE
(CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015**

Summary of Ambient Measurements
May 17, 2016

Table 4-1 Summary of Hourly Meteorological Measurements – July to September 2015

Parameter	Crago Road Station (Predominately Downwind)	Units
Wind Speed ^A	Max	44.1
	Min	0.0
	Mean (October)	13.2
	Mean (November)	12.0
	Mean (December)	13.1
	Mean (Period)	12.8
	Standard Deviation	7.1

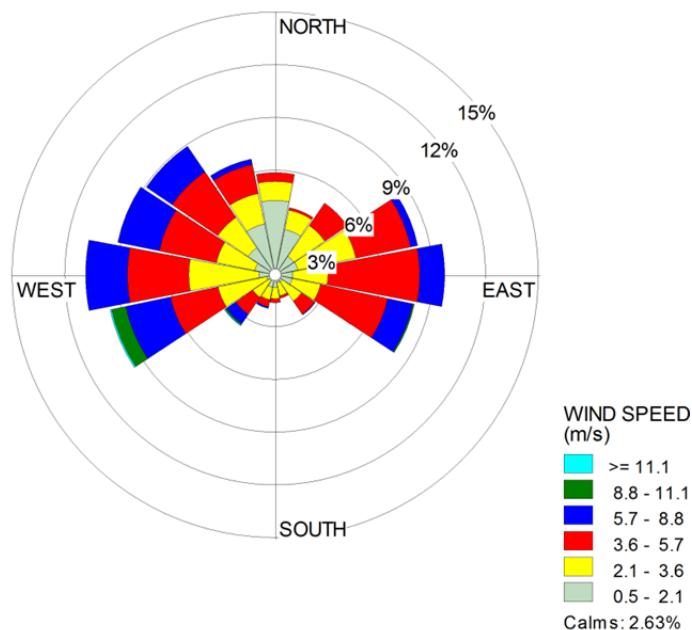
Notes:

- A. Wind speed is measured at 10-m.

A wind rose showing directionality and speed is presented in **Figure 4-1**. The length of the radial bars gives the total percent frequency of winds from the indicated direction, while portions of the barbs of different widths indicate the frequency associated with each wind speed category.

Winds over the three-month period occurred predominantly from easterly and westerly to northwesterly directions. Wind contribution from the south was low. Higher wind speeds occurred from the west-southwest while lower wind speeds were observed from northerly directions.

Figure 4-1 Wind Rose for October to December 2015



QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015

Summary of Ambient Measurements
May 17, 2016

4.2 CAC AMBIENT AIR QUALITY MEASUREMENTS

A summary of the maximum, minimum, arithmetic mean and standard deviation of the measured CAC pollutant concentrations are presented in **Table 4-2**. Also presented in this table are the number of exceedances (if any occurred) of the relevant Ontario ambient air quality criteria (AAQC) or health-based standard for each contaminant. All monitored contaminants were below their applicable criteria during the period between October to December, 2015.

Nitric oxide (NO) has no regulatory criteria as discussed in **Section 4.2.2** below. There are both hourly and daily AAQCs as well as Reg. 419 Schedule 3 criteria for NO_x which are based on health effects of NO₂. As specified in the MOECC's listing of AAQCs (MOECC, 2012a) the AAQC were compared to measured NO₂ concentrations in this report. However, as per the current April 2012 version of O. Reg. 419 Summary of Standards and Guidelines, the Schedule 3 criterion for NO_x (MOECC, 2012b) was compared to the monitored NO_x levels.

A comparison of the maximum measured data to their respective air quality criteria and the two existing ambient air monitoring stations (Stantec, 2015) is presented graphically in **Figure 4-2**.

QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015

Summary of Ambient Measurements
May 17, 2016

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

Pollutant	Averaging Period	AAQC / Schedule 3 / HHRA Health-Based Standards			Crago Road Station (Predominately Downwind)	
		ppb	µg/m³		Concentration (ppbv)	Concentration (µg/m³)
SO ₂	1	250	690	Maximum	45.4	124.2
				Minimum	0.0	0.0
				Mean (October)	0.7	2.0
				Mean (November)	1.2	3.3
				Mean (December)	1.4	4.0
				Mean (Period)	1.1	3.1
				Standard Deviation	3.1	8.5
				# of Exceedances	0	0
	24	100	275	Maximum	11.2	31.3
				Minimum	0.0	0.0
				Mean (October)	0.7	2.0
				Mean (November)	1.2	3.3
				Mean (December)	1.4	4.0
				Mean (Period)	1.1	3.1
				Standard Deviation	1.5	4.3
				# of Exceedances	0	0

QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015

Summary of Ambient Measurements
May 17, 2016

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

Pollutant	Averaging Period	AAQC / Schedule 3 / HHRA Health-Based Standards			Crago Road Station (Predominately Downwind)	
		ppb	µg/m³		Concentration (ppbv)	Concentration (µg/m³)
PM _{2.5}	24	N/A	28 ^	Maximum	-	45.8
				Minimum	-	0.4
				Mean (October)	-	3.3
				Mean (November)	-	7.0
				Mean (December)	-	10.4
				Mean (Period)	-	7.0
				Standard Deviation	-	7.3
				# of Exceedances	-	N/A
NO ₂	1	200	400	Maximum	36.2	71.5
				Minimum	0.0	0.0
				Mean (October)	4.1	7.8
				Mean (November)	7.4	14.9
				Mean (December)	4.2	8.4
				Mean (Period)	5.2	10.3
				Standard Deviation	6.0	12.1
				# of Exceedances	0	0
	24	100	200	Maximum	20.8	41.3
				Minimum	0.0	0.0
				Mean (October)	4.1	7.9
				Mean (November)	7.3	14.8
				Mean (December)	4.2	8.2

QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015

Summary of Ambient Measurements
May 17, 2016

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

Pollutant	Averaging Period	AAQC / Schedule 3 / HHRA Health-Based Standards			Crago Road Station (Predominately Downwind)	
		ppb	µg/m³		Concentration (ppbv)	Concentration (µg/m³)
NO _c	1	NA	NA	Mean (Period)	5.2	10.3
				Standard Deviation	4.2	8.6
				# of Exceedances	0	0
NO _c	24	NA	NA	Maximum	59.5	78.0
				Minimum	0.0	0.0
				Mean (October)	1.8	2.3
				Mean (November)	3.4	4.4
				Mean (December)	2.0	2.6
				Mean (Period)	2.4	3.1
				Standard Deviation	5.5	7.2
				# of Exceedances	N/A	N/A
				Maximum	15.1	19.6

QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015

Summary of Ambient Measurements
May 17, 2016

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

Pollutant	Averaging Period	AAQC / Schedule 3 / HHRA Health-Based Standards			Crago Road Station (Predominately Downwind)	
		ppb	µg/m³		Concentration (ppbv)	Concentration (µg/m³)
NOx	1	200 ^B	400 ^B	Maximum	80.9	162.5
				Minimum	0.0	0.0
				Mean (October)	5.9	11.3
				Mean (November)	10.7	21.6
				Mean (December)	6.2	12.4
				Mean (Period)	7.5	15.1
				Standard Deviation	10.5	21.2
				# of Exceedances	0	0
	24	100 ^C	200 ^C	Maximum	35.8	70.9
				Minimum	0.0	0.0
				Mean (October)	5.9	11.5
				Mean (November)	10.7	21.5
				Mean (December)	6.2	12.2
				Mean (Period)	7.6	15.0
				Standard Deviation	6.9	14.0
				# of Exceedances	0	0

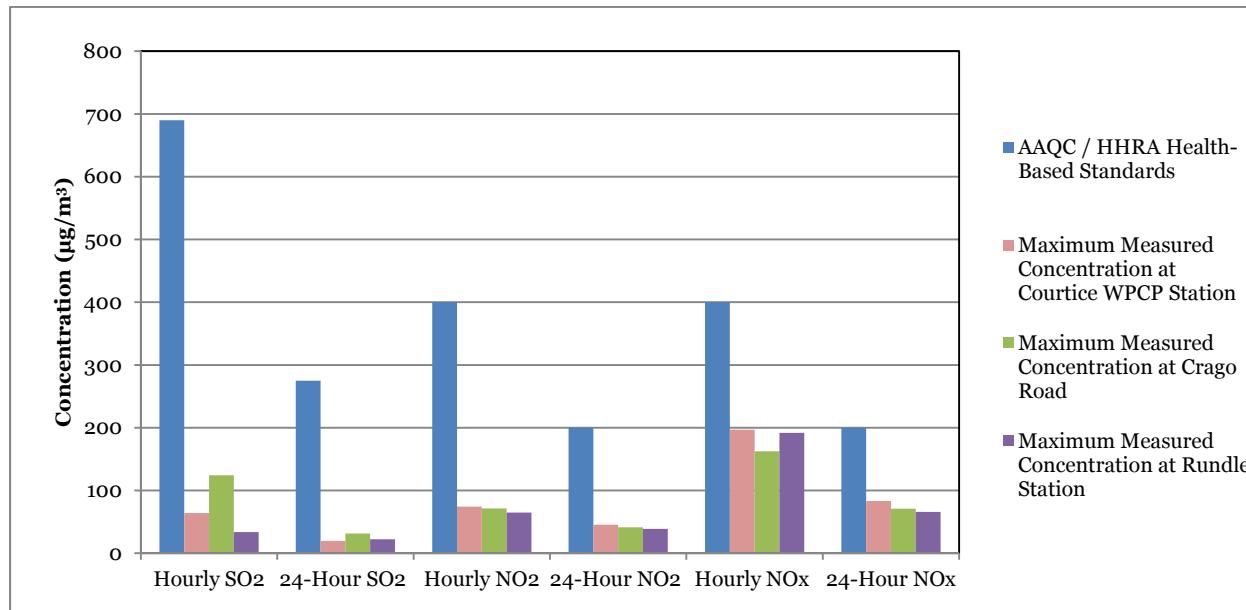
Note:

- A. Canadian Ambient Air Quality Standards (CAAQS) for Respirable Particulate Matter (CCME, 2012). 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.

QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CAGO ROAD STATION) – OCTOBER TO DECEMBER 2015

Summary of Ambient Measurements
May 17, 2016

Figure 4-2 Comparison of NO₂ / NOx and SO₂ Ambient Air Quality Monitoring Data to Applicable Criteria and Existing Stations



Detailed discussion for each measured contaminant is presented in the following sections.

4.2.1 Sulphur Dioxide (SO₂)

Data summaries are presented in **Appendix A** for sulphur dioxide for each month as well as time history plots of hourly and 24-hour average SO₂ concentrations. For hourly and 24-hour averages, the Ontario AAQCs of 690 $\mu\text{g}/\text{m}^3$ and 275 $\mu\text{g}/\text{m}^3$ are shown with blue lines on the respective plot. As shown in these figures, measured ambient SO₂ concentrations at both stations were well below the criteria.

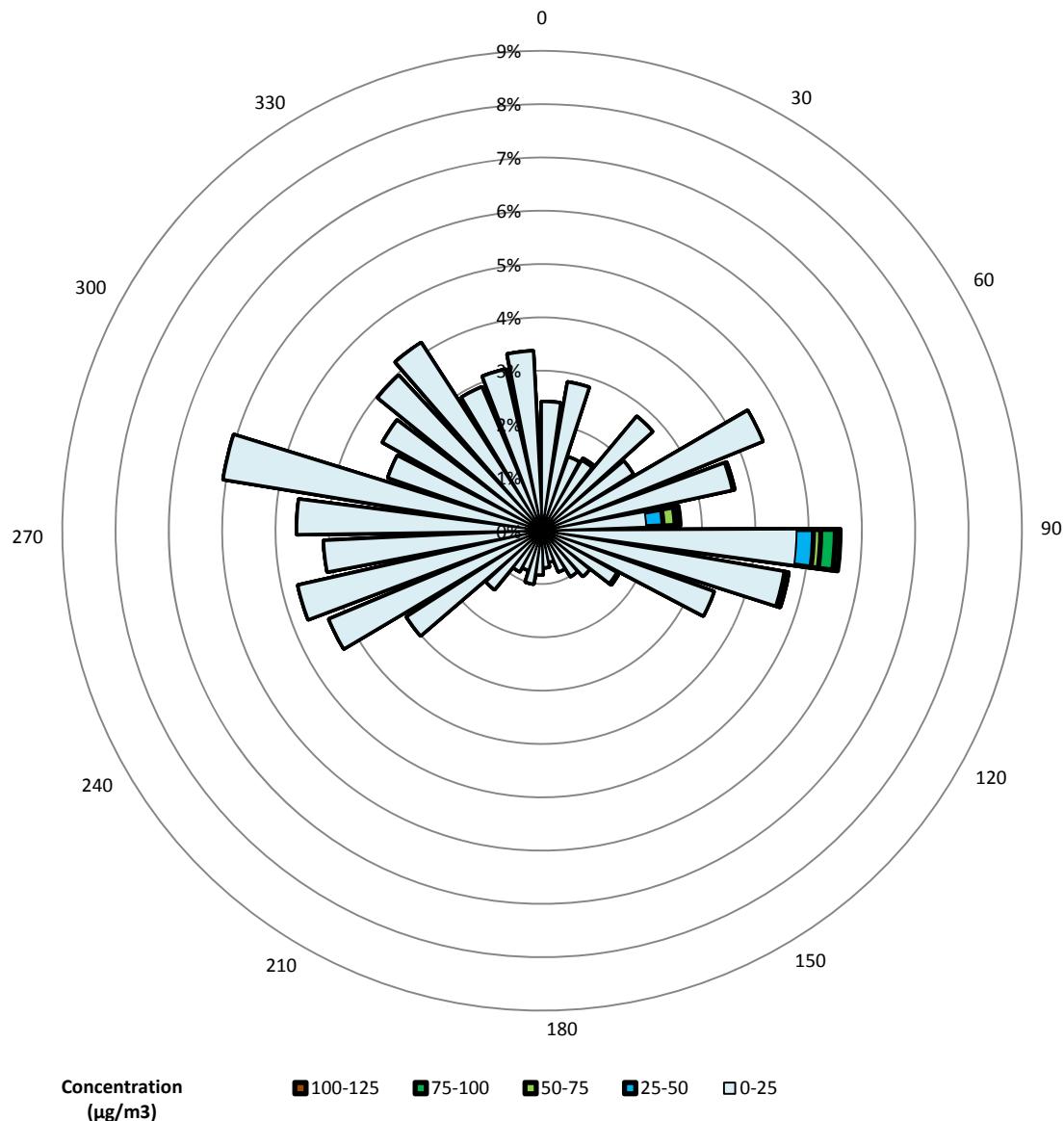
The maximum hourly and 24-hour average SO₂ concentrations measured at the Cago Road Station during October to December 2015 were 124.2 and 31.3 $\mu\text{g}/\text{m}^3$ respectively, which are 18% and 11% of the applicable 1-hour and 24-hour ambient air quality criteria.

A pollution rose of hourly average SO₂ concentrations measured at the Cago Road Station is presented in **Figure 4-3**. The pollution rose plot presents measured hourly average contaminant concentrations versus measured wind direction (over 10° wind sectors). In this period, the Cago Road station generally measured higher hourly concentrations for winds blowing from easterly directions with the highest measured hourly concentration occurring from the east.

**QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE
(CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015**

Summary of Ambient Measurements
May 17, 2016

Figure 4-3 Pollution Rose of Measured Hourly Average SO₂ Concentrations – October to December 2015



QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAIGO ROAD STATION) – OCTOBER TO DECEMBER 2015

Summary of Ambient Measurements
May 17, 2016

4.2.2 Nitrogen Dioxide (NO₂)

Nitrogen oxides (NO_x) are almost entirely made up of nitric oxide (NO) and nitrogen dioxide (NO₂). Together, they are often referred to as NO_x. Most NO₂ in the atmosphere is formed by the oxidation of NO, which is emitted directly by combustion processes, particularly those at high temperature and pressure. Exposure to both NO and NO₂ can result in adverse health effects to an exposed population. NO₂ is the regulated form of NO_x. Similar to other jurisdictions (e.g., Alberta Environment, World Health Organization), the O. Reg. 419/05 Schedule 3 standards for NO_x are based on health effects of NO₂, as health effects are seen at much lower concentrations of NO₂ than NO. In this report, because NO₂ is the regulated form of NO_x, the AAQCs were compared to measured NO₂ concentrations (as per MOECC 2012a). However, as per the current April 2012 version of O. Reg. 419 Summary of Standards and Guidelines, the Schedule 3 NO_x criteria were also compared to the monitored NO_x concentrations (see **Section 4.2.3** below).

Data summaries are presented in **Appendix B** for nitrogen dioxide for the station for each month as well as time history plots of the hourly and 24-hour average NO₂ concentrations. For the hourly and 24-hour averages, the Ontario AAQCs of 400 µg/m³ and 200 µg/m³ are shown with blue lines on the respective plot. As shown in these figures, measured ambient NO₂ concentrations were well below the criteria.

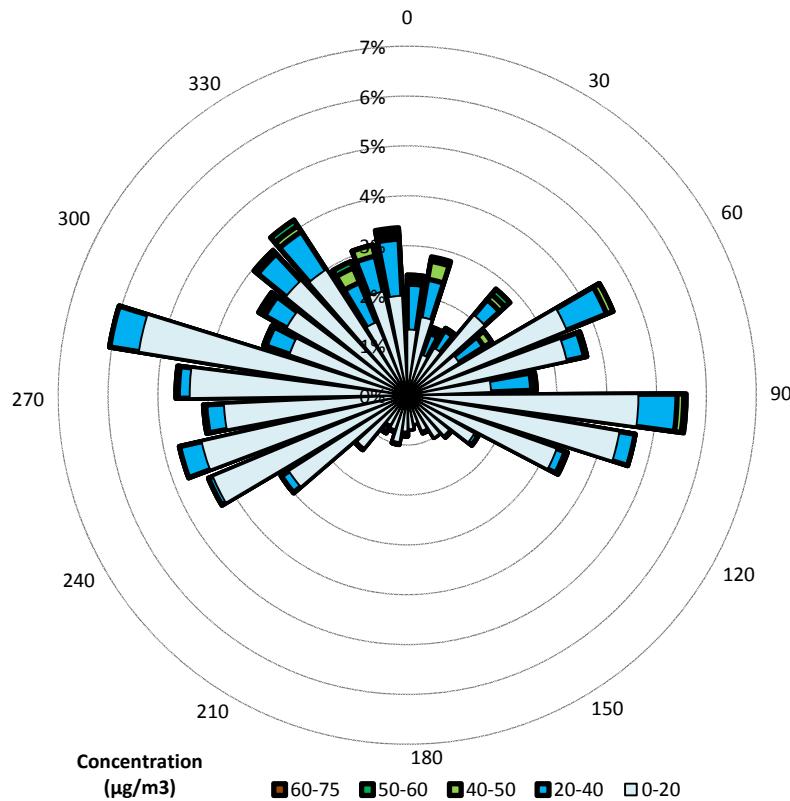
The maximum measured hourly and 24-hour average concentrations were 71.5 and 41.3 µg/m³, which are 18% and 21% of the applicable 1-hour and 24-hour ambient air quality criteria.

A pollution rose of measured hourly average NO₂ concentrations is presented in **Figure 4-4**. Higher measured hourly average concentrations generally occurred from north-northwesterly to easterly directions with the highest measured hourly concentration occurring from the north-northeast.

QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015

Summary of Ambient Measurements
May 17, 2016

Figure 4-4 Pollution Roses of Measured Hourly Average NO₂ – October to December 2015



4.2.3 Nitrogen Oxides (NO_x)

Data summaries are presented in **Appendix C** for nitrogen oxides for each station and month as well as time history plots of the hourly and 24-hour average NO_x concentrations. For the hourly and 24-hour averages, the Ontario Schedule 3 criteria of 400 $\mu\text{g}/\text{m}^3$ and 200 $\mu\text{g}/\text{m}^3$ are shown with blue lines on the respective plot. As shown in these figures, the maximum measured ambient hourly and 24-hour average NO_x concentrations at the Crago Road Station were below the criteria during this quarter.

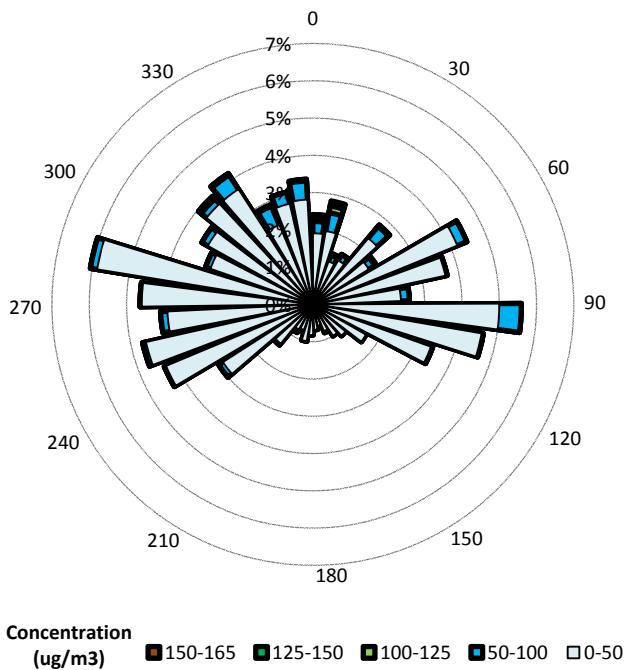
The maximum hourly NO_x concentration measured at the Crago Road station was 162.5 $\mu\text{g}/\text{m}^3$, which is 41% of the 1-hour ambient criteria. The 24-hour average NO_x concentration measured at this station was 70.9 $\mu\text{g}/\text{m}^3$, which is 35% of the applicable 24-hour criteria. See Table 4-2 for detailed results.

QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAVO ROAD STATION) – OCTOBER TO DECEMBER 2015

Summary of Ambient Measurements
May 17, 2016

A pollution rose of measured hourly average NOx concentrations is presented in **Figure 4-5**. In Figure 4-5, higher measured hourly average NOx concentrations typically occurred for winds blowing from north-northwesterly to easterly directions with the highest measured hourly concentration occurring from the north-northeast.

Figure 4-5 Pollution Roses of Measured Hourly Average NOx Concentrations – October to December 2015



4.2.4 Particulate Matter Smaller than 2.5 Microns (PM_{2.5})

Data summaries and time history plots of measured 24-hour average concentrations are presented in **Appendix D** for PM_{2.5}.

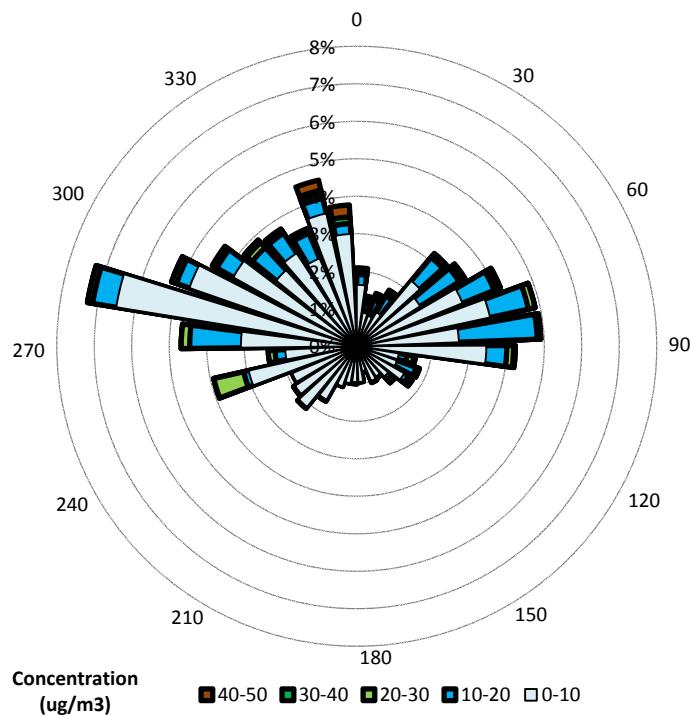
The maximum measured 24-hour average PM_{2.5} concentration was 45.8 µg/m³ during this quarter. It should be noted that since an exceedance of the 24-hour CAAQS for PM_{2.5} requires the average of the 98th percentile levels in each of three consecutive years to be greater than 28 µg/m³ whereas the PM_{2.5} measurement at this station in the report consisted of approximately 3 months of data, there is insufficient data to determine with any certainty if exceedances of the CAAQS would occur. Discussion of PM_{2.5} measurements with respect to the CAAQS will be provided in the 2015 annual report, at which time sufficient data will have been collected to make preliminary comparisons.

QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAVO ROAD STATION) – OCTOBER TO DECEMBER 2015

Summary of Ambient Measurements
May 17, 2016

A pollution rose showing the measured 24-hour average ambient PM_{2.5} concentrations versus direction is shown in **Figure 4-6**. Higher measured concentrations typically occurred from north-northwesterly to easterly directions, with the highest measured 24-hour concentration occurring from the northeast.

Figure 4-6 Pollution Roses of Measured 24-Hour Average PM_{2.5} Concentrations – October to December 2015



QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015

Conclusions
May 17, 2016

5.0 CONCLUSIONS

This quarterly report provides a summary of the ambient air quality data collected at the Crago Road monitoring station located in the vicinity, and predominantly downwind, of the DYEC for the period October to December 2015.

The following observations and conclusions were made from a review of the measured ambient air quality monitoring data:

1. Measured levels of NO₂, SO₂ and PM_{2.5} were below the applicable O. Reg. 419/05 criteria or human health risk assessment (HHRA) health-based standards presented in **Table 2-1** of this report;
2. Since the Canadian Ambient Air Quality Standard (CAAQS) for PM_{2.5} is based on a 98th percentile level over 3 years, whereas the PM_{2.5} measurement period at the Crago Road station for this quarterly report was three months, there was insufficient data collected to determine with any certainty if exceedances of the CAAQS would occur. Therefore no comparison of the measured PM_{2.5} data during this quarter to the CAAQS was conducted for this report, as it would not be scientifically accurate or representative;
3. In summary, all monitored contaminants were below their applicable MOECC criteria for the monitoring data presented in this report. All measured levels of all monitored contaminants were below their applicable HHRA health-based standards.

QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE (CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015

References
May 17, 2016

6.0 REFERENCES

Canadian Council of Ministers of the Environment (CCME), (2007). Guidance Document on Achievement Determination. Canada-Wide Standards for Particulate Matter and Ozone. Revised (PN1391)(978-1-896997-74-2 PDF)

Canadian Council of Ministers of the Environment (CCME), (2012). Guidance Document on Achievement Determination. Canadian Ambient Air Quality Standards for Fine Particulate Matter and Ozone (PN 1483)(978-1 896997-91-9 PDF)

Jacques Whitford, (2009). Final Environmental Assessment, December 4, 2009

Ontario Minister of the Environment (MOECC), (2010). Environmental Assessment Act, Section 9. Notice of Approval to Proceed with the Undertaking. Re: The Amended Environmental Assessment for Durham and York Residual Waste Study (EA File No: 04-EA-02-08)

Ontario Ministry of the Environment (MOECC), (2012a). Standards Development Branch, Ontario's Ambient Air Quality Criteria, April 2012. (PIBs 6570e01)

Ontario Ministry of the Environment (MOECC), (2012b). Standards Development Branch, Summary of Standards and Guidelines to support Ontario Regulation 419/05 – Air Pollution – Local Air Quality (including Schedule 6 of O. Reg 419/05 on Upper Risk Thresholds), April 2012 (PIBs 6569e01)

Stantec Consulting Limited, (2009). Final Environmental Assessment, Appendix C12: Site Specific Human Health and Ecological Risk Assessment Technical Study Report, December 4, 2009.

Stantec Consulting Limited, (2012). Ambient Air Quality Monitoring Plan – Durham York Residual Waste Study, May 8, 2012

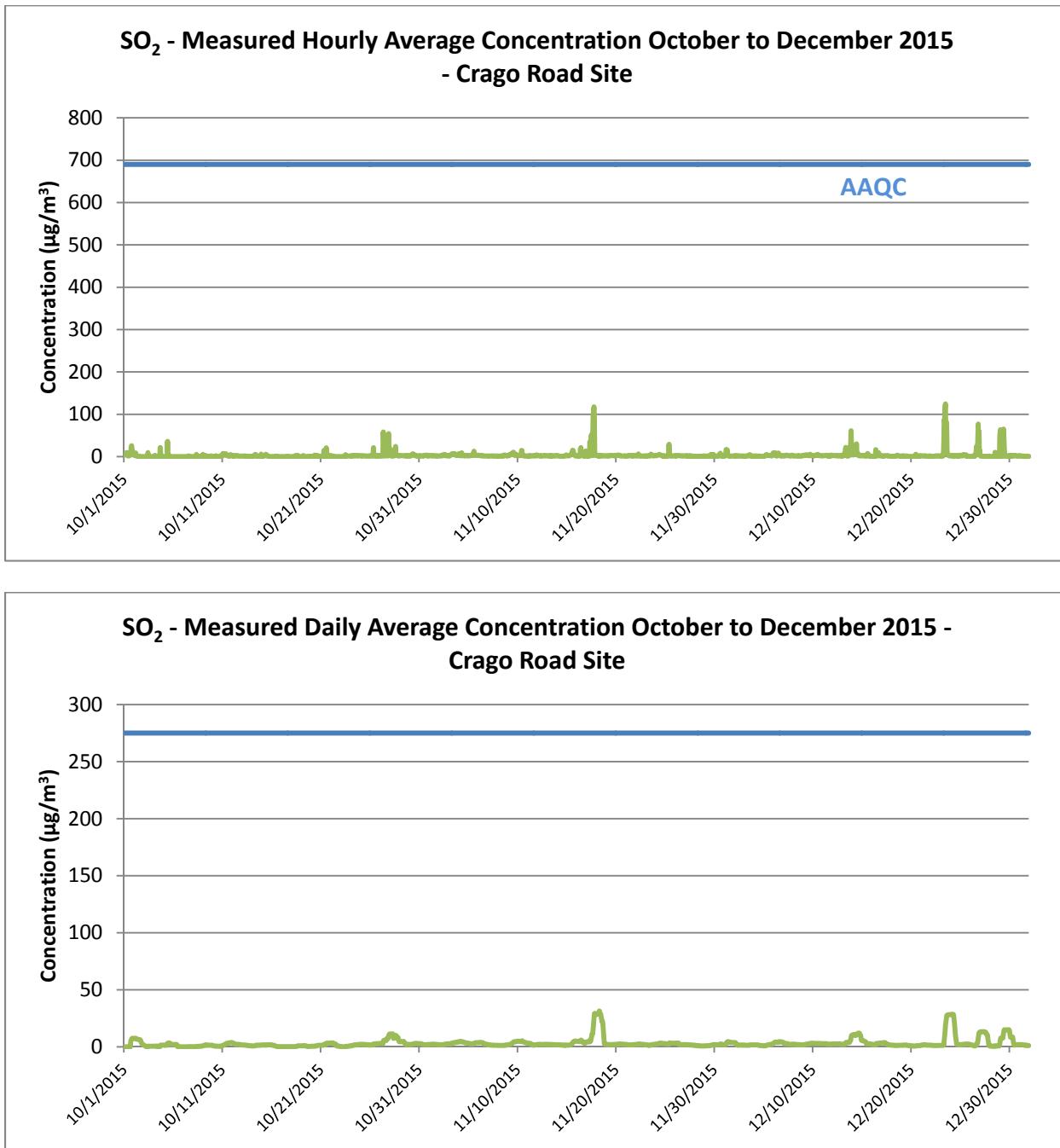
Stantec Consulting Limited , (2015). Quarterly Ambient Air Quality Monitoring Report for the Durham York Energy Centre – October to December 2014, January 28, 2015.

**QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE
(CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015**

**APPENDIX A
SO₂ Data Summaries and Time History Plots**

		SO2 - Crago Road																																	
		December 2015																																	
Hour																																			
Day	Hour	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Count	Maximum	Minimum	Average	Hrs>690	Days>275				
1	0.9	1.4	1.3	2.4	3.0	16.8	14.2	8.4	15.5	4.1	3.3	1.6	1.4	0.8	0.6	1.1	1.2	1.5	1.6	1.4	1.3	1.4	1.3	1.4	24	16.8	0.6	3.7	0	0					
2	1.7	1.4	1.5	1.4	1.8	1.8	1.8	1.4	1.6	1.9	2.0	1.4	1.4	1.6	1.3	1.3	1.6	1.4	1.4	1.1	1.3	1.1	1.4	1.4	24	2.0	1.1	1.5	0	0					
3	1.4	1.4	0.7	0.9	1.1	1.2	0.9	1.0	1.4	1.4	1.5	2.6	2.7	3.7	4.3	4.6	1.8	1.3	0.8	0.8	1.2	1.2	0.5	1.1	24	4.6	0.5	1.6	0	0					
4	1.3	1.1	1.3	1.3	1.2	1.5	1.5	0.7	1.1	0.9	1.4	1.2	1.2	0.7	0.6	0.7	1.1	0.5	0.6	0.5	0.7	0.6	24	1.5	0.5	1.0	0	0							
5	0.5	0.6	0.8	0.7	1.2	3.1	4.1	4.1	4.4	3.1	3.9	2.9	2.3	2.7	3.0	2.9	2.6	2.7	3.2	1.5	2.0	2.1	2.8	7.1	24	7.1	0.5	2.7	0	0					
6	8.7	7.0	7.6	3.8	9.3	6.4	3.2	2.1	2.5	1.5	2.7	3.7	8.5	8.0	2.3	2.2	3.1	2.5	1.5	2.2	2.0	1.5	2.0	2.2	24	9.3	1.5	4.0	0	0					
7	2.4	1.8	1.3	1.5	1.8	1.7	2.2	3.5	3.0	2.8	3.2	2.5	2.1	1.8	2.2	2.0	2.1	1.6	1.4	1.7	2.2	3.2	2.8	2.5	24	3.5	1.3	2.2	0	0					
8	1.8	2.3	1.9	1.4	1.4	1.3	1.5	1.3	1.4	1.4	1.6	2.5	2.1	2.2	2.0	1.5	1.3	1.4	1.5	1.5	2.1	2.0	2.0	24	2.5	1.3	1.7	0	0						
9	2.5	2.6	2.4	2.9	3.5	3.4	2.6	3.2	3.6	4.2	3.7	3.1	2.9	2.9	3.4	2.6	2.3	2.6	5.5	4.3	3.1	2.4	2.1	2.2	24	5.5	2.1	3.1	0	0					
10	2.2	2.5	2.2	2.0	2.1	1.8	2.9	2.5	2.6	2.5	3.8	4.9	4.5	5.2	2.9	3.0	2.2	2.1	2.4	2.3	2.2	1.9	2.2	2.1	24	5.2	1.8	2.7	0	0					
11	2.1	2.0	2.3	2.2	2.7	2.3	2.3	2.4	2.6	2.8	2.9	2.5	1.9	2.5	2.5	1.7	1.3	C	2.0	3.3	3.5	3.2	2.9	2.2	22	3.5	1.3	2.4	0	0					
12	2.3	3.3	2.6	2.3	2.2	2.4	2.2	2.7	2.3	2.8	2.7	1.9	1.8	2.2	2.2	2.5	1.5	1.7	1.7	1.8	2.1	1.7	2.4	24	3.3	1.5	2.2	0	0						
13	1.5	1.3	1.3	1.4	5.7	2.9	4.9	6.4	12.6	21.7	2.9	6.1	2.0	1.0	1.3	1.4	1.8	5.4	3.2	23.0	13.9	13.5	61.0	33.0	24	61.0	1.0	9.5	0	0					
14	17.1	4.4	4.2	5.8	4.0	4.7	5.4	9.9	6.3	5.6	9.2	30.0	6.0	4.9	8.1	6.0	2.4	2.4	2.4	2.0	2.3	2.2	1.8	2.5	24	30.0	1.8	6.2	0	0					
15	2.7	2.9	2.4	1.8	2.9	2.2	2.6	2.1	2.0	1.4	1.4	1.1	1.5	5.4	7.4	4.2	4.7	2.6	1.3	0.9	0.6	1.1	0.9	0.7	24	7.4	0.6	2.4	0	0					
16	0.7	0.7	0.6	0.4	0.6	0.6	0.6	0.4	0.7	3.5	16.5	12.3	1.6	3.8	2.9	6.7	8.0	9.1	1.8	1.5	1.7	1.6	1.8	2.1	24	16.5	0.4	3.3	0	0					
17	1.9	1.3	1.3	1.0	1.2	1.5	1.3	1.5	2.0	2.1	2.1	1.9	1.9	2.0	2.2	2.0	2.4	1.8	1.7	1.1	0.9	0.8	0.6	0.5	24	2.4	0.5	1.5	0	0					
18	0.6	0.8	0.5	0.9	0.8	0.6	0.8	0.7	0.7	0.9	1.0	0.8	1.5	2.5	3.0	3.1	2.7	2.6	2.2	1.7	1.1	0.6	0.8	0.9	24	3.1	0.5	1.3	0	0					
19	0.9	1.2	0.5	0.7	1.9	1.8	1.4	1.1	1.4	1.3	0.8	1.4	1.3	1.3	0.8	0.9	0.6	0.7	0.3	0.4	0.1	0.4	1.9	0.1	24	1.9	0.1	1.0	0	0					
20	0.0	0.0	0.1	0.4	0.6	0.3	0.3	0.1	0.2	0.6	0.9	4.3	5.4	1.7	2.4	1.5	1.3	1.1	0.6	0.6	1.0	1.2	2.2	2.2	24	5.4	0.0	1.2	0	0					
21	2.1	1.7	1.8	1.4	1.4	1.4	1.6	1.6	2.0	2.1	1.6	1.6	1.3	1.2	1.1	1.0	0.8	0.8	0.9	1.3	1.4	1.5	0.9	24	2.1	0.8	1.4	0	0						
22	1.3	1.1	0.6	0.7	1.1	0.8	0.7	0.8	1.0	1.4	1.2	1.5	1.4	1.2	1.7	1.9	2.1	1.5	1.4	1.4	1.6	1.4	1.2	24	2.1	0.6	1.2	0	0						
23	0.9	1.8	0.8	0.7	0.9	1.3	1.2	4.0	27.9	86.6	82.4	114.0	124.2	42.2	82.1	69.0	14.7	6.1	4.3	2.9	2.7	2.4	2.1	24	124.2	0.7	28.2	0	0						
24	2.2	2.4	1.8	2.0	2.5	1.4	1.4	2.1	1.7	1.6	2.6	2.0	2.9	1.6	1.5	1.7	1.3	1.9	1.7	1.4	1.5	1.0	1.9	3.3	24	3.3	1.0	1.9	0	0					
25	3.3	2.9	1.6	1.7	1.6	1.9	4.3	2.9	2.3	2.8	2.8	4.8	3.5	2.6	2.0	3.2	3.7	1.1	0.9	0.6	0.6	0.5	0.7	0.3	24	4.8	0.3	2.1	0	0					
26	0.0	0.2	0.1	0.0	0.0	0.0	0.1	0.2	2.3	0.2	0.8	4.2	2.7	4.3	16.1	24.1	9.2	8.2	33.3	76.8	48.5	59.7	6.8	24	76.8	0.0	12.4	0	0						
27	13.8	1.5	1.0	1.0	0.7	0.7	0.6	0.6	0.7	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.1	0.4	0.6	1.3	1.1	24	13.8	0.1	1.3	0	0					
28	0.9	0.7	0.4	0.1	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	0.3	0.0	0.0	0.2	0.2	0.0	1.4	24	10.1	0.0	0.7	0	0					
29	16.5	51.7	63.1	34.2	1.6	0.7	0.9	0.6	0.6	51.1	64.7	42.3	17.1	2.9	1.4	0.8	0.7	0.7	1.1	1.2	0.8	0.8	1.2	2.2	24	64.7	0.6	15.0	0	0					
30	2.1	1.7	3.1	1.3	1.1	1.2	2.0	2.0	1.4	2.0	2.6	2.2	2.5	2.1	2.9	2.6	2.0	1.7	1.9	1.6	1.0	0.9	1.4	1.9	24	3.1	0.9	1.9	0	0					
31	2.0	2.4	2.2	1.9	1.4	1.3	1.7	0.9	1.3	0.9	0.8	0.7	1.0	1.2	0.0	0.1	0.9	0.8	0.9	1.0	0.5	0.6	0.8	0.7	24	2.4	0.0	1.1	0	0					
Count	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	742	31	30	31							
Maximum	17.1	51.7	63.1	34.2	9.3	16.8	14.2	9.9	27.9	86.6	82.4	114.0	124.2	42.2	82.1	69.0	24.1	9.2	8.2	33.3	76.8	48.5	61.0	33.0	24	124.2	8.2	47.4							
Minimum	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	0.3	0.0	0.0	0.2	0.2	0.0	0.1	22	1.5	0.0	0.1							
Average	3.2	3.5	3.7	2.6	2.0	2.2	2.3	2.3	3.4	7.0	7.4	8.3	6.9	4.0	5.1	4.8	3.1	2.3	1.9	3.1	4.3	3.3	5.3	3.0	24	16	1	4.0							
#>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	99	100	Regulation Acceptable Desirable Violations		Maximum																			
Data	0.6	0.9	1.2	1.4	1.7	2.0	2.4	2.9	4.9	12.1	64.1	124.2																							
Notes	C - Calibration / Span Cycle NA - No Data Available T - Test A- MOE Audit M - Equipment Malfunction / Down R - Rate of Change																																		

Figure A-1 Time History Plots of Measured Hourly Average and 24-Hour Average SO₂ Concentrations- Crago Road Station

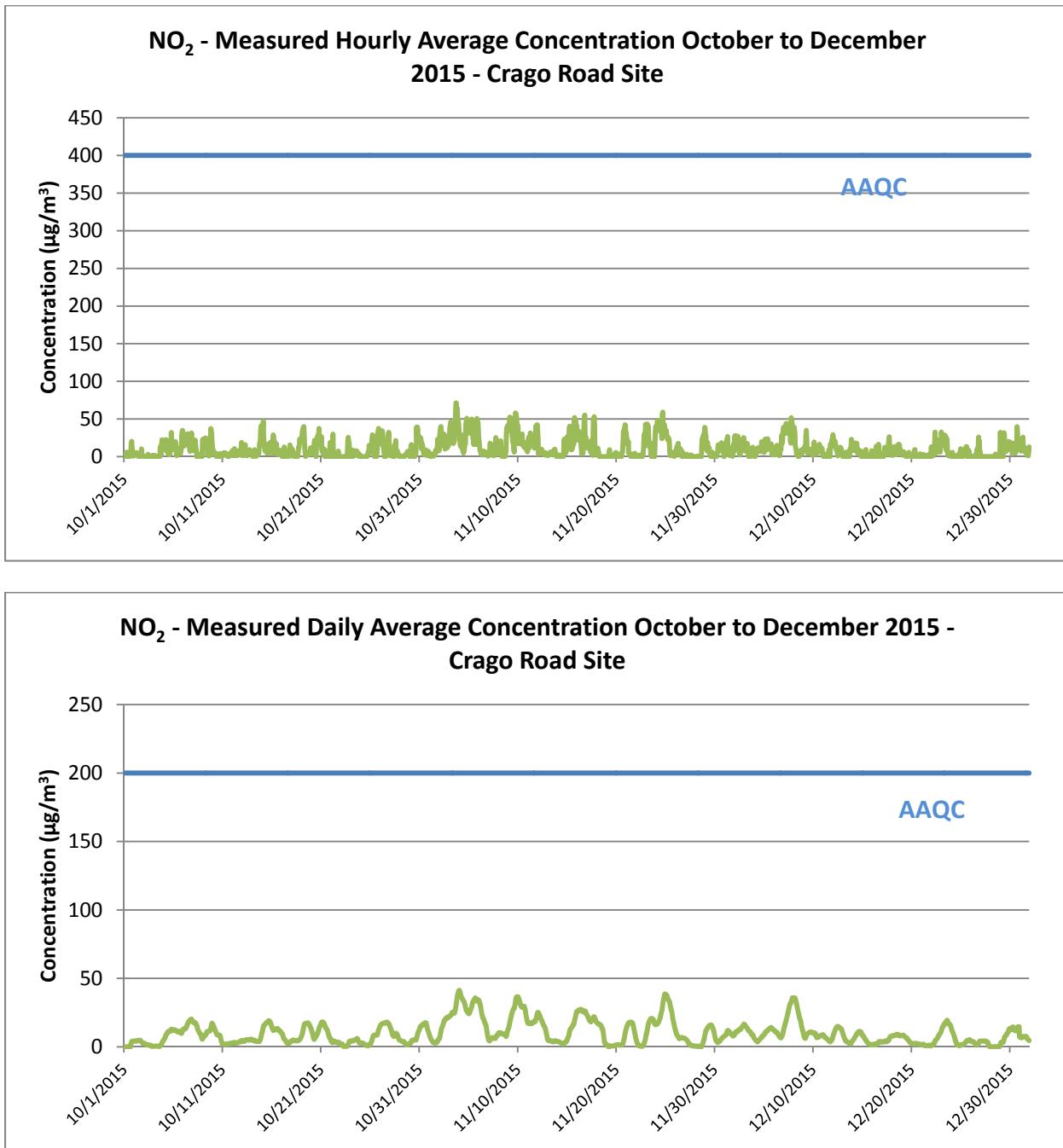


**QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE
(CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015**

**APPENDIX B
NO₂ Data Summaries and Time History Plots**

		NO ₂ - Crago Road		October 2015																																																											
		Hour		0		100		200		300		400		500		600		700		800		900		1000		1100		1200		1300		1400		1500		1600		1700		1800		1900		2000		2100		2200		2300		Count		Maximum		Minimum		Average		Hrs>400		Days>200	
Day	Hour	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Count	Maximum	Minimum	Average	Hrs>400	Days>200																																
1	1.4	0.2	1.7	1.9	2.7	3.1	4.7	5.9	3.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	5.9	17.7	20.3	14.2	7.9	2.8	2.1	24	20.3	0.0	4.1	0	0																																
2	0.8	1.2	3.4	3.0	3.5	4.9	5.5	5.2	3.4	2.6	3.2	0.6	0.4	1.6	0.6	1.3	0.6	2.0	5.5	10.2	4.0	1.3	0.9	0.0	24	10.2	0.0	2.7	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	0.0	0.3	0.9	0.4	0.2	0.7	0.0	0.0	0.3	0.3	1.6	0.6	24	3.0	0.0	0.4	0	0																																		
4	1.2	0.4	0.7	0.2	1.6	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.0	8.6	2.7	15.0	22.3	17.5	10.9	24	22.3	0.0	3.9	0	0																																	
5	14.0	9.5	12.5	14.4	13.0	13.0	22.5	22.2	11.1	6.8	9.8	21.0	4.4	6.1	6.2	2.4	3.4	4.2	9.3	17.0	32.0	19.6	9.8	10.6	24	32.0	2.4	12.3	0	0																																	
6	10.8	13.8	13.7	10.5	12.1	18.6	19.9	17.0	6.9	1.2	2.7	8.1	10.9	6.7	4.6	5.2	4.4	5.1	4.1	6.6	10.6	28.3	33.8	34.9	24	34.9	1.2	12.1	0	0																																	
7	27.2	17.6	14.1	14.4	15.9	19.3	16.3	26.2	23.4	15.9	24.2	30.2	27.3	17.7	15.3	17.9	12.0	7.1	10.6	9.7	23.3	31.4	15.8	21.3	24	31.4	7.1	18.9	0	0																																	
8	13.4	7.9	15.4	15.6	11.2	9.0	21.8	15.6	8.9	8.0	0.0	0.4	0.0	0.3	0.0	0.0	1.6	1.4	0.8	3.1	0.0	0.9	0.0	0.0	24	21.8	0.0	5.6	0	0																																	
9	22.7	23.2	22.2	23.1	20.5	20.6	24.5	21.8	24.5	22.3	20.3	13.2	3.2	2.0	1.9	1.0	0.9	2.1	6.5	11.0	37.2	35.4	31.2	21.8	24	37.2	0.9	17.2	0	0																																	
10	13.4	10.2	4.7	3.3	5.5	5.1	5.4	5.0	4.5	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	3.9	0.1	0.0	2.8	1.6	0.6	24	13.4	0.0	2.9	0	0																																
11	0.8	1.8	3.7	4.2	5.3	3.4	4.1	3.7	4.2	4.6	3.1	0.9	2.3	1.3	0.6	1.0	0.5	1.0	1.1	2.7	2.5	5.2	2.9	3.5	24	5.3	0.5	2.7	0	0																																	
12	1.9	8.1	2.9	2.0	6.0	1.6	10.5	1.6	2.8	2.3	1.9	2.3	3.0	1.4	3.1	2.7	6.9	8.1	4.9	2.6	6.0	3.7	2.0	18.6	24	18.6	1.4	4.5	0	0																																	
13	5.2	1.7	1.5	6.9	3.0	1.8	2.6	9.2	15.8	7.0	3.6	2.3	1.4	1.3	2.3	3.5	5.3	6.0	7.6	9.1	7.9	5.6	6.3	5.0	24	15.8	1.3	5.1	0	0																																	
14	3.1	2.5	0.4	0.0	0.5	3.1	6.7	9.0	4.1	2.2	0.7	0.5	1.2	2.8	2.2	2.8	2.9	3.8	9.2	17.4	19.3	19.5	36.5	40.8	24	40.8	0.0	8.0	0	0																																	
15	35.9	25.9	24.0	38.1	46.9	23.4	14.5	11.2	7.6	12.1	14.1	9.8	6.6	4.7	5.5	4.8	16.8	11.3	11.1	11.0	8.3	9.4	19.0	13.9	24	46.9	4.7	16.1	0	0																																	
16	11.8	4.0	7.2	21.0	28.9	27.4	21.9	20.3	8.0	4.2	9.7	16.3	16.8	11.5	4.7	3.8	2.6	3.9	3.0	3.8	6.7	8.6	2.3	2.1	24	28.9	2.1	10.4	0	0																																	
17	2.4	2.2	0.4	0.6	0.0	0.3	7.6	12.7	3.2	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	24	15.4	0.0	4.0	0	0																																	
18	6.1	0.7	5.4	9.3	3.4	4.6	3.5	4.8	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	4.9	12.2	11.5	17.6	23.3	20.0	22.3	24	23.3	0.0	6.3	0	0																																	
19	21.5	23.8	22.1	31.7	35.8	38.0	38.9	39.9	26.7	13.5	4.7	0.4	0.7	1.6	2.1	3.9	5.5	4.5	3.1	5.3	4.0	11.6	24	39.9	0.4	14.4	0	0																																			
20	3.7	3.7	3.8	6.3	3.7	5.6	8.9	9.2	18.1	21.8	19.6	19.5	C	C	18.7	14.1	16.0	27.8	15.6	25.3	37.3	21.3	17.0	19.2	22	37.3	3.7	15.3	0	0																																	
21	18.8	21.9	26.3	8.4	8.3	5.7	3.2	3.5	10.1	6.5	0.0	0.0	0.6	7.4	6.7	2.0	0.0	0.0	0.0	0.0	0.0	0.0	24	26.3	0.0	6.5	0	0																																			
22	4.2	0.9	0.0	0.0	0.0	0.3	29.7	6.3	1.2	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	24	29.7	0.0	2.2	0	0																																		
23	0.0	0.0	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	1.9	0.0	20.5	25.5	19.5	19.0	11.9	0.0	24	25.5	0.0	4.1	0	0																																	
24	1.9	1.1	0.0	0.0	0.0	0.0	0.0	0.0	8.4	3.2	4.6	2.1	2.2	2.8	3.8	5.2	7.5	5.4	1.1	5.6	3.2	3.7	3.8	0.7	1.1	24	8.4	0.0	2.8	0	0																																
25	0.3	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	14.9	0.0	1.9	0	0																																	
26	5.6	8.7	6.5	11.9	17.2	24.9	29.0	27.7	13.8	12.5	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	10.9	30.3	34.2	37.3	24	37.3	0.0	13.8	0	0																																		
27	24.7	27.4	21.0	17.2	23.5	31.9	34.2	31.6	13.6	12.2	7.9	0.0	1.0	0.0	0.0	0.8	0.2	15.0	12.2	18.1	27.0	21.7	32.2	12.5	24	34.2	0.0	16.2	0	0																																	
28	9.2	1.5	2.3	3.5	5.5	6.2	6.6	3.2	0.0	0.0	1.3	0.3	15.4	11.2	9.2	21.2	1.5	6.2	6.9	7.6	2.1	3.9	0.8	0.3	24	21.2	0.0	5.3	0	0																																	
29	0.7	0.5	1.2	1.2	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	0.0	0.0	0.0	0.0	0.0	24	7.0	0.0	2.2	0	0																																	
30	5.2	0.0	0.0	6.9	14.8	15.9	15.1	8.4	1.8	1.0	1.3	0.1	0.0	0.0	0.6	2.6	2.9	2.9	11.6	39.2	26.6	38.8	34.6	24.6	22.3	24	39.2	0.0	11.4	0	0																																
31	21.4	26.3	23.3	19.5	24.7	20.7	10.3	17.5	13.2	13.6	8.5	4.4	2.6	2.2	5.5	7.0	3.7	8.6	6.2	3.7	1.4	2.3	2.5	6.9	24	26.3	1.4	10.7	0	0																																	
Count	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	742	31	30	31	0	0																																
Maximum	35.9	27.4	26.3	38.1	46.9	38.0	38.9	39.9	26.7	22.3	24.2	30.2	27.3	17.7	18.7	21.2	16.8	27.8	39.2	30.3	38.8	37.3	36.5	40.8	24	46.9	16.8	31.1	0	0																																	
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	22	3.0	0.0	0.0	0.0	0.0																																	
Average	9.3	8.0	7.7	8.9	10.1	10.1	11.9	11.																																																							

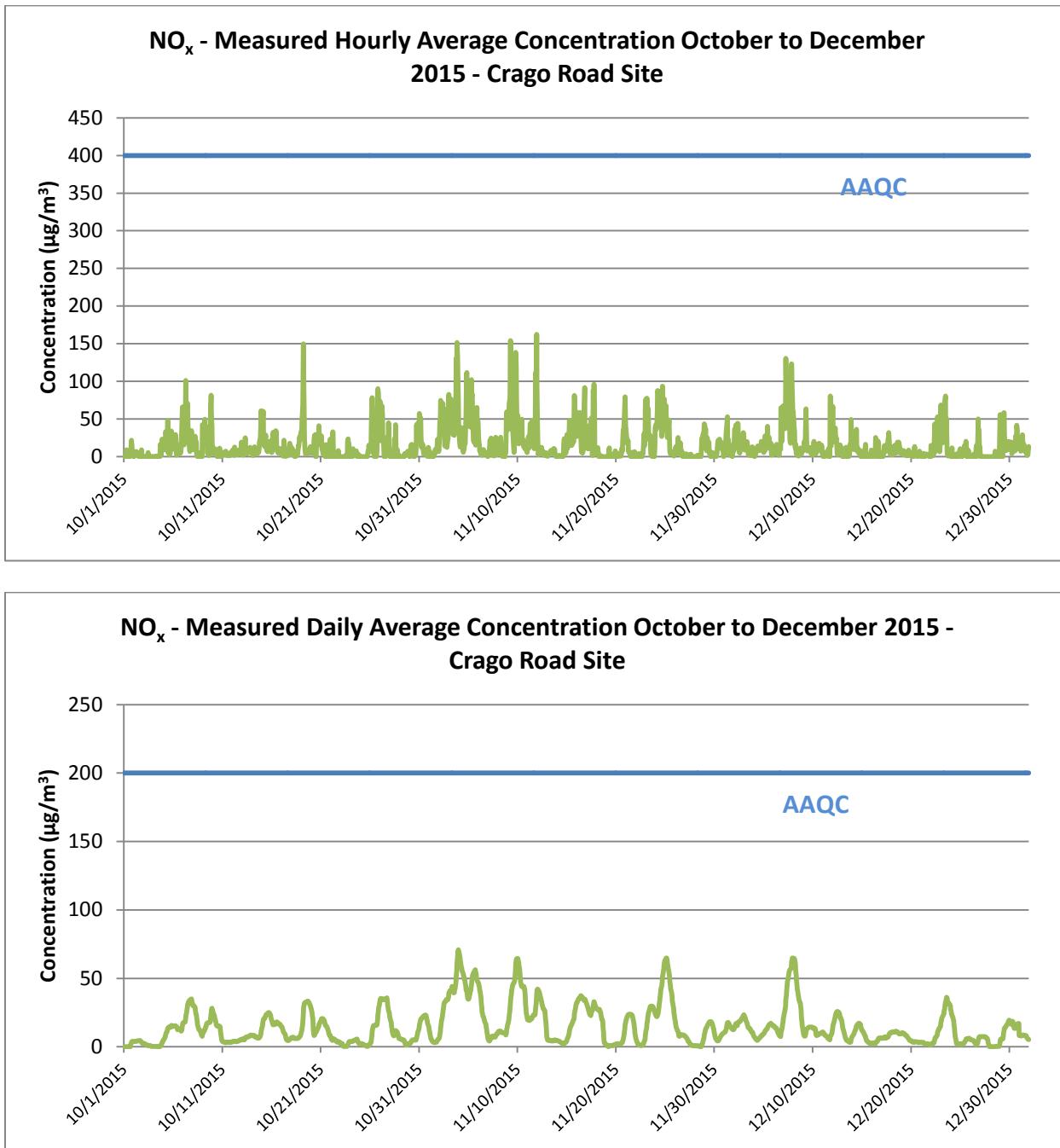
Figure B-1 Time History Plots of Measured Hourly Average and 24-Hour Average NO₂ Concentrations – Crago Road Station



**QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE
(CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015**

**APPENDIX C
NOx Data Summaries and Time History Plots**

Figure C-1 Time History Plots of Measured Hourly Average and 24-Hour Average NO_x Concentrations – Crago Road Station



**QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE
(CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015**

**APPENDIX D
PM2.5 Data Summaries and Time History Plot**

		PM _{2.5} - Crago Road																													
		November 2015																													
		(µg/m ³)																													
Hour																															
Day	Hour	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Count	Maximum	Minimum	Average		
1	3.6	4.9	5.6	4.2	2.2	1.6	1.6	1.3	1.7	1.5	1.7	2.1	3.1	3.6	2.9	3.2	2.9	2.4	3.6	4.5	6.0	5.0	5.1	3.6	24	6.0	1.3	3.2			
2	3.9	4.0	5.5	7.4	8.7	7.8	7.1	6.2	5.3	5.1	8.2	8.1	10.0	9.6	4.8	2.6	2.3	7.9	7.6	2.5	3.7	4.1	4.2	4.8	24	10.0	2.3	5.9			
3	6.0	9.2	7.7	9.5	9.7	9.5	10.4	13.4	10.1	9.2	9.5	10.5	11.4	12.0	12.3	13.0	14.3	17.2	17.4	15.4	16.2	16.2	15.9	15.1	24	17.4	6.0	12.1			
4	13.8	20.8	20.0	15.1	10.2	9.3	9.1	9.1	7.4	6.7	8.6	8.2	7.4	8.6	8.8	8.5	9.2	10.9	12.6	13.5	19.0	17.4	13.4	15.3	24	20.8	6.7	11.8			
5	15.4	12.4	10.7	10.1	10.8	11.5	11.4	14.2	15.9	17.3	15.8	13.4	11.1	11.6	11.3	10.5	12.8	12.6	10.7	11.3	12.1	13.3	11.8	12.2	24	17.3	10.1	12.5			
6	11.1	11.6	13.2	10.3	8.9	6.1	5.3	4.7	4.6	3.6	2.7	2.5	1.9	1.6	1.6	2.0	2.1	2.0	2.0	1.7	1.5	1.3	1.2	0.6	24	13.2	0.6	4.3			
7	0.8	0.9	1.0	1.2	2.8	2.8	1.4	1.4	1.7	1.6	1.8	2.3	3.9	2.0	2.0	1.7	1.7	2.1	3.3	6.4	5.4	2.7	2.9	24	6.4	0.8	2.3				
8	2.9	4.8	8.4	13.9	3.6	4.2	4.6	4.4	2.8	2.1	1.4	1.1	1.0	0.9	1.4	1.1	1.1	1.5	1.6	2.2	3.5	7.9	11.7	9.6	24	13.9	0.9	4.1			
9	10.2	11.4	11.6	12.4	12.5	13.4	13.8	15.3	11.5	12.3	12.0	12.0	11.0	9.1	7.8	7.8	14.3	15.6	24.7	29.0	26.1	20.3	14.3	24	29.0	7.8	14.2				
10	12.6	12.0	9.0	7.8	7.4	8.4	9.3	8.7	8.7	8.6	9.7	10.2	9.5	8.6	6.6	5.5	5.0	5.0	3.0	2.5	3.4	3.4	2.9	2.4	24	12.6	2.4	7.1			
11	2.2	2.3	2.8	3.5	2.3	1.6	2.1	3.5	4.4	2.5	3.8	4.6	5.4	3.9	3.7	9.3	8.0	9.4	12.9	14.5	15.2	18.1	20.1	17.1	24	20.1	1.6	7.2			
12	19.3	25.0	19.2	15.5	16.2	13.6	8.4	5.1	2.6	1.8	2.0	2.1	4.9	3.3	1.4	0.9	0.7	0.3	0.3	0.3	0.3	0.3	0.3	0.0	24	25.0	0.0	6.0			
13	0.4	0.0	0.0	0.0	0.0	0.1	0.3	0.6	1.3	1.8	1.5	1.1	0.8	0.8	0.7	0.9	0.8	0.7	0.8	0.5	0.2	0.3	0.4	24	1.8	0.0	0.6				
14	1.3	0.6	0.8	1.0	1.2	0.0	0.0	0.0	0.2	0.1	0.0	0.2	0.2	0.2	0.3	0.5	1.3	2.1	1.1	1.8	2.1	1.9	3.7	24	3.7	0.0	0.9				
15	7.6	12.3	14.0	12.5	13.9	13.8	12.9	12.2	10.3	9.1	9.4	10.2	10.4	10.7	11.5	13.4	14.1	16.0	22.6	28.9	24.4	19.3	20.5	21.3	24	28.9	7.6	14.6			
16	20.2	19.7	19.4	19.0	17.6	19.0	20.1	23.7	20.3	16.3	9.4	9.8	7.6	4.3	4.6	4.1	4.5	4.5	6.6	6.7	7.3	8.3	5.7	5.4	24	23.7	2.9	11.8			
17	2.2	2.0	2.0	2.1	2.0	2.2	2.5	3.5	4.6	4.2	4.0	5.8	3.4	2.3	1.9	2.8	5.5	6.1	6.4	5.4	3.2	3.8	4.6	24	6.4	1.9	3.5				
18	5.5	9.9	18.1	18.0	14.6	11.8	8.6	C	C	C	12.8	9.6	8.9	8.3	7.1	7.0	5.5	4.7	3.9	3.5	3.9	4.0	4.2	4.0	21	18.1	3.5	8.3			
19	3.9	3.3	2.1	1.2	0.6	0.5	1.3	1.2	0.5	0.9	1.7	2.0	2.3	2.9	3.4	3.3	4.1	4.5	5.0	4.7	6.1	6.1	0.5	2.7							
20	6.1	6.6	5.3	5.6	6.0	5.8	5.8	5.1	4.8	4.9	5.6	6.2	6.5	6.9	7.1	5.6	7.3	7.2	8.8	11.6	14.1	16.1	21.8	19.2	24	21.8	4.8	8.3			
21	13.9	10.6	8.7	8.0	8.1	6.5	6.7	3.2	4.8	4.8	4.6	4.5	4.0	3.5	3.0	3.2	6.1	5.6	4.3	3.4	2.8	3.2	3.6	24	13.9	2.8	5.4				
22	2.5	0.9	1.1	0.7	0.5	0.0	0.2	0.5	0.7	0.3	0.1	0.1	0.0	0.0	0.1	0.4	0.3	0.6	0.9	1.3	2.3	3.9	2.4	2.6	24	3.9	0.0	0.9			
23	4.3	6.4	5.1	4.0	4.6	3.0	3.9	3.6	2.6	2.9	3.4	5.8	5.9	2.9	2.2	2.5	4.4	6.0	5.2	3.6	6.3	7.0	6.8	10.4	24	10.4	2.2	4.7			
24	13.9	19.6	18.6	21.0	23.0	27.3	30.7	32.7	32.8	29.9	31.2	33.0	31.2	33.0	32.6	29.3	24.1	13.9	7.2	8.1	9.5	10.8	12.0	13.6	24	33.0	7.2	21.6			
25	13.2	11.9	11.7	9.8	9.3	13.6	18.3	26.6	30.5	26.8	75.9	27.0	13.2	9.7	8.5	3.6	3.2	4.3	4.2	4.7	4.9	5.0	4.2	4.1	24	75.9	3.2	14.3			
26	5.3	7.3	9.0	11.4	11.4	9.4	5.2	4.6	4.2	3.3	3.7	3.7	3.5	3.7	3.2	3.2	3.8	4.7	4.3	4.4	4.9	4.5	3.8	3.4	24	11.4	3.2	5.2			
27	2.7	2.5	2.7	2.8	2.8	2.9	2.9	3.2	3.7	3.7	3.9	3.6	3.3	3.7	3.6	3.1	1.1	1.1	1.8	3.6	5.4	4.6	3.3	3.0	4.9	24	5.4	1.1	3.2		
28	5.8	4.2	3.8	3.8	3.6	3.7	3.9	3.6	3.4	2.6	2.9	3.9	3.8	4.2	7.4	13.1	17.1	34.0	51.9	R	3.4	4.5	5.4	6.3	23	51.9	2.6	8.5			
29	5.8	5.0	5.3	5.2	4.5	4.4	4.4	4.7	5.1	4.3	4.0	4.0	1.6	1.2	1.6	1.7	2.2	2.9	2.2	2.4	2.0	1.9	2.0	2.4	24	5.8	1.2	3.3			
30	1.8	1.8	1.9	2.0	1.9	1.8	2.0	2.1	2.3	2.4	2.6	2.6	2.2	2.9	2.9	3.1	3.5	4.1	4.0	4.1	4.2	4.6	5.3	24	5.3	1.8	2.8				
31																									0	0.0	0.0				
Count	30	30	30	30	30	30	30	29	29	29	30	30	30	30	30	30	30	30	30	30	30	30	30	30	716	30	29	30			
Maximum	20.2	25.0	20.0	21.0	23.0	27.3	30.7	32.7	32.8	29.9	75.9	33.0	31.2	32.6	29.3	24.1	17.1	34.0	51.9	28.9	29.0	26.1	21.8	21.3	24	75.9	17.1	30.0			
Minimum	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.1	0.3	0.3	0.3	0.3	0.4	0.2	0.3	0.0	0	0.0	0	0	0.0	0.0			
Average	7.3	8.1	8.2	8.0	7.4	7.2	7.1	7.5	7.2	6.5	8.4	6.9	6.5	5.9	5.5	5.3	5.4	6.7	7.8	6.9	7.5	7.5	7.4	7.2	23	17	3	7.1			
#>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	Reg	Acceptable	Desirable	Violations	Maximum														
Data	1.1	2.0	2.9	3.7	4.6	5.9	8.7	11.5	15.4	20.1	31.2	75.9	Hour																75.9		
													Day																21.6		
													Month																7.1		
Notes	C - Calibration / Span Cycle NA - No Data Available T - Test/Startup period A- MOE Audit M - Equipment Malfunction / Down R - Rate of Change																														

		PM _{2.5} - Crago Road																											
		December 2015																											
		(µg/ml)																											
Hour																													
Day	Hour	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Count	Maximum	Minimum	Average
1	4.6	4.6	4.9	5.0	5.0	9.7	19.2	29.7	39.9	10.0	9.8	2.9	2.1	1.9	2.0	1.9	2.1	2.4	2.3	2.1	2.3	2.1	2.7	8.5	24	39.9	1.9	7.4	
2	13.1	30.8	69.9	51.3	61.2	59.0	51.3	40.6	38.0	52.0	80.9	86.7	64.0	52.8	43.2	44.0	45.9	44.1	30.1	8.8	4.0	8.1	16.3	33.3	24	86.7	4.0	42.9	
3	41.8	36.4	33.0	32.3	28.9	26.9	26.2	21.6	18.0	12.6	6.8	0.8	0.8	0.8	1.1	4.9	7.5	6.3	5.0	5.6	2.6	0.5	0.8	24	41.8	0.5	13.4		
4	1.7	1.9	1.9	2.5	4.7	6.5	5.4	8.3	11.9	12.7	12.3	10.3	9.4	8.0	6.4	4.9	5.8	5.9	5.9	5.8	6.4	6.4	7.5	8.5	24	12.7	1.7	6.7	
5	8.6	9.2	10.4	12.5	20.9	26.5	26.5	24.2	24.9	29.0	36.7	33.1	27.9	28.1	26.2	24.0	24.7	25.3	24.0	19.3	18.9	20.3	21.3	20.1	24	36.7	8.6	22.6	
6	20.3	17.0	14.5	17.0	19.3	21.8	22.4	22.6	20.9	19.7	18.6	20.4	22.2	20.3	21.3	22.5	22.9	22.2	13.6	7.0	4.3	2.1	2.0	2.0	24	22.9	2.0	17.4	
7	2.0	2.4	3.2	7.9	15.8	14.8	17.2	20.7	16.0	10.7	4.1	3.5	3.4	3.8	3.7	3.4	3.7	3.4	4.1	8.3	8.7	13.0	15.7	16.6	24	20.7	2.0	8.6	
8	12.8	13.4	11.7	9.4	6.4	3.5	1.7	1.4	1.5	1.6	1.4	1.3	1.1	1.1	1.3	2.0	2.1	1.8	2.0	2.1	1.8	2.0	2.6	2.8	24	13.4	1.1	3.7	
9	2.0	2.1	3.5	4.4	4.4	6.8	11.1	15.9	19.3	6.1	1.4	1.4	1.6	1.7	1.6	1.4	1.1	0.6	0.7	0.7	0.7	1.0	1.6	1.8	24	19.3	0.6	3.9	
10	1.9	2.0	1.8	1.6	1.4	1.6	2.0	2.4	2.6	2.7	2.6	2.6	2.7	2.9	2.9	2.7	2.3	1.5	0.8	0.6	1.6	2.1	3.8	2.4	3.8	0.6	2.2		
11	4.8	6.4	7.5	8.6	7.4	8.4	8.5	6.4	5.9	3.1	3.9	3.7	4.1	5.4	5.2	1.9	1.1	C	C	3.0	9.6	19.8	30.8	35.0	22	35.0	1.1	8.7	
12	39.9	50.0	57.2	46.0	63.3	83.4	60.7	85.3	85.2	84.1	79.1	52.9	17.4	13.6	18.2	18.2	18.8	28.2	39.0	43.7	25.9	23.6	19.8	12.3	24	85.3	12.3	44.4	
13	9.2	6.1	3.6	2.6	4.8	5.1	5.9	6.3	8.6	11.6	5.8	9.3	9.1	8.3	9.1	14.4	41.9	R	36.3	R	47.8	47.9	69.7	25.3	22	69.7	2.6	17.7	
14	15.3	8.9	3.9	2.0	2.1	2.1	2.2	2.3	2.1	2.1	2.0	1.9	2.2	2.6	2.6	2.1	1.7	1.6	1.2	0.5	0.3	0.2	0.3	24	15.3	0.2	2.7		
15	0.4	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.1	0.0	0.0	0.1	0.3	1.2	14.3	24.0	12.9	7.8	7.8	9.9	9.9	10.4	12.4	24	24.0	0.0	4.7		
16	10.4	10.6	10.3	12.0	11.5	14.0	18.4	19.4	21.9	R	R	R	14.6	R	33.7	94.7	R	R	23.5	33.4	37.7	36.7	30.0	26.2	18	94.7	10.3	25.5	
17	25.5	30.7	32.5	29.7	24.7	12.0	2.6	2.9	1.9	1.8	1.8	1.8	5.5	46.1	57.2	40.0	59.6	50.9	12.4	1.4	1.1	1.1	1.0	1.5	24	59.6	1.0	18.6	
18	1.0	0.6	0.8	0.7	0.6	0.7	0.9	1.1	1.3	1.8	1.4	1.7	2.1	2.4	2.7	2.6	2.9	4.0	3.5	2.3	2.0	1.7	1.6	24	4.0	0.6	1.7		
19	1.2	1.2	1.3	1.2	1.2	1.4	1.4	1.1	1.2	0.8	0.6	0.6	0.6	0.6	0.8	0.5	0.7	0.8	0.7	0.6	0.7	0.6	0.9	1.0	24	1.4	0.5	0.9	
20	0.8	0.6	0.5	0.4	0.5	0.6	0.7	0.6	0.8	1.5	1.7	2.0	1.8	1.8	2.1	2.0	1.4	1.1	1.1	0.9	0.8	0.8	0.8	24	2.1	0.4	1.1		
21	0.7	0.7	0.6	0.7	0.6	0.8	0.8	0.8	1.2	1.9	2.4	3.1	3.1	3.5	3.1	13.6	2.1	1.7	2.1	2.0	2.6	3.0	3.6	24	13.6	0.6	2.3		
22	6.2	4.3	5.1	3.7	3.5	4.4	4.1	4.2	11.9	4.0	4.3	3.6	3.3	3.5	3.9	5.1	6.0	7.4	9.1	10.0	11.1	12.2	11.6	7.3	24	12.2	3.3	6.2	
23	4.1	4.9	5.7	3.9	4.4	5.1	6.1	8.6	18.5	52.6	26.8	35.8	24.6	3.6	3.7	3.3	2.1	1.8	1.7	2.0	1.5	0.8	0.7	0.8	24	52.6	0.7	9.3	
24	1.3	0.4	0.3	0.3	0.3	0.3	0.5	1.0	0.9	1.1	1.0	0.7	0.6	0.6	0.5	0.7	0.6	0.7	0.6	0.5	0.5	0.5	0.8	1.7	24	1.7	0.3	0.7	
25	2.4	3.0	3.5	3.9	4.2	5.1	5.6	5.2	6.1	6.0	9.2	8.4	4.8	4.7	8.5	8.9	4.5	7.5	7.7	8.1	9.5	8.6	7.5	7.4	24	9.5	2.4	6.3	
26	6.5	6.3	6.6	6.4	6.4	5.2	3.2	3.4	2.1	2.8	2.0	1.9	2.3	2.2	2.8	8.4	9.0	4.8	4.0	5.1	6.8	7.2	16.6	11.3	24	16.6	1.9	5.5	
27	34.6	8.3	6.4	4.4	3.6	2.1	0.7	0.9	1.7	1.3	1.5	1.8	1.6	1.9	1.9	2.1	2.1	2.2	2.3	2.1	2.1	2.7	3.6	24	34.6	0.7	4.0		
28	5.7	2.5	2.7	2.9	2.9	3.1	2.1	1.7	1.8	1.6	1.7	1.6	1.3	13.3	3.5	1.8	2.0	2.3	2.4	2.7	2.7	2.2	2.1	5.4	24	13.3	1.3	3.0	
29	41.3	75.4	52.9	18.3	0.7	0.6	0.6	0.2	0.2	51.0	53.8	44.5	20.4	2.2	0.3	0.4	2.1	1.5	2.2	2.8	2.9	3.5	3.8	4.4	24	75.4	0.2	16.1	
30	5.1	4.9	6.3	4.7	6.4	6.7	4.8	5.3	6.7	6.9	7.7	6.7	6.6	4.2	4.3	5.3	4.9	10.2	18.0	14.0	9.6	8.8	11.9	11.6	24	18.0	4.2	7.6	
31	13.8	15.2	13.9	12.6	12.1	11.1	11.6	4.6	8.6	4.5	3.3	4.2	5.2	4.8	6.5	6.6	6.4	4.5	4.1	3.7	4.3	5.8	8.1	10.4	24	15.2	3.3	7.7	
Count	31	31	31	31	31	31	31	31	31	30	30	30	31	30	31	31	30	28	30	30	31	31	31	31	734	31	28	31	
Maximum	41.8	75.4	69.9	51.3	63.3	83.4	60.7	85.3	85.2	84.1	80.9	86.7	64.0	52.8	57.2	94.7	59.6	50.9	39.0	43.7	47.8	47.9	69.7	35.0	24	94.7	35.0	63.8	
Minimum	0.4	0.2	0.3	0.2	0.3	0.3	0.3	0.2	0.2	0.1	0.0	0.0	0.1	0.3	0.4	0.7	0.6	0.7	0.6	0.5	0.3	0.2	0.3	18	1.4	0.0	0.3		
Average	10.9	11.6	12.2	10.0	10.6	11.3	10.5	11.2	12.4	13.3	12.9	11.6	8.5	8.3	9.0	11.1	10.8	9.3	9.3	7.2	7.9	8.3	9.9	9.1	24	31	2	10.4	
#>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	Regulations				Acceptable				Desirable				Violations				Maximum
Data	0.7	1.4	2.0	2.7	4.1	6.1	8.9	15.4	28.2	44.1	77.9	94.7	Hour				Day				Month				44.4				10.4

Notes

C - Calibration / Span Cycle

NA - No Data Available

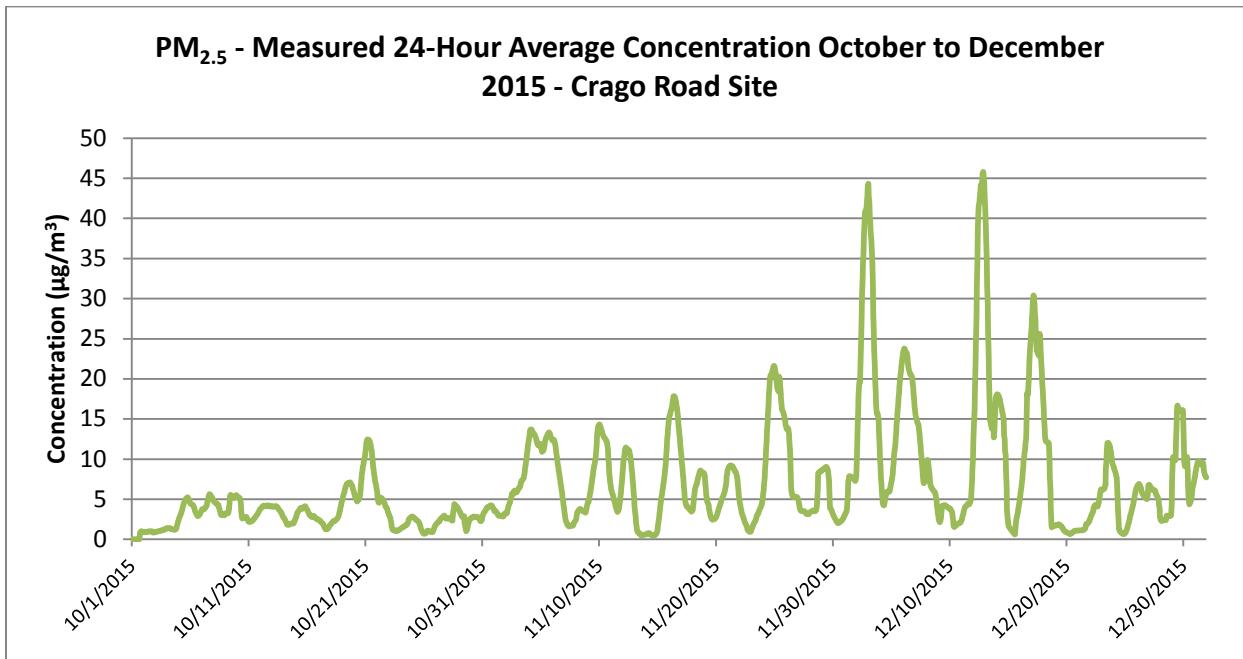
T - Test

A - MOE Audit

M - Equipment Malfunction / Down

R - Rate of Change

Figure D-1 Time History Plot of Measured 24-Hour Average PM_{2.5} Concentrations – Crago Road Station



**QUARTERLY AMBIENT AIR QUALITY MONITORING REPORT FOR THE DURHAM YORK ENERGY CENTRE
(CRAGO ROAD STATION) – OCTOBER TO DECEMBER 2015**

**APPENDIX E
Continuous Parameter Edit Logs**

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:	Crago Road				
Station address:	Crago Road	Emitter 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:	1228	
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	24-Apr-15	TH	Invalidate Data	31/12/2014 00:00	29/01/2015 09:00	Suspect data due to the analyzer's analog output failing. This problem was resolved on January 29, 2015	
2	24-Apr-15	TH	Invalidate Data	27/02/2015 13:00	27/02/2015 13:00	Monthly calibration	
3	24-Apr-15	TH	Invalidate Data	26/03/2015 09:00	26/03/2015 10:00	Monthly calibration	
4	5-Jun-15	TH	Invalidate Data	23/04/2015 06:00	23/04/2015 07:00	Monthly calibration	
5	5-Jun-15	TH	Invalidate Data	11/5/2015 13:00	11/5/2015 16:00	Monthly calibration	
6	30-Jul-15	TH	Invalidate Data	30/06/2015 06:00	30/06/2015 08:00	Monthly calibration	
7	9-Oct-15	TH	Invalidate Data	31/07/2015 06:00	31/07/2015 09:00	Monthly calibration	
8	9-Oct-15	TH	Invalidate Data	20/08/2015 05:00	20/08/2015 07:00	Monthly calibration	
9	9-Oct-15	TH	Invalidate Data	09/09/2015 22:00	23/09/2015 05:00	Connector corroded and loose causing analyzer to download false data to logger. API has sent a connector under warranty.	
10	9-Oct-15	TH	Invalidate Data	23/09/2015 06:00	23/09/2015 07:00	Monthly calibration	
11	9-Oct-15	TH	Invalidate Data	23/09/2015 08:00	30/09/2015 23:00	Monitor removed for annual maintenance	
12	22-Jan-16	TH	Invalidate Data	20/10/2015 12:00	20/10/2015 14:00	Monthly calibration	
13	22-Jan-16	TH	Invalidate Data	18/11/2015 07:00	18/11/2015 08:00	Monthly calibration	
14	22-Jan-16	TH	Invalidate Data	11/12/2015 17:00	11/12/2015 18:00	Monthly calibration	
15	27-Jan-16	CL	Invalidate Data	20/08/2015 09:00	20/08/2015 09:00	Rate of change	
16	17-Feb-16	TH	Invalidate Data	30/11/2015 23:00	30/11/2015 23:00	Rate of change	

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:	Crago Road				
Station address:	Crago Road	Emitter Address:	The Region of Durham, 605 Rossland Rd, Whitby, ON				
Pollutant or para/NOx	Instrument make & model:	API Model 200E Chemiluminescence Analyzer	Serial Number:				1424
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 (xxxx)	Date (dd/mm/yyyy)	Hour (xx:xx)
1	24-Apr-15	TH	Invalidate Data	23/01/2015 08:00	23/01/2015 10:00	Monthly calibration	
2	24-Apr-15	TH	Invalidate Data	27/02/2015 13:00	27/02/2015 13:00	Monthly calibration	
3	24-Apr-15	TH	Invalidate Data	26/03/2015 09:00	26/03/2015 10:00	Monthly calibration	
4	5-Jun-15	TH	Invalidate Data	23/04/2015 07:00	23/04/2015 08:00	Monthly calibration	
5	5-Jun-15	TH	Invalidate Data	11/5/2015 13:00	11/5/2015 16:00	Monthly calibration	
6	30-Jul-15	TH	Invalidate Data	30/06/2015 06:00	30/06/2015 06:00	Monthly calibration	
7	9-Oct-15	TH	Invalidate Data	31/07/2015 06:00	31/07/2015 09:00	Monthly calibration	
8	9-Oct-15	TH	Invalidate Data	20/08/2015 05:00	20/08/2015 09:00	Monthly calibration	
9	9-Oct-15	TH	Invalidate Data	23/09/2015 07:00	23/09/2015 08:00	Monthly calibration	
10	9-Oct-15	TH	Invalidate Data	23/09/2015 09:00	30/09/2015 23:00	Monitor removed for annual maintenance	
11	22-Jan-16	TH	Invalidate Data	20/10/2015 12:00	20/10/2015 13:00	Monthly calibration	
12	22-Jan-16	TH	Invalidate Data	18/11/2015 07:00	18/11/2015 09:00	Monthly calibration	
13	22-Jan-16	TH	Invalidate Data	11/12/2015 17:00	11/12/2015 18:00	Monthly calibration	
14	17-Feb-16	TH	Invalidate Data	30/11/2015 23:00	30/11/2015 23:00	Rate of change	

Examples of Acceptable Edit Actions:

Add offset of

Delete hours

Zero Correction

Slope Correction

Marking data as out-of-range

EDIT LOG TABLE

Project Name	Durham York Energy Centre Ambient Air Monitoring Program		Phone:	905-944-7777	E-mail:	greg.crooks@stantec.com, connie.lim@stantec.com, tim.hung@stantec.com				
Contact	Greg Crooks / Connie Lim / Tim Hung									
Station number:	N/A		Station Name:	Crago Road						
Station address:	Crago Road		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	Serial Number:	CM 0269				
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 (xxxx)	Date (dd/mm/yyyy)	Hour (xxxx)			
1	24-Apr-15	TH	Invalidate Data	31/12/2014	00:00	23/01/2015	11:00	Issues identified with the analyzer which had to be sent back to manufacturer for repairs - no data available		
2	24-Apr-15	TH	Invalidate Data	27/02/2015	13:00	27/02/2015	13:00	Monthly calibration		
3	24-Apr-15	TH	Invalidate Data	14/03/2015	11:00	26/03/2015	12:00	Analyzer not storing data - data not recoverable		
4	5-Jun-15	TH	Invalidate Data	10/4/2015	00:00	23/04/2015	11:00	Beta detector failed		
5	5-Jun-15	TH	Invalidate Data	11/5/2015	13:00	11/5/2015	16:00	Monthly calibration		
6	3-Jul-15	TH	Invalidate Data	27/03/2015	00:00	29/03/2015	23:00	Abnormal readings, inconsistent with the concurrent measurements at the other two sites		
7	30-Jul-15	TH	Invalidate Data	30/06/2015	06:00	30/06/2015	06:00	Monthly calibration		
8	3-Sep-15	CL	Replace Data	9-May-15	17:00	11-May-15	10:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
9	3-Sep-15	CL	Replace Data	18-May-15	12:00	19-May-15	05:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
10	3-Sep-15	CL	Replace Data	26-May-15	11:00	28-May-15	15:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
11	3-Sep-15	CL	Replace Data	30-May-15	06:00	31-May-15	03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
12	3-Sep-15	CL	Replace Data	5-Jun-15	09:00	6-Jun-15	09:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
13	3-Sep-15	CL	Replace Data	8-Jun-15	05:00	10-Jun-15	03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
14	3-Sep-15	CL	Replace Data	10-Jun-15	06:00	11-Jun-15	06:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
15	3-Sep-15	CL	Replace Data	11-Jun-15	14:00	17-Jun-15	03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
16	3-Sep-15	CL	Replace Data	18-Jun-15	18:00	19-Jun-15	13:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
17	3-Sep-15	CL	Replace Data	21-Jun-15	01:00	26-Jun-15	17:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
18	3-Sep-15	CL	Replace Data	28-Jun-15	01:00	30-Jun-15	02:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
19	3-Sep-15	CL	Replace Data	30-Jun-15	09:00	30-Jun-15	23:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
20	12-Sep-15	CL	Replace Data	2-Apr-15	19:00	10-Apr-15	11:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
21	12-Sep-15	CL	Invalidate Data	6-Apr-15	00:00	6-Apr-15	00:05	Invalidate out-of-range readings		
22	9-Oct-15	TH	Invalidate Data	31/07/2015	06:00	31/07/2015	06:00	Monthly calibration		
23	9-Oct-15	TH	Invalidate Data	20/08/2015	05:00	20/08/2015	06:00	Monthly calibration		
24	9-Oct-15	TH	Invalidate Data	23/09/2015	06:00	23/09/2015	07:00	Monthly calibration		
25	9-Oct-15	TH	Invalidate Data	23/09/2015	08:00	30/09/2015	23:00	Monitor removed for annual maintenance		
26	9-Nov-15	TH	Replace Data	1-Jul-15	00:00	1-Jul-15	03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
27	9-Nov-15	TH	Replace Data	1-Jul-15	05:00	2-Jul-15	06:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
28	9-Nov-15	TH	Replace Data	5-Jul-15	11:00	6-Jul-15	03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
29	9-Nov-15	TH	Replace Data	6-Jul-15	05:00	6-Jul-15	16:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
30	9-Nov-15	TH	Replace Data	6-Jul-15	19:00	7-Jul-15	07:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
31	9-Nov-15	TH	Replace Data	7-Jul-15	09:00	8-Jul-15	03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
32	9-Nov-15	TH	Replace Data	8-Jul-15	05:00	8-Jul-15	12:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
33	9-Nov-15	TH	Replace Data	8-Jul-15	14:00	9-Jul-15	02:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
34	9-Nov-15	TH	Replace Data	9-Jul-15	08:00	10-Jul-15	07:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
35	9-Nov-15	TH	Replace Data	10-Jul-15	09:00	11-Jul-15	03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
36	9-Nov-15	TH	Replace Data	11-Jul-15	05:00	12-Jul-15	03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
37	9-Nov-15	TH	Replace Data	12-Jul-15	05:00	13-Jul-15	03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
38	9-Nov-15	TH	Replace Data	13-Jul-15	05:00	13-Jul-15	07:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
39	9-Nov-15	TH	Replace Data	13-Jul-15	09:00	15-Jul-15	02:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
40	9-Nov-15	TH	Replace Data	17-Jul-15	09:00	18-Jul-15	03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
41	9-Nov-15	TH	Replace Data	18-Jul-15	05:00	20-Jul-15	03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
42	9-Nov-15	TH	Replace Data	20-Jul-15	05:00	20-Jul-15	07:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
43	9-Nov-15	TH	Replace Data	20-Jul-15	09:00	21-Jul-15	07:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
44	9-Nov-15	TH	Replace Data	21-Jul-15	09:00	21-Jul-15	14:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
45	9-Nov-15	TH	Replace Data	25-Jul-15	01:00	27-Jul-15	03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
46	9-Nov-15	TH	Replace Data	27-Jul-15	05:00	28-Jul-15	03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
47	9-Nov-15	TH	Replace Data	28-Jul-15	05:00	31-Jul-15	05:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
48	9-Nov-15	TH	Replace Data	31-Jul-15	18:00	1-Aug-15	03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
49	9-Nov-15	TH	Replace Data	1-Aug-15	05:00	4-Aug-15	03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
50	9-Nov-15	TH	Replace Data	4-Aug-15	05:00	5-Aug-15	07:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
51	9-Nov-15	TH	Replace Data	5-Aug-15	07:00	5-Aug-15	20:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
52	9-Nov-15	TH	Replace Data	6-Aug-15	11:00	6-Aug-15	11:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
53	9-Nov-15	TH	Replace Data	6-Aug-15	13:00	6-Aug-15	17:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
54	9-Nov-15	TH	Replace Data	7-Aug-15	01:00	7-Aug-15	03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		
55	9-Nov-15	TH	Replace Data	7-Aug-15	07:00	7-Aug-15	10:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.		

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:	Crago Road					
Station address:	Crago Road		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	Serial Number:	CM 0269			
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)		
56	9-Nov-15	TH	Replace Data	7-Aug-15 12:00	8-Aug-15 04:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
57	9-Nov-15	TH	Replace Data	8-Aug-15 07:00	9-Aug-15 03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
58	9-Nov-15	TH	Replace Data	9-Aug-15 06:00	10-Aug-15 03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
59	9-Nov-15	TH	Replace Data	10-Aug-15 07:00	12-Aug-15 03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
60	9-Nov-15	TH	Replace Data	12-Aug-15 05:00	17-Aug-15 03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
61	9-Nov-15	TH	Replace Data	17-Aug-15 05:00	18-Aug-15 03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
62	9-Nov-15	TH	Replace Data	18-Aug-15 05:00	20-Aug-15 04:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
63	9-Nov-15	TH	Replace Data	20-Aug-15 13:00	20-Aug-15 13:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
64	9-Nov-15	TH	Replace Data	20-Aug-15 19:00	24-Aug-15 03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
65	9-Nov-15	TH	Replace Data	24-Aug-15 05:00	24-Aug-15 07:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
66	9-Nov-15	TH	Replace Data	24-Aug-15 09:00	25-Aug-15 13:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
67	9-Nov-15	TH	Replace Data	26-Aug-15 11:00	26-Aug-15 23:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
68	9-Nov-15	TH	Replace Data	27-Aug-15 01:00	27-Aug-15 02:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
69	9-Nov-15	TH	Replace Data	28-Aug-15 13:00	29-Aug-15 03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
70	9-Nov-15	TH	Replace Data	29-Aug-15 05:00	30-Aug-15 03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
71	9-Nov-15	TH	Replace Data	8/30/2015 05:00	8/31/2015 03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
72	9-Nov-15	TH	Replace Data	8/31/2015 05:00	8/31/2015 05:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
73	9-Nov-15	TH	Replace Data	8/31/2015 13:00	8/31/2015 15:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
74	9-Nov-15	TH	Replace Data	8/31/2015 17:00	9/1/2015 03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
75	9-Nov-15	TH	Replace Data	9/1/2015 05:00	9/2/2015 03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
76	9-Nov-15	TH	Replace Data	9/2/2015 05:00	9/3/2015 03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
77	9-Nov-15	TH	Replace Data	9/3/2015 05:00	9/4/2015 03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
78	9-Nov-15	TH	Replace Data	9/4/2015 05:00	9/5/2015 03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
79	9-Nov-15	TH	Replace Data	9/5/2015 05:00	9/6/2015 03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
80	9-Nov-15	TH	Replace Data	9/6/2015 05:00	9/8/2015 07:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
81	9-Nov-15	TH	Replace Data	8-Sep-15 09:00	10-Sep-15 10:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
82	9-Nov-15	TH	Replace Data	11-Sep-15 17:00	11-Sep-15 17:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
83	9-Nov-15	TH	Replace Data	12-Sep-15 09:00	12-Sep-15 16:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
84	9-Nov-15	TH	Replace Data	13-Sep-15 10:00	14-Sep-15 02:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
85	9-Nov-15	TH	Replace Data	14-Sep-15 17:00	15-Sep-15 02:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
86	9-Nov-15	TH	Replace Data	15-Sep-15 08:00	16-Sep-15 03:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
87	9-Nov-15	TH	Replace Data	16-Sep-15 05:00	16-Sep-15 07:00	Data logger recording zero data. Hourly data downloaded directly from PM monitor are used instead.			
88	22-Jan-16	TH	Invalidate Data	20/10/2015 12:00	20/10/2015 13:00	Monthly calibration			
89	22-Jan-16	TH	Invalidate Data	18/11/2015 07:00	18/11/2015 09:00	Monthly calibration			
90	22-Jan-16	TH	Invalidate Data	11/12/2015 17:00	11/12/2015 18:00	Monthly calibration			
91	7-Mar-16	TH	Invalidate Data	28/11/2015 19:00	28/11/2015 19:00	Invalidated - after review of minute average data, the elevated PM2.5 level is based on a 3-minute period of elevated concentrations with the rest of the hour being about 60% lower - suggesting a local/ transient source of emissions.			
92	21-Apr-16	CL	Invalidate Data	13/12/2015 17:00	13/12/2015 17:00	Invalidated based on rate of change of the minute data, and with consideration of construction activities reported in the area in this timeframe.			
93	21-Apr-16	CL	Invalidate Data	13/12/2015 19:00	13/12/2015 19:00	Invalidated based on rate of change of the minute data, and with consideration of construction activities reported in the area in this timeframe.			
94	21-Apr-16	CL	Invalidate Data	16/12/2015 09:00	16/12/2015 11:00	Invalidated based on rate of change of the minute data, and with consideration of construction activities reported in the area in this timeframe.			
95	21-Apr-16	CL	Invalidate Data	16/12/2015 13:00	16/12/2015 13:00	Invalidated based on rate of change of the minute data, and with consideration of construction activities reported in the area in this timeframe.			
96	21-Apr-16	CL	Invalidate Data	16/12/2015 16:00	16/12/2015 17:00	Invalidated based on rate of change of the minute data, and with consideration of construction activities reported in the area in this timeframe.			

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

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:	Crago Road					
Station address:	Crago Road		Emitter Address:	The Region of Durham, 605 Rossland Rd, Whitby, ON					
Pollutant or parameter:	Rainfall	Instrument make & model:		Texas Electronic TE525M					
Data edit period	Start date:	1-Jan-15	End date:	31-Dec-15					
Edit #	Edit date	Editor's Name	Edit Action	Starting	Ending	Reason			
				Date (dd/mm/yyyy)	Hour (xxxx)	Date (dd/mm/yyyy)	Hour (xx:xx)		

Examples of Acceptable Edit Actions

Add offset of

Delete hours

Zero Correction

Slope Correction

Manual data en

Invalidating span & zero check data

Invalidating data due to equipment

Invalidating data when instrumental

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:	Crago Road					
Station address:	Crago Road		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:	1-Jan-15	End date:	31-Dec-15					
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)		

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:	Crago Road					
Station address:	Crago Road		Emitter Address:	The Region of Durham, 605 Rossland Rd, Whitby, ON					
Pollutant or parameter:	Wind Speed/Wind Direction	Instrument make & model:		Met One Instruments Inc. Model 034B					
Data edit period	Start date:	1-Jan-15	End date:	31-Dec-15					
Edit #	Edit date	Editor's Name	Edit Action	Starting		Ending	Reason		
				Date (dd/mm/yyyy)	Hour (xx:xx)	Date (dd/mm/yyyy)			

Examples of Acceptable Edit Actions

Add offset of

Delete hours

Zero Correction

Slope Correction

Manual data entry

Invalidating span & zero check data

Invalidating data due to equipment

Invalidating data

Marking data as **invalid**

Marking data as Out of Range