Quarterly Ambient Air Quality Monitoring Report for the Durham York Energy Centre (Crago Road Station) – January to March 2017

Durham York Energy Centre

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Sign-off Sheet

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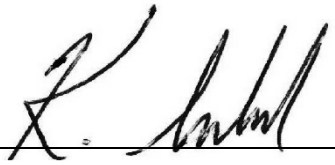
Reviewed by 

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Executive Summary

The Regional Municipalities of Durham and York operate the Durham York Energy Centre (DYEC) which is an Energy from Waste (EFW) facility intended to provide a long-term, sustainable solution to manage the remaining municipal solid waste after waste diversion from the Regions. The facility commenced commercial operation on February 1, 2016.

An Ambient Air Quality Monitoring Plan – Durham York Residual Waste Study (Ambient Monitoring Plan) was developed and included two monitoring stations referred to as the Courtice Water Pollution Control Plant (WPCP) Station and the Rundle Road Station (as well as a temporary Fence Line Station). The plan developed for these 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.

Subsequently, the Region decided to add a third ambient air monitoring station located near the corner of Crago and Osborne Roads (referred to as the Crago Road Station), which was installed in October/November 2014. The Crago Road Station is not part of the Ambient Monitoring Plan; however, it is operated following the same protocols as the other two stations. Results from the Crago Road Station are reported separately from the Courtice WPCP and Rundle Road Stations.

The Crago Road Station is equipped to measure concentrations of several air contaminants either continuously or at scheduled intervals (non-continuously) as outlined below:

- Contaminants monitored continuously:
  - Sulphur Dioxide (SO_2)
  - Nitrogen Oxides (NO_X), and
  - Particulate Matter smaller than 2.5 microns ($PM_{2.5}$).
- Contaminants monitored non-continuously:
  - Metals in Total Suspended Particulate (TSP) matter
  - Polycyclic Aromatic Hydrocarbons (PAHs), and
  - Dioxins and Furans.

Meteorological data is also measured at the station. The predominantly downwind Crago Road Station measures horizontal wind speed, wind direction, atmospheric temperature, relative humidity, and rainfall.

This quarterly report provides a summary of the ambient air quality data collected at the Crago Road Station for the period January to March 2017 (Calendar Quarter 1). All measured air quality parameters had acceptable data recovery rates during this quarter. Instrumentation recovery rates are presented in Section 3.2 of this report.

Site personnel noted ongoing Highway 418 construction on the north and south sides of Highway 401 between Courtice and Crago Roads during Quarter 1 2017.

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

1. Measured levels of NO_2, SO_2 and $PM_{2.5}$ were below the applicable O. Reg. 419/05 Standards or human health risk assessment (HHRA) health-based criteria 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 98^{th} 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. The maximum measured concentrations of TSP and all metals with Ministry of Environment and Climate Change (MOECC) air quality Standards were well below their applicable Standards (as presented in **Table 2-2** in this report).
4. The maximum measured concentrations of PAHs with MOECC air quality Standards were well below their applicable criteria shown in **Table 2-3**, with the exception of 24-hour benzo(a)pyrene (B(a)P) concentrations in three (3) samples which exceeded the applicable Ontario Ambient Air Quality Criteria (AAQC) by between 38% and 220%. The current Ontario 24-hour B(a)P AAQC was introduced in 2011 and levels above this AAQC are commonly measured throughout Ontario. The measurements were however, well below the MOECC Schedule 6 Upper Risk Threshold, the MOECC O. Reg. 419/05 24-hour average guideline, and the HHRA health based criterion.
5. The maximum measured toxic equivalent dioxin and furan concentration was below the applicable Standard presented in **Table 2-3**.

In summary, the measured concentrations of the air contaminants monitored were below their applicable MOECC Standards during the monitoring period between January and March 2017, with the exception of three (3) benzo(a)pyrene samples. All measured levels of the monitored contaminants were below their applicable HHRA health-based criteria.

Abbreviations

AAQC	Ambient Air Quality Criteria
ACB List	Air Contaminants Benchmark List: Standards, Guidelines and Screening Levels for Assessing Point of Impingement Concentrations of Air Contaminants
CAAQS	Canadian Ambient Air Quality Standard
CAC	Criteria Air Contaminants
CDD	Chlorinated Dibenzo-p-dioxins
CDF	Chlorinated Dibenzo-p-furans
D/Fs	Dioxins and Furans
DYEC	Durham York Energy Centre
EFW	Energy from Waste
HHRA	Human Health Risk Assessment
MOECC	Ontario Ministry of the Environment and Climate Change
SO_2	Sulphur Dioxide
NO_X	Nitrogen Oxides
O_3	Ozone
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
Q1, Q2, Q3, Q4	Quarter 1 (January, February, and March); Quarter 2 (April, May, and June); Quarter 3 (July, August, and September); and Quarter 4 (October, November, and December)
TEQ	Toxic Equivalent Quotient
TEQs	Toxic Equivalents
TSP	Total Suspended Particulate
VES	Valley Environmental Services
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
Miscellaneous	
°C	Temperature in degrees Celsius
N/A	Not Available
%	Percent
ppm	Parts per million
ppb	Parts per billion
ppbv	Parts per billion by volume
ppt	Parts per trillion
min	Minimum
max	Maximum
mm	Millimetre
m	Metre
km/hr	Kilometre per hour
mg/m^3	Milligrams per cubic metre
$\mu g/m^3$	Micrograms per cubic metre
ng/m^3	Nanograms per cubic metre
pg/m^3	Picograms per cubic metre
pg TEQ/m^3	Picograms toxic exposure equivalents per cubic metre

1.0 INTRODUCTION

1.1 BACKGROUND AND OBJECTIVES

The Regional Municipalities of Durham and York operate 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 location of the DYEC is shown in **Figure 1-1**. The facility commenced commercial operation on February 1, 2016.

An Ambient Air Quality Monitoring Plan – Durham York Residual Waste Study (Ambient Monitoring Plan) was developed and included two monitoring stations referred to as the Courtice Water Pollution Control Plant (WPCP) Station and the Rundle Road Station (as well as a temporary Fence Line Station). The plan developed for these 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 measurable 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.

At the request of 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 Monitoring Plan, is operated following the same protocols as the other two stations (Courtice WPCP and Rundle Road Stations) already in operation.

The Crago Road Station is equipped to measure concentrations of several air contaminants either continuously or at scheduled intervals (non-continuously) as outlined below:

- Contaminants monitored continuously:
  - Sulphur Dioxide (SO_2)
  - Nitrogen Oxides (NO_X), and
  - Particulate Matter smaller than 2.5 microns ($PM_{2.5}$).

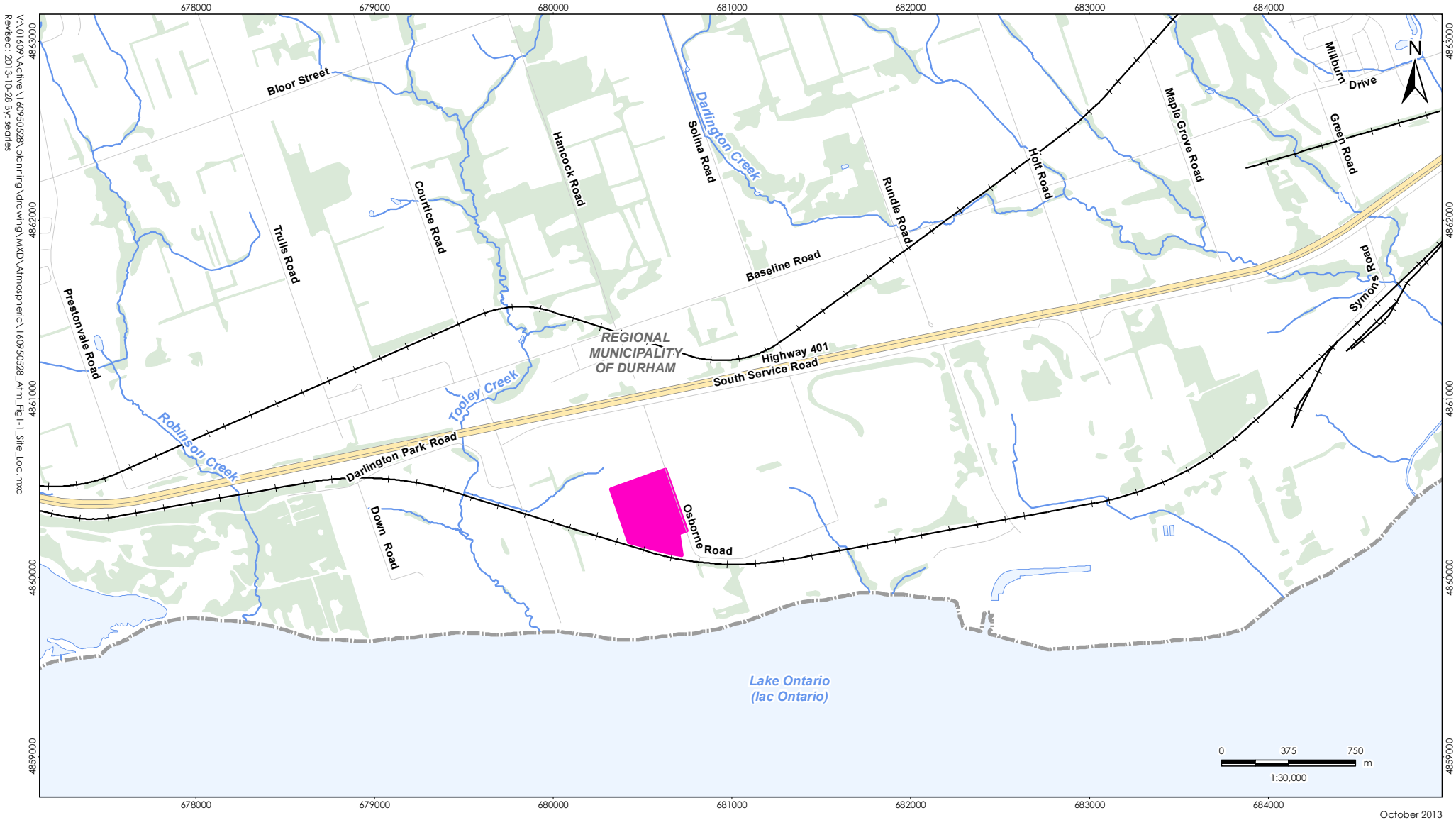
- Contaminants monitored non-continuously:
  - Metals in Total Suspended Particulate (TSP) matter
  - Polycyclic Aromatic Hydrocarbons (PAHs), and
  - Dioxins and Furans.

This quarterly report provides a summary of the ambient air quality data collected at this station for the period January to March 2017 (Q1).

1.2 LOCATION OF AMBIENT AIR QUALITY MONITORING STATION

The selection of the site for the monitoring station was accomplished in consultation with Regional Municipality of Durham 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 Crago Road Station is sited east of the DYEC near the Darlington Hydro Upper and Lower Soccer Fields on the east side of Crago Road, north of Osborne Road. Its location is shown in **Figure 1-2** and **Figure 1-3**. The monitoring station measures all the air contaminants listed in Section 1.1 and meteorological data.



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October 2013
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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

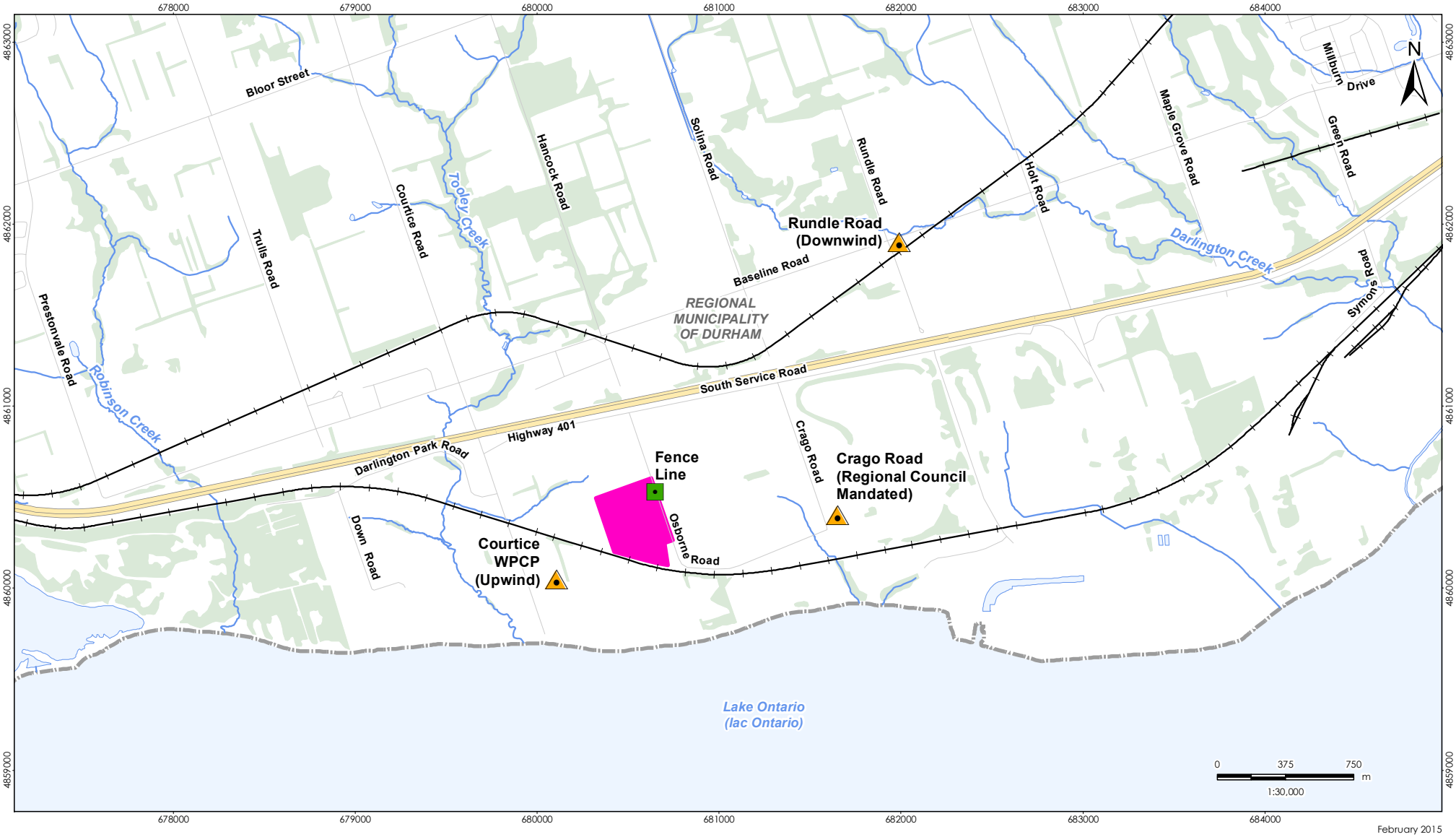
The Region of Durham
Durham York Energy Centre

Figure No.

1-1

Title

Site Location Plan



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February 2015
160950528

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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

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.

Client/Project

The Region of Durham
Durham York Energy Centre

Figure No.

1-2

Title

Locations of Ambient Monitoring Stations

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

2.0 KEY COMPONENTS ASSESSED

2.1 METEOROLOGY

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

- Wind Speed and direction at a height of 10 m
- Ambient temperature at a height of 2 m
- Relative humidity, and
- Rainfall.

2.2 AIR QUALITY CONTAMINANTS OF CONCERN

The ambient air quality monitoring program for the Crago Road Station includes the following contaminants specified in the Ambient Monitoring Plan (Stantec, 2012):

- Continuously monitored criteria air contaminants (CACs)
  - Sulphur Dioxide (SO_2)
  - 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.

The following are lists of the specific metals, PAHs, and dioxins and furans being measured. Rationales for the choice of contaminants being monitored are provided in the Ambient Monitoring Plan (Stantec, 2012).

<u>Metals</u>:

- Aluminum (Al)
- Antimony (Sb)
- Arsenic (As)
- Barium (Ba)
- Beryllium (Be)
- Bismuth (Bi)
- Boron (B)
- Cadmium (Cd)
- Cobalt (Co)
- Copper (Cu)
- Chromium (Cr) (Total)
- Iron (Fe)
- Lead (Pb)
- Magnesium (Mg)
- Manganese (Mn)
- Mercury (Hg)
- Molybdenum (Mo)
- Nickel (Ni)
- Phosphorus (Ph)
- Selenium (Se)
- Silver (Ag)
- Strontium (Sr)
- Thallium (Tl)
- Tin (Sn)
- Titanium (Ti)
- Uranium (U)
- Vanadium (V)
- Zinc (Zn)
- Zirconium (Zr)

Polycyclic Aromatic Hydrocarbons:

- 1-Methylnaphthalene
- 2-Methylnaphthalene
- Acenaphthene
- Acenaphthylene
- Anthracene
- Benzo(a)anthracene
- Benzo(a)fluorene
- Benzo(a)pyrene
- Benzo(b)fluorene
- Benzo(b)fluoranthene
- Benzo(e)pyrene
- Benzo(g,h,i)perylene
- Benzo(k)fluoranthene
- Biphenol
- Chrysene
- Dibenz(a,h)anthracene
- Dibenz(a,c)anthracene
- Fluoranthene
- Indeno(1,2,3-cd)pyrene
- Naphthalene
- Perylene
- Phenanthrene
- Pyrene
- Tetralin
- o-Terphenyl
- Total PAHs

Dioxins and Furans:

- 2,3,7,8-Tetra CDD
- 1,2,3,7,8-Penta CDD
- 1,2,3,4,7,8-Hexa CDD
- 1,2,3,6,7,8-Hexa CDD
- 1,2,3,7,8,9-Hexa CDD
- 1,2,3,4,6,7,8-Hepta CDD
- Octa CDD
- Total Tetra CDD
- Total Penta CDD
- Total Hexa CDD
- Total Hepta CDD
- 2,3,7,8-Tetra CDF
- 1,2,3,7,8-Penta CDF
- 2,3,4,7,8-Penta CDF
- 1,2,3,4,7,8-Hexa CDF
- 1,2,3,6,7,8-Hexa CDF
- 2,3,4,6,7,8-Hexa CDF
- 1,2,3,7,8,9-Hexa CDF
- 1,2,3,4,6,7,8-Hepta CDF
- 1,2,3,4,7,8,9-Hepta CDF
- Octa CDF
- Total Tetra CDF
- Total Penta CDF
- Total Hexa CDF
- Total Hepta CDF
- Total toxic equivalency (I-TEQ)

2.3 AIR QUALITY CRITERIA

Two sets of criteria were used for comparison to the air quality data as specified in the Ambient Monitoring Plan (Stantec, 2012). The first set of criteria was the Standards reported in O. Reg. 419/05 (Schedules 3 and 6). These are compliance based Standards used throughout the province of Ontario. These criteria, along with O. Reg. 419/05 guidelines and Jurisdictional Screening Levels are unchanged but were consolidated in December 2016 into a new format known as the "Air Contaminants Benchmark List: Standards, Guidelines and Screening Levels for Assessing Point of Impingement Concentrations of Air Contaminants" (MOECC, 2016). However, not all chemicals have O. Reg. 419/05 Standards, or in some instances updated health-based criteria 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 criteria.

The previously applicable 24-hour average Canada-Wide Standard (CWS) for $PM_{2.5}$ of 30 µg/m^3 (98th percentile averaged over 3 consecutive years), has been superseded by a new Canadian Ambient Air Quality Standard (CAAQS) of 28 µg/m^3 (98th percentile averaged over three consecutive years) and an annual objective of 10 µg/m^3 as noted in **Table 2-1**. The proposed CAAQS 24-hour objective for 2020 is 27 µg/m^3.

Summaries of the relevant air quality criteria for the contaminants monitored are presented in **Table 2-1** to **Table 2-3**.

Table 2-1 Summary of Air Quality Criteria for CACs

Contaminant	CAS	O. Reg. 419/05 – Schedule 3 Standards			HHRA Health-Based Criteria		
		1-Hour (ppb / µg/m^3)	24-Hour (ppb / µg/m^3)	Annual (ppb / µg/m^3)	1-Hour (ppb / µg/m^3)	24-Hour (ppb / µg/m^3)	Annual (ppb / µg/m^3)
Sulphur dioxide	7446095	250 /690	100 / 275	20 / 55	250 / 690	100 / 275	11 / 29
Nitrogen oxides [A]	10102-44-0	200 /400	100 / 200	-	200 / 400	100 / 200	30 / 60
Contaminant	**CAS**	**Canadian Ambient Air Quality Standards (CAAQS)**			**HHRA Health-Based Criteria**		
		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 Standard for NO_X is based on health effects of NO_2, as NO_2 has adverse health effects at much lower concentrations than NO. Therefore, the Standard was compared to NO_2 in this report. However, as per the current (December 2016) version of the Air Contaminants Benchmark List: Standards, Guidelines and Screening Levels for Assessing Point of Impingement Concentrations of Air Contaminants, 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 criterion for $PM_{2.5}$ was selected referencing CCME (2006).

Table 2-2 Summary of Air Quality Criteria for Metals

Contaminant	CAS	O. Reg. 419/05 – Schedule 3 Standards			HHRA Health-Based Criteria		
		1-Hour (µg/m³)	24-Hour (µg/m³)	Other time Period (µg/m³)	1-Hour (µg/m³)	24-Hour (µg/m³)	Annual (µg/m³)
Total Particulate	NA	-	120	-	-	120	60
Aluminum	7429-90-5	-	4.8	-	-	-	-
Antimony	7440-36-0	-	25	-	5	25	0.2
Arsenic	7440-38-2	-	0.3	-	0.2	0.3	0.015 [A] 0.0043 [B]
Barium	7440-39-3	-	10	-	5	10	1
Beryllium	7440-41-7	-	0.01	-	0.02	0.01	0.007 [A] 0.0024 [B]
Bismuth	7440-69-9	-					
Boron	7440-42-8	-	120	-	50	-	5
Cadmium	7440-43-9	-	0.025	0.005; annual	0.1	0.025	0.005 [A] 0.0098 [B]
Chromium (Total)	7440-47-3	-	0.5	-	1	-	60
Cobalt	7440-48-4	-	0.1	-	0.2	0.1	0.1
Copper	8440-50-8	-	50	-	-	-	-
Iron	15438-31-0	-	4	-	-	-	-
Lead	7439-92-1	-	0.5	0.2; 30-day	1.5	0.5	0.5
Magnesium	7439-95-4	-					
Manganese	7439-96-5	-	0.4	-	-	-	-
Mercury	7439-97-6	-	2	-	0.6	2	0.3
Molybdenum	7439-87-7	-	120	-	-	-	-
Nickel	7440-02-0	-	0.2	0.04; annual	6	-	0.05
Phosphorus	7723-14-0	-	-	-	-	-	6.4×10^7
Selenium	7782-49-2	-	10	-	2	10	0.2
Silver	7440-22-4	-	1	-	0.1	1	0.01
Strontium	7440-24-6	-	120	-	-	-	-
Thallium	7440-28-0	-	-	-	1		0.1
Tin	7440-31-5	-	10	-	20	10	2
Titanium	7440-32-6	-	120	-	-	-	-
Vanadium	7440-62-2	-	2	-	0.5	1	1

Table 2-2 Summary of Air Quality Criteria for Metals

Contaminant	CAS	O. Reg. 419/05 – Schedule 3 Standards			HHRA Health-Based Criteria		
		1-Hour (µg/m³)	24-Hour (µg/m³)	Other time Period (µg/m³)	1-Hour (µg/m³)	24-Hour (µg/m³)	Annual (µg/m³)
Uranium	7440-61-1	-	1.5	0.03; annual	-	-	-
Zinc	7440-66-6	-	120	-	50		5
Zirconium	7440-67-7	-	20	-	-	-	-

Notes:
A. Annual Average
B. Carcinogenic Annual Average

Table 2-3 Summary of Air Quality Criteria for PAHs and D/Fs

Contaminant	CAS	O. Reg. 419/05 – Schedule 3 Standards			HHRA Health-Based Criteria			
		1-Hour (ng/m³)	24-Hour (ng/m³)	Other time Period (ng/m³)	1-Hour (ng/m³)	24-Hour (ng/m³)	Annual (ng/m³)	Toxic Equivalency Factor Annual [A, F] (ng/m³)$^{-1}$
1-Methylnaphthalene	90-12-0	-	12,000	-	-	-	3,000	-
2-Methylnaphthalene	91-57-6	-	10,000	-	-	-	3,000	-
Acenaphthene	83-32-9	-	-	-	1,000	-	-	1
Acenaphthylene	208-96-8	-	3,500	-	1,000	-	-	10
Anthracene	120-12-7	-	200	-	500	-	50	-
Benzo(a)anthracene	56-55-3	-	-	-	500	-	-	100
Benzo(b)fluoranthene	205-99-2	-	-	-	500	-	-	100
Benzo(k)fluoranthene	207 -08-9	-	-	-	500	-	-	100
Benzo(a)fluorene	238-84-6	-	-	-	500	-	50	-
Benzo(b)fluorene	243-17-4	-	-	-	500	-	50	-
Benzo (g,h,i) perylene	191-24-2	-	-	-	500	-	-	100
Benzo(a)pyrene	50-32-8	-	0.05 [B] 5 [C] 1.1 [D]	0.01; annual	-	1	87 [A]	-
Benzo(e)pyrene	192-97-2	-	-	-	500	-	-	10
Biphenyl	92-52-4	-	-	-	-	-	224,000	-
Chrysene	218-01-9	-						-
Dibenzo(a,c)anthracene	215-58-7	-	-	-	-	-	-	100

Table 2-3 Summary of Air Quality Criteria for PAHs and D/Fs

Contaminant	CAS	O. Reg. 419/05 – Schedule 3 Standards			HHRA Health-Based Criteria			
		1-Hour (ng/m^3)	24-Hour (ng/m^3)	Other time Period (ng/m^3)	1-Hour (ng/m^3)	24-Hour (ng/m^3)	Annual (ng/m^3)	Toxic Equivalency Factor Annual [A, F] $(ng/m^3)^{-1}$
Dibenzo(a,h)anthracene	53-70-3	-	-	-	500	-	-	1,000
Fluoranthene	206-44-0	-	-	-	500	-	-	1
Indeno(1,2,3-cd)pyrene	193-39-5	-	-	-	500	-	-	100
Naphthalene	91-20-3	-	22,500	-	-	22,500	3,000	-
o-Terphenyl	84-15-1	-	-	-	50,000	-	5,000	-
Perylene	198-55-0	-	-	-	500	-	-	1
Phenanthrene	85-01-8	-	-	-	500	-	-	1
Pyrene	129-00-0	-	-	-	500	-	-	1
Tetralin	119-64-2	-						-
Dioxins and Furans Total Toxic Equivalency E	NA	-	0.1 (pg TEQ/m^3) [E] 1 (pg TEQ/m^3) [C]	-	-	-	-	-

Notes:

A. Carcinogenic Annual Average. Units in $(ng/m^3)^{-1}$.
B. Ontario Ambient Air Quality Criteria - The standard for benzo(a)pyrene (B(a)P) is for B(a)P as a surrogate for PAHs.
C. O. Reg. 419/05 Schedule 6 Upper Risk Thresholds
D. O. Reg. 419/05 24 Hour Guideline
E. Application of the air standard for dioxins, furans, and dioxin-like PCBs requires the calculation of the total toxicity equivalent (TEQ) concentration contributed by all dioxin-like compounds in the mixture. TEQ is calculated using the methodology as per the O. Reg. 419/05 Summary of Standards and Guidelines, and the corresponding WHO_{2005} toxic equivalency factors (i-TEFs).
F. Toxic Equivalency Factors (TEFs) are shown as benzo(a)pyrene equivalents.

3.0 INSTRUMENTATION SUMMARY AND FIELD CONDITIONS

3.1 INSTRUMENTATION

The measurement program at the monitoring site includes both continuous and non-continuous monitors to sample air contaminant concentrations.

Monitoring for respirable particulate matter ($PM_{2.5}$), nitrogen oxides (NO_X) and sulphur dioxide (SO_2) 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	Teledyne 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 API Model T100	Pulsed Florescence - 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

Two manually operated, hi-volume air samplers are installed at the Crago Road Station to collect metals in total suspended particulate (TSP), polycyclic aromatic hydrocarbons (PAHs), and dioxins and furans. Sampling for these contaminants is conducted following the methodology and analyses described in the Ambient Monitoring Plan (Stantec, 2012), as presented in **Table 3-2.** The samples were submitted to Maxxam Analytics Inc., a Canadian Association for Laboratory Accreditation Inc. (CALA) / Standards Council of Canada (SCC) accredited laboratory, for analysis.

Table 3-2 Summary of Non-Continuous Ambient Air Quality Monitors

Contaminant	Sampler	Filter Media	Lab Analysis	Sampling Schedule
TSP and metals	Tisch Environmental TE-5170 mass-flow high volume sampler	Pre-weighed, conditioned Teflon coated glass fibre filters	Weighed for particulate loading and analysed using the Atomic Emission Spectroscopy / Inductively Coupled Plasma (AES/ICP) technique to determine metals content	24 hour sample taken every 6 days
PAHs	Tisch Environmental TE-1000 mass-flow high volume air sampler	Dual chambered sampling module with a Teflon-coated glass fibre filter and a Poly-Urethane Foam (PUF) cartridge	Gas Chromatography / Mass Spectrometry (GC/MS)	24 hour sample taken every 12 days
Dioxins and Furans				24 hour sample taken every 24 days.

Horizontal wind speed, wind direction, atmospheric temperature, relative humidity, and rainfall are measured at the predominantly downwind Crago Road Station. 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 at the Crago Road Station is summarized in **Table 3-3**.

Table 3-3 Summary of Meteorological Equipment

Parameter	Equipment
Wind Speed/Wind Direction	Met One Instruments Inc. Model 034B
Temperature/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

One instrumentation issue was encountered during this quarter with the NO_X analyzer. After the February calibration, a large non-linear negative drift in the NO_X measurements was observed that was corrected by a second site visit later in the day to re-zero the analyzer. A summary of the operational issues for each measurement parameter during the monitoring period is presented in **Table 3-4**.

Table 3-4 Summary of Instrument Issues at the Crago Road Station

Parameter	Issues	Timeframe	Remedial Action
SO_2	Equipment supplier identified potential internal power cable issue.	15-Mar-17	Supplier provided a new power cable under warranty, which was installed by Valley Environmental Services (VES). All data intact.
NOx	Sudden, non-linear negative drift in NO_X measurements.	22-Feb-2017 8:00 - 14:00	Reviewed and invalidated 6 hours of data.
	Equipment supplier identified potential internal power cable issue.	15-Mar-17	Supplier provided a new power cable under warranty, which was installed by VES. All data intact.
$PM_{2.5}$	None	-	-
TSP/Metals Hi-Vol.	None	-	-
PAH/ D/F Hi-Vol	None	-	-
Other	None	-	-

3.3 INSTRUMENTATION RECOVERY RATES

Data recovery rates for each monitor at the station during Q1 are presented in **Table 3-5**.

Table 3-5 Summary of Data Recovery Rates for the Crago Road Station – January to March 2017

Parameter	Valid Measurement Hours	Data Recovery Rate (%)
SO^2	2152	99.6% [B]
NO_X	2146	99.4% [B]
$PM_{2.5}$	2154	99.7% [B]

Table 3-5 Summary of Data Recovery Rates for the Crago Road Station – January to March 2017

Parameter	Valid Measurement Hours	Data Recovery Rate (%)
Temperature	2160	100% [B]
Rainfall	2160	100% [B]
Relative Humidity	2160	100% [B]
Wind Speed/Direction	2160	100% [B]
TSP/Metals	15 [A]	100%
PAHs	7 [A]	100%
Dioxins and Furans	4 [A]	100%

Notes:
A. Number of filters/24-hour average samples.
B. Includes instrumentation issues summarized in Table 3-4 and monthly calibrations.

3.4 FIELD CONDITION OBSERVATIONS

During Q1 2017, activities in the vicinity of the Crago ambient air monitoring station were observed that had the potential to be affecting air quality levels. These observations were noted by Stantec and Valley Environmental Services (VES) personnel during field visits.

Construction of Highway 418, which will connect with Highway 401 between Courtice Road and Crago Road was ongoing during this quarter. Highway 418 will provide a north-south link between Highway 401 and the Phase 2 expansion of Highway 407. The Highway 401/418 interchange will be located almost directly north of the DYEC. Throughout the quarter, hydro crews were observed working in a large area immediately north of the DYEC between Energy Drive and Hwy 401 for the relocation/re-alignment of South Service Road. The new South Service Road will be located immediately south of the existing South Service Road and run between Courtice Road and Crago Road. A photograph of South Service Road realignment construction is shown in **Figure 3-1**.

Figure 3-1 View of South Service Road Realignment Construction (Looking East on the Existing South Service Road)

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 January to March 2017 period are presented in **Table 4-1**.

Table 4-1 Summary of Hourly Meteorological Measurements – January to March 2017

Parameter		Crago Road Station (Predominately Downwind)	Units
Temperature	Maximum	12.5	˚C
	Minimum	-15.0	˚C
	Mean (January)	-1.8	˚C
	Mean (February)	-1.1	˚C
	Mean (March)	-1.8	˚C
	Mean (Period)	-1.6	˚C
	Standard Deviation	5.4	˚C
Rainfall	Maximum	8.1	mm
	Minimum	0.0	mm
	Mean (January)	0.10	mm
	Mean (February)	0.06	mm
	Mean (March)	0.10	mm
	Mean (Period)	0.09	mm
	Standard Deviation	0.47	mm
Relative Humidity	Maximum	97.8	%
	Minimum	26.6	%
	Mean (January)	75.8	%
	Mean (February)	72.3	%
	Mean (March)	68.1	%
	Mean (Period)	72.1	%
	Standard Deviation	15.4	%

Table 4-1 Summary of Hourly Meteorological Measurements – January to March 2017

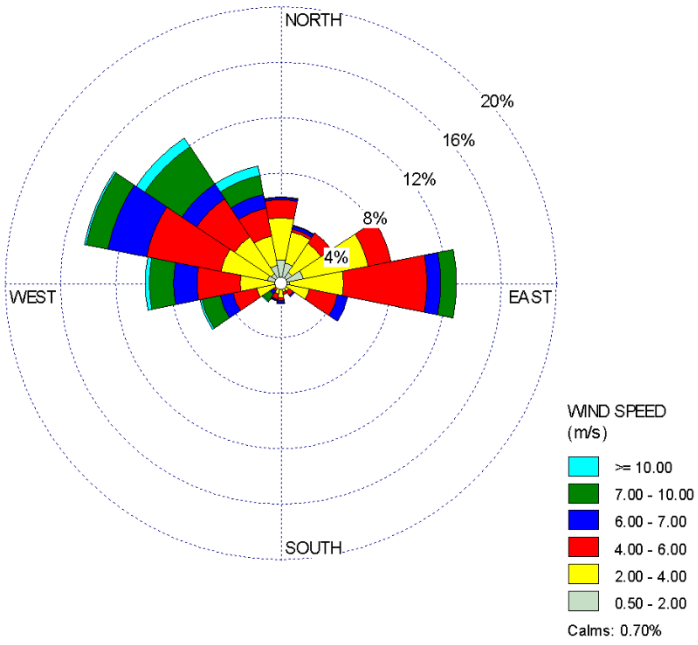
Parameter		Crago Road Station (Predominately Downwind)	Units
Wind Speed [A]	Maximum	51.4	km/hr
	Minimum	0.0	km/hr
	Mean (January)	14.8	km/hr
	Mean (February)	14.7	km/hr
	Mean (March)	16.8	km/hr
	Mean (Period)	15.5	km/hr
	Standard Deviation	8.4	km/hr

Note:
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 barbs 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 west-northwesterly directions. Wind contribution from the north and south was low. Higher wind speeds occurred from northwesterly directions.

Figure 4-1 Wind Rose for January to March 2017



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 O. Reg. 419/05 Schedule 3 Standards, Ontario Ambient Air Quality Criteria (AAQC) or health-based criteria for each contaminant. All monitored contaminants were below their applicable criteria during the period January to March 2017.

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 O. Reg. 419/05 Schedule 3 Standards for NO_X which are based on health effects of NO_2, therefore the AAQC were compared to measured NO_2 concentrations in this report. As per the current (December 2016) version of the Air Contaminants Benchmark List: Standards, Guidelines and Screening Levels for Assessing Point of Impingement Concentrations of Air Contaminants (MOECC, 2016), the Schedule 3 Standard for NO_X was also compared to the monitored NO_X levels.

The maximum concentration levels measured at the Crago Road Station in this quarter are compared in **Figure 4-2** to their respective air quality criteria along with the levels measured at the Courtice WPCP and Rundle Road Stations (Stantec, 2017).

Table 4-2 Summary of Ambient CAC Monitoring Data – January to March 2017

Pollutant	Averaging Period	AAQC / Schedule 3 / HHRA Health-Based Criteria			Crago Road Station (Predominately Downwind)	
		ppb	µg/m³		Concentration (ppbv)	Concentration (µg/m³)
SO_2	1	250	690	Maximum	35.1	99.6
				Minimum	0.0	0.0
				Mean (January)	0.5	1.5
				Mean (February)	0.7	1.9
				Mean (March)	0.8	2.3
				Mean (Period)	0.7	1.9
				Standard Deviation	1.9	5.3
				# of Exceedances	0	0
	24	100	275	Maximum	10.3	29.0
				Minimum	0.0	0.0
				Mean (January)	0.5	1.5
				Mean (February)	0.7	1.9
				Mean (March)	0.8	2.2
				Mean (Period)	0.7	1.9
				Standard Deviation	1.1	3.2
				# of Exceedances	0	0

Table 4-2 Summary of Ambient CAC Monitoring Data – January to March 2017

Pollutant	Averaging Period	AAQC / Schedule 3 / HHRA Health-Based Criteria			Crago Road Station (Predominately Downwind)	
		ppb	µg/m³		Concentration (ppbv)	Concentration (µg/m³)
$PM_{2.5}$	24	N/A	28 [A]	Maximum	-	30.4
				Minimum	-	0.5
				Mean (January)	-	8.1
				Mean (February)	-	7.5
				Mean (March)	-	6.1
				Mean (Period)	-	7.2
				Standard Deviation	-	4.9
				# of Exceedances	-	N/A
NO_2	1	200	400	Maximum	30.2	63.7
				Minimum	0.0	0.0
				Mean (January)	5.8	12.0
				Mean (February)	5.0	10.2
				Mean (March)	4.3	8.7
				Mean (Period)	5.0	10.3
				Standard Deviation	5.8	12.0
				# of Exceedances	0	0
	24	100	200	Maximum	20.4	42.3
				Minimum	0.0	0.0
				Mean (January)	5.8	11.8
				Mean (February)	4.9	10.1
				Mean (March)	4.1	8.4

Table 4-2 Summary of Ambient CAC Monitoring Data – January to March 2017

Pollutant	Averaging Period	AAQC / Schedule 3 / HHRA Health-Based Criteria			Crago Road Station (Predominately Downwind)	
		ppb	µg/m³		Concentration (ppbv)	Concentration (µg/m³)
				Mean (Period)	4.9	10.1
				Standard Deviation	3.9	7.9
				# of Exceedances	0	0
NO[C]	1	NA	NA	Maximum	42.1	56.9
				Minimum	0.0	0.0
				Mean (January)	1.9	2.5
				Mean (February)	1.4	1.8
				Mean (March)	1.0	1.3
				Mean (Period)	1.4	1.9
				Standard Deviation	3.3	4.4
				# of Exceedances	N/A	N/A
	24	NA	NA	Maximum	14.5	19.4
				Minimum	0.0	0.0
				Mean (January)	1.9	2.6
				Mean (February)	1.3	1.7
				Mean (March)	0.9	1.2
				Mean (Period)	1.4	1.9
				Standard Deviation	1.8	2.4
				# of Exceedances	N/A	N/A

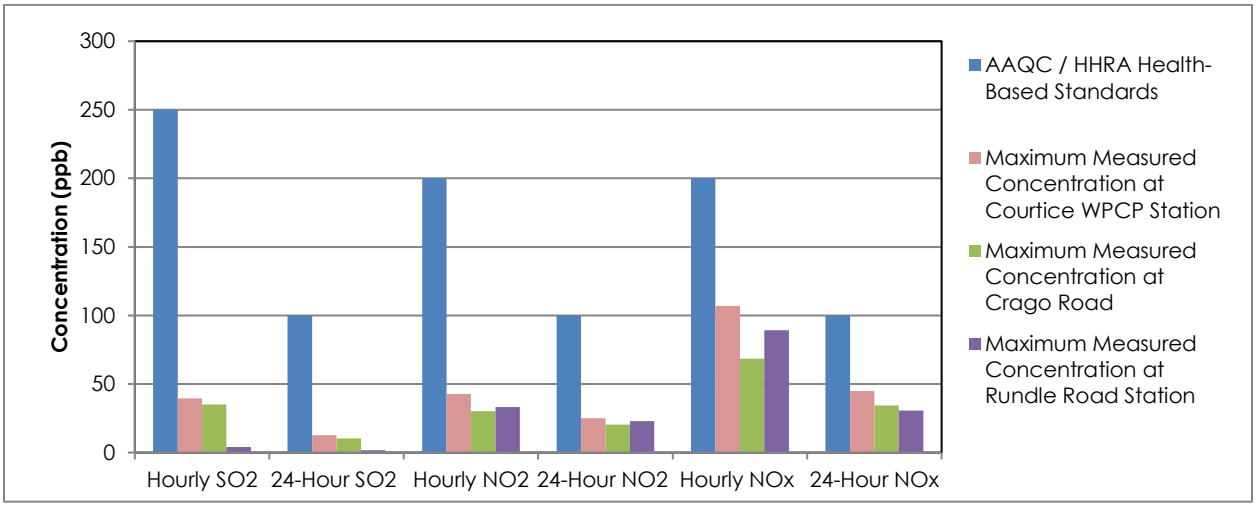
Table 4-2 Summary of Ambient CAC Monitoring Data – January to March 2017

Pollutant	Averaging Period	AAQC / Schedule 3 / HHRA Health-Based Criteria			Crago Road Station (Predominately Downwind)	
		ppb	µg/m³		Concentration (ppbv)	Concentration (µg/m³)
NO_X	1	200 [B]	400 [B]	Maximum	68.4	141.7
				Minimum	0.0	0.0
				Mean (January)	7.6	15.5
				Mean (February)	6.2	12.6
				Mean (March)	5.0	10.3
				Mean (Period)	6.3	12.8
				Standard Deviation	8.4	17.2
				# of Exceedances	0	0
	24	100 [C]	200 [C]	Maximum	34.4	71.3
				Minimum	0.0	0.0
				Mean (January)	7.5	15.5
				Mean (February)	6.0	12.3
				Mean (March)	4.9	9.9
				Mean (Period)	6.1	12.6
				Standard Deviation	5.4	11.1
				# of Exceedances	0	0

Notes:

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 (December 2016) of Air Contaminants Benchmark List: Standards, Guidelines and Screening Levels for Assessing Point of Impingement Concentrations of Air Contaminants, the air standard for NO_X is compared to a monitored NO_X concentration, although the O. Reg. 419/05 Schedule 3 Standard for NO_X is based on health effects of NO_2.
C. NO has no regulatory criteria.

Figure 4-2 Comparison of NO_2, NO_X and SO_2 Ambient Air Quality Monitoring Data to Applicable Criteria at the Stations



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

4.2.1 Sulphur Dioxide (SO_2)

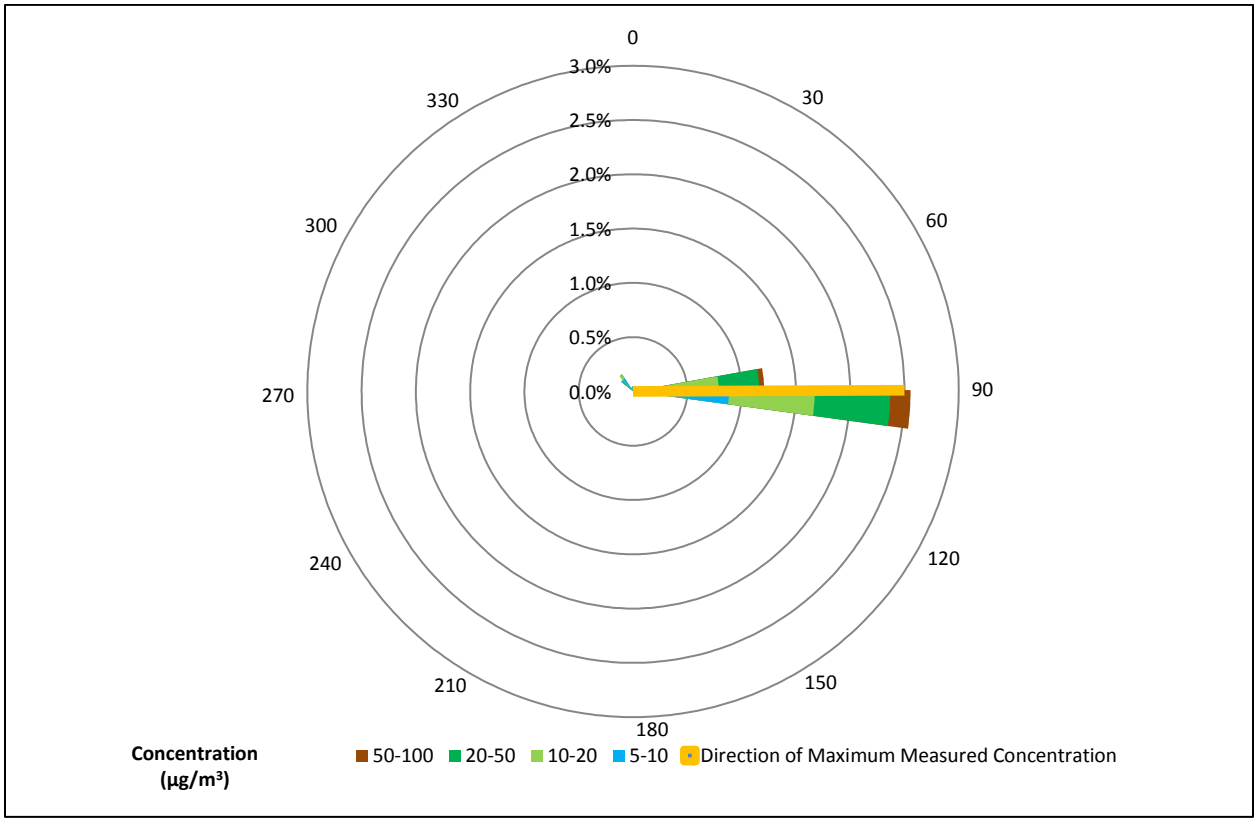
Data summaries are presented in **Appendix A** for sulphur dioxide for each month as well as time history plots of hourly and 24-hour average SO_2 concentrations. For hourly and 24-hour averages, the Ontario AAQCs of 250 ppb and 100 ppb (690 µg/m³ and 275 µg/m³) are shown with blue lines on the respective plot. As shown in these figures, measured ambient SO_2 concentrations at the station were well below the Ontario AAQCs.

The maximum hourly and 24-hour average SO_2 concentrations measured at the Crago Road Station during January to March 2017 were 35.1 and 10.3 ppb (99.6 and 29.0 µg/m³) respectively, which are 14% and 10% of the applicable 1-hour and 24-hour Ontario AAQCs.

A pollution rose of hourly average SO_2 concentrations measured at the Crago 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). Concentrations less than 5 µg/m³, which account for 95% of the measurements, have been removed from the plot to allow the distribution of maximum levels to be more clearly shown in the figure. In this period, the Crago Road Station generally measured higher hourly concentrations for winds blowing from easterly directions.

The maximum hourly average concentration of SO_2 occurred on February 7, 2017 at 11:00, with winds blowing from the east (the direction of the St. Mary's Cement facility). The maximum 24-hour average SO_2 concentration also occurred for winds blowing from the direction of St. Mary's Cement on February 7, 2017.

Figure 4-3 Pollution Rose of Measured Hourly Average SO_2 Concentrations – January to March 2017



4.2.2 Nitrogen Dioxide (NO_2)

Nitrogen oxides (NO_X) are almost entirely made up of nitric oxide (NO) and nitrogen dioxide (NO_2). Together, they are often referred to as NO_X. Most NO_2 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 NO_2 can result in adverse health effects to an exposed population. NO_2 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 NO_2, as health effects are seen at much lower concentrations of NO_2 than NO. In this report, because NO_2 is the regulated form of NO_X, the AAQC were compared to measured NO_2 concentrations. However, as per the current (December 2016) version of the Air Contaminants Benchmark List: Standards, Guidelines and Screening Levels for Assessing Point of Impingement Concentrations of Air Contaminants, the Schedule 3 NO_X criteria were also compared to the monitored NO_X concentrations (see Section 4.2.3 below).

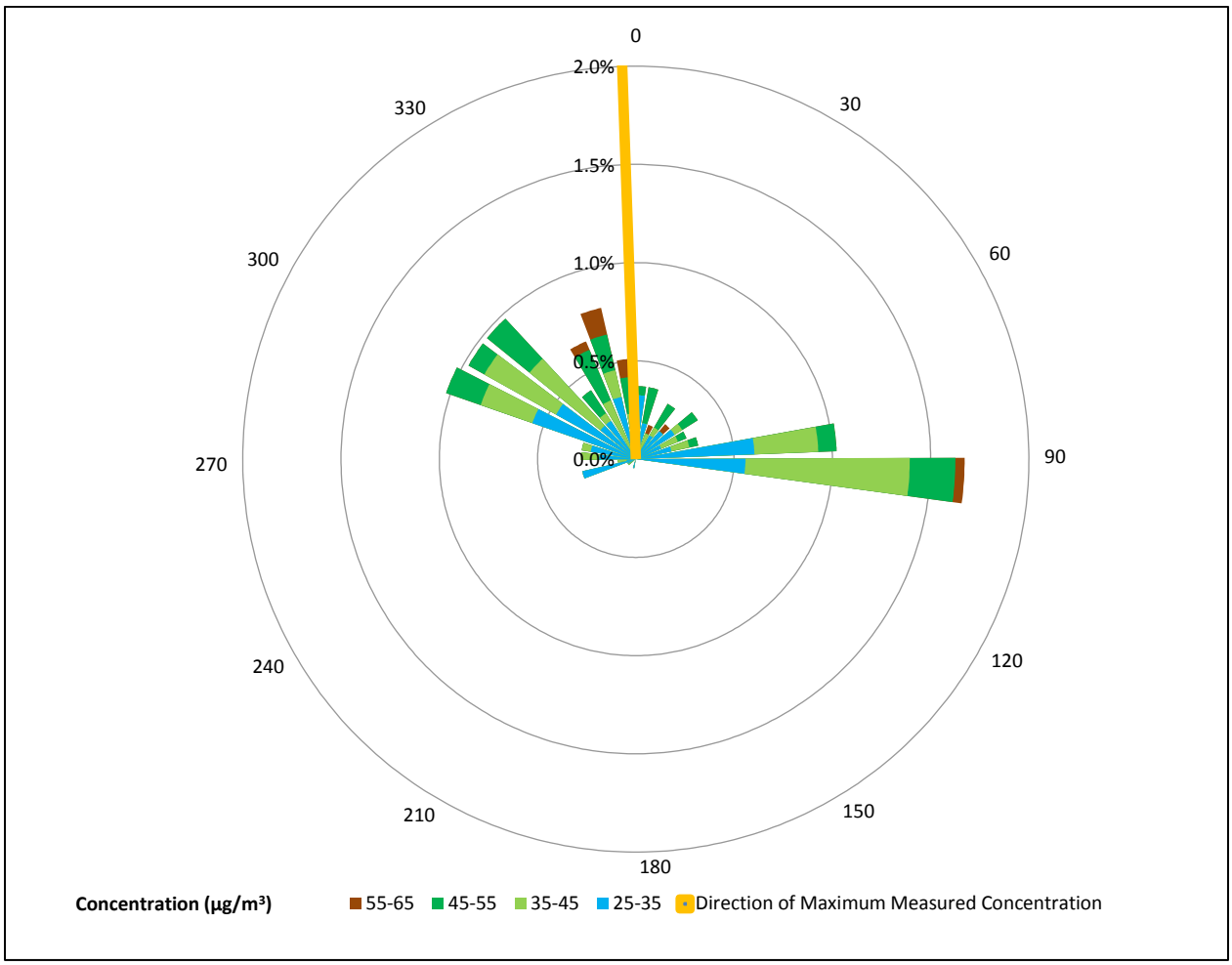
Data summaries are presented in **Appendix B** for nitrogen dioxide for the station for each month as well as time history plots of the hourly and 24-hour average NO_2 concentrations. For the hourly and 24-hour averages, the Ontario AAQCs of 200 ppb and 100 ppb (400 µg/m^3 and 200 µg/m^3) are shown with blue lines on the respective plot. As shown in these figures, measured ambient NO_2 concentrations were well below the Ontario AAQCs.

The maximum measured hourly and 24-hour average concentrations were 30.2 and 20.4 ppb (63.7 and 42.3 µg/m^3), which are 15% and 20% respectively, of the applicable 1-hour and 24-hour Ontario AAQCs.

A pollution rose of measured hourly average NO_2 concentrations is presented in **Figure 4-4**. Concentrations less than 25 µg/m^3, which account for 88% of the measurements, have been removed from the plot to allow the distribution of maximum levels to be more clearly shown in the figure. Higher measured hourly average concentrations generally occurred from the east and northwest.

The highest measured hourly average NO_2 concentration occurred on February 13, 2017 at 21:00. During this hour winds were blowing from the north for which Highway 401 was upwind. The highest 24-hour average concentration occurred when winds were blowing from the northwest on January 17, 2017, for which Highway 401 and Highway 418 construction activities were upwind.

Figure 4-4 Pollution Rose of Measured Hourly Average NO_2 – January to March 2017



4.2.3 Nitrogen Oxides (NO_X)

Data summaries are presented in **Appendix C** for nitrogen oxides for each 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 O. Reg. 419/05 Schedule 3 Standards of 200 ppb and 100 ppb (400 µg/m³ and 200 µg/m³) are shown with blue lines on the respective plot.

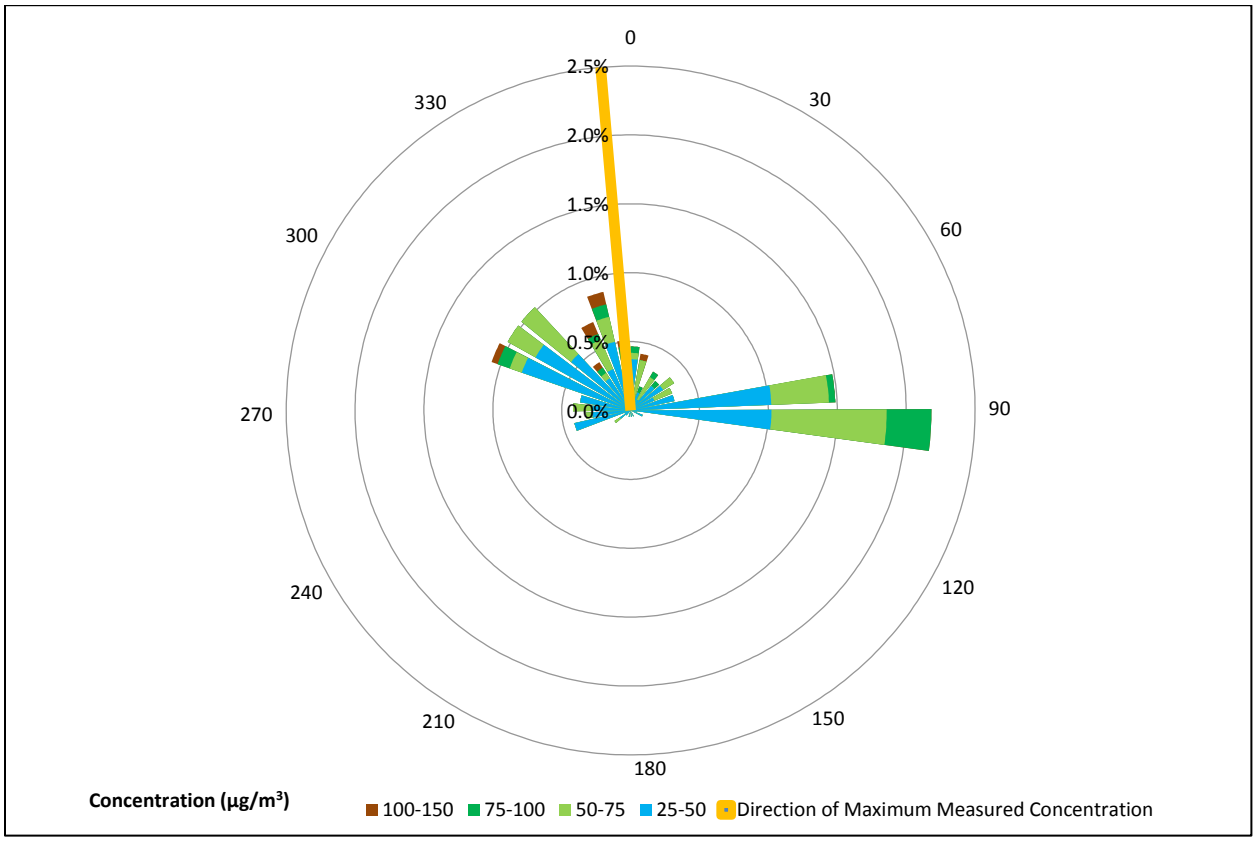
The maximum hourly NO_X concentration measured at the Crago Road Station was 68.4 ppb (141.7 µg/m³), which is 34% of the 1-hour Ontario AAQCs. The maximum 24-hour average NO_X concentration measured at this station was 34.4 ppb (71.3 µg/m³), which is 34% of the applicable 24-hour Ontario AAQCs. See **Table 4-2** for detailed results.

A pollution rose of measured hourly average NO_X concentrations is presented in **Figure 4-5**. Concentrations less than 25 µg/m³, which account for 85% of the measurements, have been removed from the plot to allow the distribution of maximum levels to be more clearly shown. In

Figure 4-5, higher measured hourly average NOx concentrations typically occurred for winds blowing from the north.

The highest measured hourly average NO_x concentration occurred for a wind blowing from the north (from the direction of Highway 401) on January 16, 2017 at 22:00. The maximum 24-hour average NO_x concentration was measured on January 17, 2017 when winds were blowing from the northwest for which Highway 401 and Highway 418 construction activities were upwind.

Figure 4-5 Pollution Rose of Measured Hourly Average NO_x Concentrations – January to March 2017



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

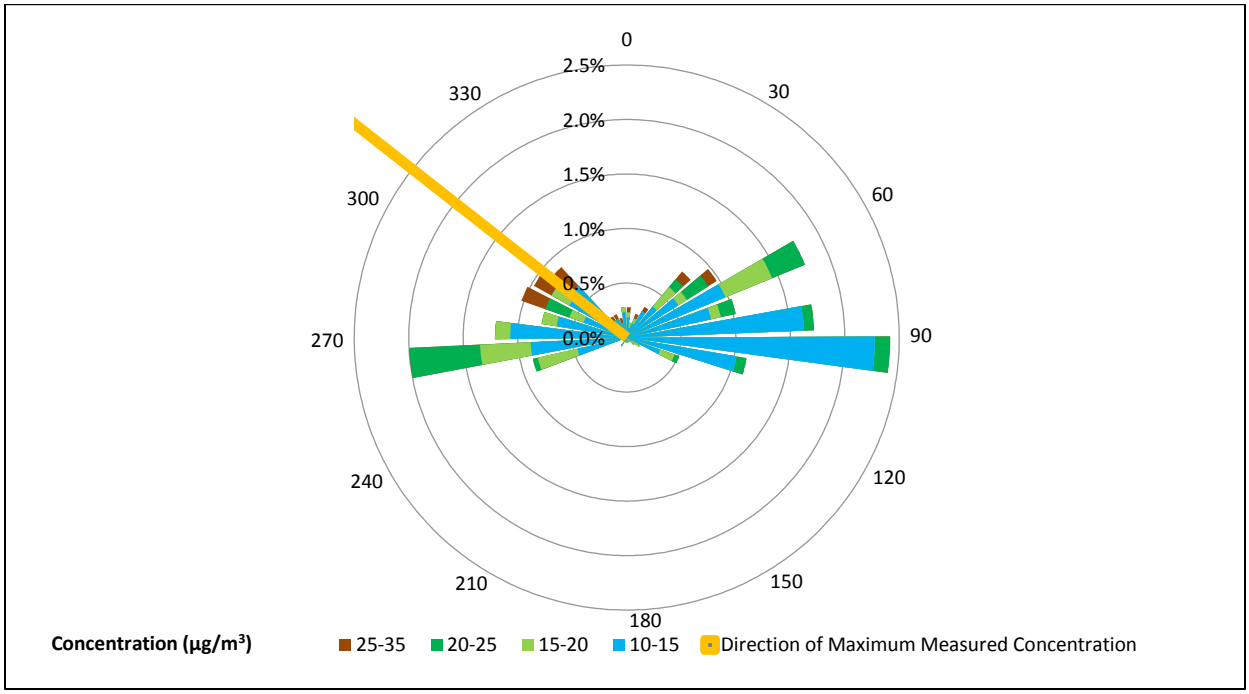
Data summaries and time history plots of measured 24-hour average concentrations are presented in **Appendix D** for $PM_{2.5}$.

The maximum measured 24-hour average $PM_{2.5}$ concentration was 30.4 µg/m^3 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 calendar years to be greater than 28 µg/m^3 whereas the $PM_{2.5}$ measurements in this report consisted of 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 2017 annual report, at which time sufficient data will have been collected to make comparisons.

A pollution rose showing the measured 24-hour average ambient $PM_{2.5}$ concentrations versus direction is shown in **Figure 4-6**. Concentrations less than 10 µg/m^3, which account for 80% of the measurements, have been removed from the plot to allow the distribution of maximum levels to be more clearly shown in the figure. Higher measured concentrations typically occurred from northwesterly directions.

The highest measured 24-hour average $PM_{2.5}$ concentration occurred on January 16, 2017 with winds originating from the northwest with moderate wind speeds. For this wind direction, agricultural fields and local roads were upwind of the Crago Road Station.

Figure 4-6 Pollution Rose of Measured 24-Hour Average $PM_{2.5}$ Concentrations – January to March 2017



4.3 AMBIENT TSP / METALS CONCENTRATIONS

A summary of the maximum and minimum ambient TSP and metals concentrations (for a daily averaging period) are presented in **Table 4-3**. A detailed summary of the concentrations measured for each sample is presented in **Appendix F**.

The maximum measured concentrations of TSP and all metals with MOECC AAQCs were below their applicable 24-hour criteria (shown in **Table 4-3** below).

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

Contaminant	Units	MOECC Standard	HHRA Health Based Criteria	Results		
				Maximum	Minimum	No. of Exceedances
Particulate	µg/m³	120	120	38.28	13.42	0
Total Mercury (Hg)	µg/m³	2	2	7.19E-06	6.54E-06 [A]	0
Aluminum (Al)	µg/m³	4.8	-	1.27E-01	3.51E-02	0
Antimony (Sb)	µg/m³	25	25	3.60E-03 [A]	3.27E-03 [A]	0
Arsenic (As)	µg/m³	0.3	0.3	2.16E-03 [A]	1.96E-03 [A]	0
Barium (Ba)	µg/m³	10	10	1.19E-02	3.30E-03	0
Beryllium (Be)	µg/m³	0.01	0.01	3.60E-04 [A]	3.27E-04 [A]	0
Bismuth (Bi)	µg/m³	-	-	2.16E-03 [A]	1.96E-03 [A]	-
Boron (B)	µg/m³	120	-	2.16E-03 [A]	1.96E-03 [A]	0
Cadmium (Cd)	µg/m³	0.025	0.025	7.19E-04 [A]	6.54E-04 [A]	0
Chromium (Cr)	µg/m³	0.5	-	3.62E-03	1.64E-03 [A]	0
Cobalt (Co)	µg/m³	0.1	0.1	2.01E-03	6.54E-04 [A]	0
Copper (Cu)	µg/m³	50	-	4.27E-02	1.29E-02	0
Iron (Fe)	µg/m³	4	-	4.77E-01	1.13E-01	0
Lead (Pb)	µg/m³	0.5	0.5	3.55E-03	9.87E-04 [A]	0
Magnesium (Mg)	µg/m³	-	-	2.69E-01	4.89E-02	-
Manganese (Mn)	µg/m³	0.4	-	1.38E-02	3.50E-03	0
Molybdenum (Mo)	µg/m³	120	-	1.08E-03 [A]	9.81E-04 [A]	0
Nickel (Ni)	µg/m³	0.2	-	5.39E-03	9.81E-04 [A]	0
Phosphorus (P)	µg/m³	-	-	1.91E-02	8.18E-03 [A]	-
Selenium (Se)	µg/m³	10	10	3.60E-03 [A]	3.27E-03 [A]	0
Silver (Ag)	µg/m³	1	1	1.80E-03 [A]	1.64E-03 [A]	0
Strontium (Sr)	µg/m³	120	-	5.87E-03	1.79E-03	0
Thallium (Tl)	µg/m³	-	-	3.60E-03 [A]	3.27E-03 [A]	-
Tin (Sn)	µg/m³	10	10	3.60E-03 [A]	3.27E-03 [A]	0

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

Contaminant	Units	MOECC Standard	HHRA Health Based Criteria	Results		
				Maximum	Minimum	No. of Exceedances
Titanium (Ti)	µg/m³	120	-	8.19E-03	3.27E-03 [A]	0
Vanadium (V)	µg/m³	2	1	1.80E-03 [A]	1.64E-03 [A]	0
Zinc (Zn)	µg/m³	120	-	4.06E-02	8.68E-03	0
Zirconium (Zr)	µg/m³	20	-	1.80E-03 [A]	1.64E-03 [A]	0
Total Uranium (U)	µg/m³	1.5	-	1.62E-04 [A]	1.47E-04 [A]	0

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

4.4 AMBIENT PAH CONCENTRATIONS

A summary of the maximum and minimum ambient PAH concentrations (for a daily averaging period) are presented in **Table 4-4**. In this summary, both individual PAHs as well as a total PAH concentration are reported. A detailed summary of the concentrations measured for each sample is presented in **Appendix G**.

The maximum measured concentrations of the PAHs with MOECC AAQCs were below their applicable 24-hour criteria, with the exception of the benzo(a)pyrene (B(a)P) measurements collected on January 7, January 31, and February 12, 2017.

B(a)P is a byproduct of a wide variety of natural and man-made combustion processes (including motor vehicles, natural gas, wood, refuse, oil, forest fires, etc.) and is widely present in the environment (including being present in soil and water).

The current Ontario 24-hour B(a)P AAQC was introduced in 2011 and levels above this AAQC are commonly measured throughout Ontario. B(a)P measurement data available from the National Air Pollutant Surveillance (NAPS) network for Ontario in 2013 (for Simcoe, Toronto, and Hamilton), all had maximum levels above the AAQC (varying between 136% -6,220% of the criteria). Available NAPS data for Ontario in 2012 (for Windsor, Toronto, and Hamilton) showed maximum B(a)P levels at these stations that varied between 716% -2,920% of the criteria. In 2011, NAPS data available for seven Ontario stations (Windsor, Toronto, Etobicoke, Hamilton, Simcoe, Pt. Petrie, and Burnt Island) showed exceedances at six of the seven stations, with only the remote Burnt Island Ontario station reporting a maximum level below the MOECC AAQC. In 2010, all of these stations, including the Burnt Island station, measured B(a)P levels above the AAQC.

The three B(a)P samples exceeded the Ontario AAQC by between 32% and 220%. However, the samples were well below the MOECC Schedule 6 Upper Risk Threshold, the MOECC O. Reg. 419/05 24-hour average guideline, and the HHRA health based criteria. Winds were occurring from the northeast or northwest during the time of sampling in each case. Contributors to the measurement may have included agricultural activity, a CN rail, and Highway 401 traffic, all of which are located to the north of the Crago Road Station. The samples at the Rundle Road Station also exceeded the B(a)P AAQC for the same days as the Crago Road Station by between 7% and 210 %. The Courtice WPCP also exceed the B(a)P AAQC on January 7, 2017 by 77%.

Based on the air quality assessments completed during the Environmental Assessment Study and the Environmental Compliance Approval application for the DYEC, the facility will not be a significant contributor of B(a)P. Therefore, ambient B(a)P levels are not expected to be substantially impacted by the operation of the DYEC.

Table 4-4 Summary of Measured Ambient PAH Concentrations

Contaminant	Units	MOECC Standard	HHRA Health Based Criteria	Results		
				Maximum	Minimum	No. of Exceedances
Benzo(a)pyrene	ng/m³	0.05 [A]	1	1.60E-01	1.61E-02	3
		5 [B]				0
		1.1 [C]				0
1-Methylnaphthalene	ng/m³	12,000	-	7.37E+00	1.35E+00	0
2-Methylnaphthalene	ng/m³	10,000	-	1.21E+01	2.12E+00	0
Acenaphthene	ng/m³	-	-	1.38E+00	3.57E-01	-
Acenaphthylene	ng/m³	3500	-	3.06E-01	6.98E-02 [F]	0
Anthracene	ng/m³	200	-	1.15E-01 [F]	6.96E-02 [F]	0
Benzo(a)anthracene	ng/m³	-	-	1.15E-01 [F]	6.96E-02 [F]	-
Benzo(a)fluorene	ng/m³	-	-	2.31E-01 [F]	1.39E-01 [F]	-
Benzo(b)fluoranthene	ng/m³	-	-	1.15E-01 [F]	6.96E-02 [F]	-
Benzo(b)fluorene	ng/m³	-	-	2.31E-01 [F]	1.39E-01 [F]	-
Benzo(e)pyrene	ng/m³	-	-	2.31E-01 [F]	1.39E-01 [F]	-
Benzo(g,h,i)perylene	ng/m³	-	-	1.15E-01 [F]	6.96E-02 [F]	-
Benzo(k)fluoranthene	ng/m³	-	-	1.15E-01 [F]	6.96E-02 [F]	-
Biphenyl	ng/m³	-	-	2.85E+00	6.59E-01	-
Chrysene	ng/m³	-	-	1.15E-01 [F]	6.96E-02 [F]	-
Dibenz(a,h)anthracene [D]	ng/m³	-	-	1.15E-01 [F]	6.96E-02 [F]	-
Dibenzo(a,c)anthracene + Picene	ng/m³	-	-	2.31E-01 [F]	1.39E-01 [F]	-

Table 4-4 Summary of Measured Ambient PAH Concentrations

Contaminant	Units	MOECC Standard	HHRA Health Based Criteria	Results		
				Maximum	Minimum	No. of Exceedances
Fluoranthene	ng/m^3	-	-	7.94E-01	3.55E-01	-
Indeno (1,2,3-cd)pyrene	ng/m^3	-	-	1.15E-01 [F]	6.96E-02 [F]	-
Naphthalene	ng/m^3	22,500	22,500	3.88	9.17	0
o-Terphenyl	ng/m^3	-	-	2.31E-01 [F]	1.39E-01 [F]	-
Perylene	ng/m^3	-	-	2.31E-01 [F]	1.39E-01 [F]	-
Phenanthrene	ng/m^3	-	-	2.96E+00	8.54E-01	-
Pyrene	ng/m^3	-	-	5.72E-01	1.95E-01	-
Tetralin	ng/m^3	-	-	3.57E+00	1.17E+00	-
Total PAH [E]	ng/m^3	-	-	7.15E+01	1.79E+01	-

Notes:

A. Ontario Ambient Air Quality Criteria. The standard for benzo(a)pyrene (B(a)P) is for B(a)P as a surrogate for PAHs.
B. O. Reg. 419/05 Schedule 6 Upper Risk Thresholds.
C. O. Reg. 419/05 24 Hour Guideline
D. Based on laboratory analyses, dibenzo(a,c)anthracene co-elutes with dibenz(a,h)anthracene. Picene elutes after dibenz(a,h)anthracene
E. The reported total PAH is the sum of all analyzed PAH species.
F. Measured concentration was less than the laboratory method detection limit.

4.5 AMBIENT DIOXINS AND FURANS CONCENTRATIONS

A summary of the maximum and minimum ambient dioxins and furans concentrations (for a daily averaging period) are presented in **Table 4-5**. In this summary, both individual dioxin and furan concentrations (pg/m^3) as well as the total toxic equivalency concentration (TEQ) are reported. A detailed summary of the concentrations measured for each sample is presented in **Appendix H.**

The maximum measured toxic equivalent dioxin and furan concentration was below the applicable 24-hour Ontario AAQC of 0.1 pg TEQ/m^3 (as shown in **Table 4-5**).

Table 4-5 Summary of Measured Ambient Dioxins and Furans Concentrations

Contaminant	Units	MOECC Standard	HHRA Health Based Criteria	Results		
				Maximum	Minimum	No. of Exceedances
2,3,7,8-Tetra CDD *	pg/m^3	-	-	5.35E-03 [A]	4.61E-03 [A]	N/A
1,2,3,7,8-Penta CDD	pg/m^3			6.15E-03 [A]	4.86E-03 [A]	
1,2,3,4,7,8-Hexa CDD	pg/m^3			8.61E-03	4.55E-03 [A]	

Table 4-5 Summary of Measured Ambient Dioxins and Furans Concentrations

Contaminant	Units	MOECC Standard	HHRA Health Based Criteria	Results		
				Maximum	Minimum	No. of Exceedances
1,2,3,6,7,8-Hexa CDD	pg/m^3			1.72E-02	4.86E-03 [A]	
1,2,3,7,8,9-Hexa CDD	pg/m^3			2.71E-02	4.40E-03 [A]	
1,2,3,4,6,7,8-Hepta CDD	pg/m^3			1.90E-01	1.52E-02 [A]	
Octa CDD	pg/m^3			3.91E-01	1.18E-01	
Total Tetra CDD	pg/m^3			2.91E-02	4.61E-03 [A]	
Total Penta CDD	pg/m^3			2.18E-02	4.86E-03 [A]	
Total Hexa CDD	pg/m^3			1.81E-01	9.11E-03 [A]	
Total Hepta CDD	pg/m^3			4.21E-01	3.76E-02	
2,3,7,8-Tetra CDF **	pg/m^3			1.29E-02	4.86E-03 [A]	
1,2,3,7,8-Penta CDF	pg/m^3			5.49E-03 [A]	4.46E-03 [A]	
2,3,4,7,8-Penta CDF	pg/m^3			5.63E-03 [A]	4.61E-03 [A]	
1,2,3,4,7,8-Hexa CDF	pg/m^3			4.65E-03 [A]	4.55E-03 [A]	
1,2,3,6,7,8-Hexa CDF	pg/m^3			4.62E-03 [A]	4.51E-03 [A]	
2,3,4,6,7,8-Hexa CDF	pg/m^3			4.93E-03 [A]	4.77E-03 [A]	
1,2,3,7,8,9-Hexa CDF	pg/m^3			5.38E-03 [A]	4.91E-03 [A]	
1,2,3,4,6,7,8-Hepta CDF	pg/m^3			1.68E-02	9.86E-03	
1,2,3,4,7,8,9-Hepta CDF	pg/m^3			5.69E-03 [A]	4.34E-03 [A]	
Octa CDF	pg/m^3			1.66E-02	5.46E-03 [A]	
Total Tetra CDF	pg/m^3			1.29E-02	4.86E-03 [A]	
Total Penta CDF	pg/m^3			1.26E-02	4.70E-03 [A]	
Total Hexa CDF	pg/m^3			6.45E-03 [A]	4.70E-03 [A]	
Total Hepta CDF	pg/m^3			1.68E-02	9.86E-03	
TOTAL TOXIC EQUIVALENCY [B]	pg TEQ/m^3	0.1	-	2.30E-02	1.55E-02	0
		1 [C]				0

Notes:

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

B. Total Toxicity Equivalent (TEQ) concentration contributed by all dioxins, furans and dioxin-like PCBs calculated as per O. Reg. 419/05 methodology using corresponding WHO_{2005} toxic equivalency factors (TEFs) and a value of half the minimum detection limit (MDL) substituted for concentrations less than the MDL.

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

* CDD - Chloro Dibenzo-p-Dioxin, ** CDF - Chloro Dibenzo-p-Furan

4.6 REVIEW OF MTO MONITORING FOR THE PREVIOUS QUARTER

The Ministry of Transportation Ontario (MTO) installed an ambient air monitoring station at 1939 Highway 2, Courtice, Ontario that has been operating since March 4, 2016. This sampling is being conducted as a condition of the Environmental Assessment (EA) notice of approval for the Highway 407 East Phase 2 construction project. The MTO Station is located approximately 4.5 km north-northwest of the Crago Road Station and 4.4 km north of the DYEC. The station measures PM_{10}, $PM_{2.5}$ and NOx. NOx is measured using a chemiluminescence monitor which uses a similar principle of operation to the Crago monitor, while PM_{10} and $PM_{2.5}$ are measured using Beta Attenuation Monitors (BAMs). The Crago Road Station measures $PM_{2.5}$ with a monitor based on light scattering photometry with beta attenuation, which is believed to more accurately measure the aerosol fraction of $PM_{2.5}$ relative to a BAM (which typically underestimates the aerosol fraction).

The Crago Road monitoring station is located to capture neighbourhood scales of representativeness (100's of metres to about 4 km). Given the distance between the MTO Station and the DYEC, the Crago Road Station would not generally be expected to be representative of ambient air quality levels in the vicinity of the MTO Station – the Crago Road monitoring station is influenced by local sources including agricultural fields, Highway 401, St. Mary's Cement, the Courtice WPCP and CN/CP rail lines, as well as the DYEC. The MTO Station is more distant from these sources and therefore is less influenced than the Crago Road Station. The MTO quarterly reports issued for the monitoring (RWDI, 2016a, b; RWDI, 2017) do not discuss the scale of representativeness that the MTO Station was situated for, but it is expected to be similar or less than that of the Crago Road Station - therefore the MTO Station measurements would not typically be representative of air quality near the DYEC.

At the time of preparation of this quarterly report, the most recent MTO Station data available was for October to December 2016 (Q4 2016). The following discussion compares the MTO Q4 2016 data (RWDI, 2017) to the measurements at the Crago Road Station for the same period:

- The maximum measured 1-hour and 24-hour NO_2 concentrations at the MTO Station in Q4 2016 were 30 ppb and 18 ppb, respectively. The maximum measured hourly and daily average NO_2 concentrations at Crago Road in Q4 were similar to the MTO Station (maximum hourly average NO_2 Concentration 31.4 ppb and maximum daily average concentrations of 18.5 ppb).
- The maximum 24-hour average $PM_{2.5}$ concentration measured at the MTO Station in Q4 2016 was 22 $\mu g/m^3$ while the maximum at the Crago Road Station was 96 $\mu g/m^3$.
- The maximum measured 24-hour average PM_{10} concentration at the MTO Station in Q4 2016 was 30 $\mu g/m^3$. The Crago Road Station does not measure PM_{10} and the MTO measurements are not comparable to the DYEC monitoring data.

The ability to compare and draw conclusions between the DYEC and MTO Station data is limited since the MTO reports do not include information on the timing and type of construction occurring in proximity to the MTO Station, which would likely have influenced measured concentrations differently relative to the construction activities observed near the DYEC.

5.0 CONCLUSIONS

This quarterly report provides a summary of the ambient air quality data collected at the Crago Road monitoring station for the period January to March 2017.

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

1. Measured levels of NO_2, SO_2 and $PM_{2.5}$ were below the applicable O. Reg. 419/05 Standards or human health risk assessment (HHRA) health-based criteria 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. The maximum measured concentrations of TSP and all metals with Ministry of Environment and Climate Change (MOECC) air quality Standards were well below their applicable Standards (as presented in **Table 2-2** in this report).
4. The maximum measured concentrations of PAHs with MOECC air quality Standards were well below their applicable criteria shown in **Table 2-3**, with the exception of 24-hour benzo(a)pyrene (B(a)P) concentrations in three (3) samples which exceeded the applicable Ontario Ambient Air Quality Criteria (AAQC) by between 32% and 220%. The current Ontario 24-hour B(a)P AAQC was introduced in 2011 and levels above this AAQC are commonly measured throughout Ontario. The measurements were however, well below the MOECC Schedule 6 Upper Risk Threshold, the MOECC O. Reg. 419/05 24-hour average guideline, and the HHRA health based criterion.
5. The maximum measured toxic equivalent dioxin and furan concentration was below the applicable Standards presented in **Table 2-3**.

In summary, the measured concentrations of the air contaminants monitored were below their applicable MOECC Standards during the monitoring period between January and March 2017, with the exception of three (3) benzo(a)pyrene samples. All measured levels of the monitored contaminants were below their applicable HHRA health-based criteria.

6.0 REFERENCES

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APPENDIX A SO_2 DATA SUMMARIES AND TIME HISTORY PLOTS

SO_2 - Crago Road
January 2017
ppb

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>250	Days>100
1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.6	0.6	0.4	0.4	0.6	0.3	0.1	0.4	0.5	0.3	24	0.6	0.1	0.2	0	0
2	0.3	0.4	0.3	0.4	0.6	0.4	0.2	0.1	0.1	0.3	3.7	2.9	1.1	9.3	10.8	7.1	11.3	9.3	5.1	1.6	1.0	0.7	0.6	0.4	24	11.3	0.1	2.8	0	0
3	0.4	0.4	0.4	2.3	3.7	2.0	1.5	0.5	0.5	0.5	0.4	0.4	0.5	0.4	1.1	1.1	0.9	0.5	0.6	0.6	0.4	0.4	0.4	0.4	24	3.7	0.4	0.9	0	0
4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.2	0.3	0.4	0.2	0.2	0.2	24	0.4	0.2	0.3	0	0
5	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	24	0.2	0.1	0.1	0	0
6	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.4	0.3	0.2	0.2	0.4	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	24	0.4	0.0	0.1	0	0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	24	0.2	0.0	0.1	0	0
8	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.6	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.6	0.0	0.1	0	0
9	0.0	0.0	0.0	0.1	0.3	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	24	0.4	0.0	0.2	0	0
10	0.4	0.4	0.5	0.4	0.3	0.5	0.4	0.4	0.4	0.5	0.5	0.5	0.3	0.3	0.2	0.3	0.2	0.1	0.2	0.3	0.4	0.3	0.4	0.3	24	0.5	0.1	0.4	0	0
11	0.3	0.3	0.3	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.3	0.3	0.3	0.3	24	0.3	0.1	0.2	0	0
12	0.3	0.3	0.2	0.3	0.4	0.4	0.4	0.3	0.1	0.2	0.3	0.2	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	24	0.4	0.0	0.2	0	0
13	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.1	0.0	0.0	0	0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	4.2	1.4	0.8	0.9	0.3	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.2	24	4.2	0.0	0.4	0	0
15	0.3	0.2	0.3	0.3	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	24	0.3	0.0	0.1	0	0
16	0.2	0.2	0.1	0.2	0.4	0.4	0.4	0.6	0.7	0.7	0.5	0.5	0.8	0.9	0.6	0.8	0.6	0.4	0.4	0.4	0.5	0.8	1.1	1.0	24	1.1	0.1	0.6	0	0
17	1.0	0.9	0.8	0.7	0.9	0.7	1.3	4.6	5.9	8.8	8.1	4.7	1.2	3.7	3.8	4.0	6.7	3.5	1.0	0.7	0.6	0.4	0.4	0.4	24	8.8	0.4	2.7	0	0
18	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.3	0.2	0.1	0.3	0.3	0.2	0.2	0.2	0.3	0.1	0.1	0.2	0.2	0.2	24	0.4	0.1	0.3	0	0
19	0.2	0.2	0.1	0.2	0.3	0.2	0.2	0.1	0.1	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.1	0.1	0.1	0.1	0.2	24	0.3	0.0	0.2	0	0
20	0.2	0.2	0.2	0.2	0.1	0.3	0.3	0.2	0.1	0.1	0.4	1.0	0.4	0.7	2.6	0.4	3.1	7.7	5.9	2.3	1.1	1.0	1.2	0.7	24	7.7	0.1	1.3	0	0
21	0.6	0.6	0.4	0.5	0.4	0.4	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.5	0.4	0.4	0.4	0.7	0.5	0.4	0.3	0.2	24	0.7	0.2	0.5	0	0
22	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.5	0.3	0.2	0.2	0.2	0.3	0.2	24	0.5	0.2	0.3	0	0
23	0.2	0.2	0.1	0.2	0.2	0.1	0.3	0.1	0.1	0.1	0.1	1.2	3.0	5.8	6.3	4.9	1.2	0.6	0.5	0.4	0.4	0.3	0.3	0.2	24	6.3	0.1	1.1	0	0
24	0.2	0.2	0.3	0.2	0.1	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.2	0.2	C	C	C	0.6	0.7	0.6	0.6	0.6	0.8	21	0.8	0.1	0.4	0	0
25	0.7	0.6	0.5	0.6	0.7	0.8	0.9	0.7	0.9	0.7	0.8	0.7	0.6	0.7	0.7	0.7	0.6	0.7	0.7	0.6	0.6	0.6	0.6	0.7	24	0.9	0.5	0.7	0	0
26	0.6	0.7	0.7	0.7	0.6	0.8	0.7	0.7	0.6	0.6	0.7	0.6	0.6	0.7	0.8	1.5	0.7	0.7	0.6	0.5	0.4	0.4	0.4	0.4	24	1.5	0.4	0.7	0	0
27	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.2	0.3	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.3	24	0.5	0.2	0.4	0	0
28	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.3	0.4	0.5	0.4	0.4	0.4	24	0.5	0.3	0.4	0	0
29	0.3	0.4	0.4	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.2	0.2	0.1	0.2	0.5	24	0.5	0.1	0.2	0	0
30	0.7	0.5	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.2	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	24	0.7	0.1	0.2	0	0
31	0.1	0.2	0.3	0.4	0.2	0.3	0.2	0.2	0.2	0.3	0.5	0.4	0.4	0.4	0.2	0.3	0.2	0.2	0.2	0.1	0.2	0.2	0.1	0.2	24	0.5	0.1	0.3	0	0
Count	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	30	30	31	31	31	31	31	31	741					
Maximum	1.0	0.9	0.8	2.3	3.7	2.0	1.5	4.6	5.9	8.8	8.1	4.7	3.0	9.3	10.8	7.1	11.3	9.3	5.9	2.3	1.1	1.0	1.2	1.0	24					
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21					
Averaage	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.5	0.6	0.7	0.7	0.5	0.9	1.0	0.9	1.0	0.9	0.6	0.4	0.3	0.3	0.3	0.3						

Percentiles	10	20	30	40	50	60	70	80	90	95	99	100
Data	0.1	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.7	1.2	6.9	11.3

Maximum Hourly	11.3
Maximum Daily	2.8
Monthly Average	0.5

Notes C - Calibration / Span Cycle; NA - No Data Available; T - Test; A- MOE Audit; M - Equipment Malfunction / Down; R - Rate of Change

SO_2 - Crago Road
February 2017
ppb

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>250	Days>100
1	0.2	0.1	0.1	0.1	0.2	0.4	0.2	0.2	0.1	0.3	0.4	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.3	0.1	0.2	0.1	0.1	0.1	24	0.4	0.1	0.2	0	0
2	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	24	0.1	0.0	0.1	0	0
3	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	24	0.2	0.0	0.1	0	0
4	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.4	0.4	24	0.4	0.0	0.1	0	0
5	0.4	0.4	0.3	0.3	0.4	0.4	0.6	0.7	0.5	0.5	0.6	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.1	0.1	0.1	0.1	0.0	0.3	24	0.7	0.0	0.4	0	0
6	0.6	0.4	0.4	0.4	0.3	0.1	0.2	0.3	0.2	0.4	0.3	0.5	0.5	0.4	0.4	0.2	0.5	0.5	0.4	0.4	0.6	0.4	0.4	0.3	24	0.6	0.1	0.4	0	0
7	0.2	0.1	0.2	0.5	10.5	17.1	22.2	10.6	1.7	8.1	24.9	35.1	23.6	21.0	10.9	9.4	4.5	4.1	9.2	14.6	9.8	3.1	1.6	1.4	24	35.1	0.1	10.2	0	0
8	1.1	0.8	0.7	0.6	0.6	0.5	0.4	0.4	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	24	1.1	0.1	0.3	0	0
9	0.1	0.3	0.5	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.4	0.4	0.5	0.1	0.1	0.1	0.1	0.1	0.0	24	0.5	0.0	0.2	0	0
10	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.3	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.3	0.4	24	0.4	0.0	0.1	0	0
11	0.3	0.4	0.6	0.5	0.4	0.7	1.0	0.7	0.8	0.7	0.6	0.4	0.6	0.4	0.4	0.4	0.4	0.3	0.2	0.1	0.1	0.2	0.3	0.4	24	1.0	0.1	0.5	0	0
12	0.2	0.2	1.1	1.7	0.9	0.2	0.3	0.3	0.3	0.2	0.2	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.2	0.2	0.1	24	1.7	0.1	0.4	0	0
13	0.1	0.4	1.1	0.9	1.1	0.9	0.1	0.1	1.3	2.3	1.9	0.7	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.2	0.1	0.1	24	2.3	0.1	0.5	0	0
14	0.2	0.1	0.1	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.6	0.6	0.6	0.6	0.5	0.7	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4	24	0.7	0.1	0.4	0	0
15	0.4	0.4	0.4	0.5	0.4	0.3	0.2	0.4	0.5	0.4	0.3	0.3	0.4	0.4	0.4	0.4	1.0	0.9	1.0	0.7	0.4	0.6	0.7	0.3	24	1.0	0.2	0.5	0	0
16	0.1	0.1	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.4	0.8	1.2	0.5	0.3	0.4	24	1.2	0.1	0.2	0	0
17	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.1	0.2	0.3	0.3	0.3	0.2	0.1	0.3	0.2	0.3	0.3	24	0.4	0.1	0.2	0	0
18	1.4	0.4	0.2	0.2	0.2	0.2	0.2	0.3	0.5	0.5	0.7	0.7	0.7	0.7	0.6	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.3	24	1.4	0.2	0.5	0	0
19	0.2	0.3	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.2	0.3	0.4	0.3	0.3	0.3	0.1	0.3	0.4	0.4	0.3	0.2	0.1	0.1	0.1	24	0.4	0.1	0.2	0	0
20	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.1	0.0	0.0	0	0
21	0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.1	0.2	0.1	0.1	0.3	0.3	0.3	0.3	0.3	24	0.3	0.0	0.1	0	0
22	0.4	0.3	0.5	0.5	0.4	0.5	C	C	C	0.9	0.8	0.8	0.7	0.7	0.7	0.6	0.7	0.8	0.7	0.8	0.7	0.8	0.7	0.2	21	0.9	0.2	0.6	0	0
23	0.9	0.8	0.8	0.7	0.8	0.8	0.8	0.8	0.6	0.8	0.7	0.9	0.9	0.7	0.8	0.7	0.7	0.6	0.5	0.6	0.6	0.6	0.6	0.7	24	0.9	0.5	0.7	0	0
24	1.0	0.6	0.7	0.7	0.5	0.5	0.4	0.4	0.6	0.5	0.4	0.4	0.5	0.5	0.6	0.6	0.5	0.6	0.6	0.5	0.4	0.5	0.5	0.6	24	1.0	0.4	0.5	0	0
25	0.6	0.7	0.7	0.6	0.6	0.7	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.6	0.6	0.4	0.3	0.4	0.4	0.4	0.4	0.4	24	0.7	0.3	0.5	0	0
26	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.3	0.0	0.0	1.0	0.1	0.3	0.4	0.2	0.3	0.3	0.4	24	1.0	0.0	0.3	0	0
27	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.6	0.6	0.6	0.6	0.6	0.7	0.5	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.1	24	0.7	0.1	0.4	0	0
28	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.3	0.3	0.3	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	24	0.5	0.1	0.3	0	0
29																									0					
30																									0					
31																									0					
Count	28	28	28	28	28	28	27	27	27	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	669					
Maximum	1.4	0.8	1.1	1.7	10.5	17.1	22.2	10.6	1.7	8.1	24.9	35.1	23.6	21.0	10.9	9.4	4.5	4.1	9.2	14.6	9.8	3.1	1.6	1.4	24					
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	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0					
Averaage	0.4	0.3	0.4	0.4	0.7	0.9	1.1	0.7	0.4	0.7	1.3	1.6	1.2	1.1	0.7	0.6	0.5	0.5	0.6	0.8	0.7	0.4	0.3	0.3						

Percentiles	10	20	30	40	50	60	70	80	90	95	99	100
Data	0.1	0.1	0.1	0.2	0.3	0.4	0.4	0.6	0.7	1.0	12.1	35.1

Maximum Hourly	35.1
Maximum Daily	10.2
Monthly Average	0.7

Notes C - Calibration / Span Cycle NA - No Data Available T - Test A- MOE Audit M - Equipment Malfunction / Down R - Rate of Change

SO_2 - Crago Road March 2017

ppb

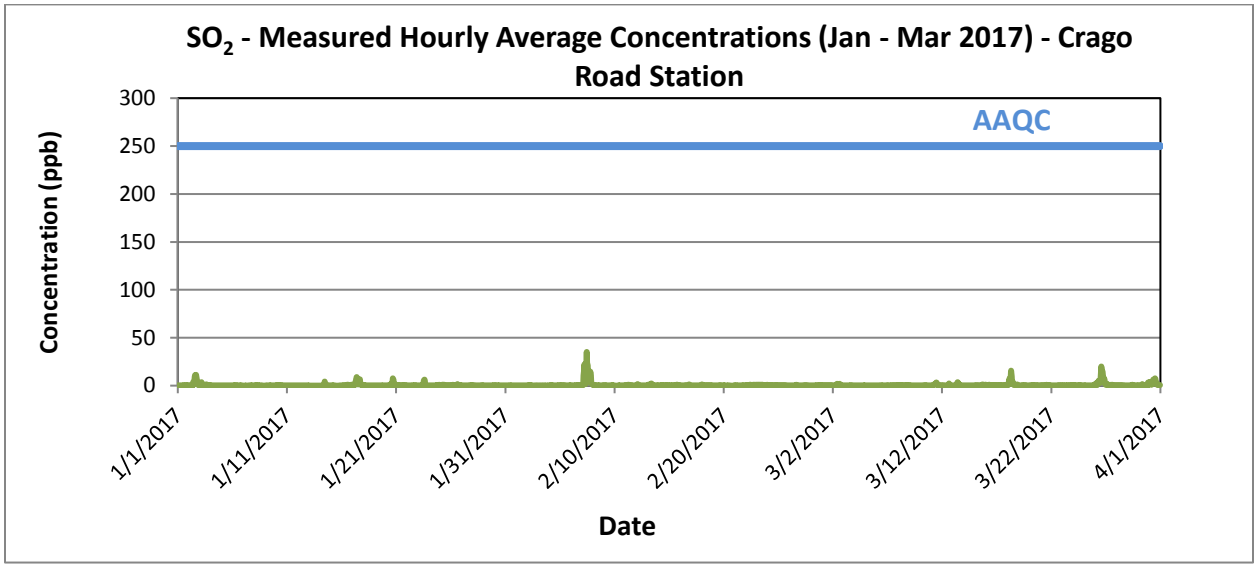
Day	Hour 0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Count	Maximum	Minimum	Average	Hrs>250	Days>100
1	0.5	0.5	0.5	0.5	0.7	0.7	0.6	0.6	0.7	0.7	0.6	0.6	0.6	0.6	0.7	0.6	0.7	0.6	0.6	0.7	0.6	0.6	0.6	0.4	24	0.7	0.4	0.6	0	0
2	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.6	1.9	1.5	1.0	1.1	1.2	1.6	1.9	1.2	0.6	0.4	0.3	0.2	0.3	0.2	0.3	24	1.9	0.2	0.7	0	0
3	0.2	0.1	0.1	0.1	0.2	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.6	0.3	0.2	0.2	0.2	0.2	0.2	24	0.6	0.1	0.3	0	0
4	0.1	0.1	0.2	0.2	0.1	0.3	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	24	0.3	0.1	0.2	0	0
5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.3	0.2	24	0.3	0.1	0.2	0	0
6	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.3	0.4	24	0.4	0.3	0.4	0	0
7	0.5	0.4	0.4	0.4	0.3	0.3	0.2	0.4	0.4	0.4	0.5	0.7	0.4	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.4	24	0.7	0.2	0.4	0	0
8	0.6	0.4	0.3	0.4	0.5	0.5	0.4	0.6	0.4	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.5	0.5	0.4	0.4	0.5	0.4	0.4	0.5	24	0.6	0.3	0.5	0	0
9	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	24	0.4	0.2	0.4	0	0
10	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.2	0.2	0.4	0.2	0.3	24	0.5	0.2	0.4	0	0
11	0.4	0.3	0.2	0.4	0.3	0.5	1.0	1.4	2.0	1.9	1.4	3.3	3.4	1.6	1.0	0.7	0.8	0.4	0.3	0.3	0.2	0.2	0.1	0.1	24	3.4	0.1	0.9	0	0
12	0.2	0.3	0.5	0.3	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.4	0.4	0.5	2.2	1.5	0.4	0.2	0.2	0.2	0.2	0.1	0.2	24	2.2	0.1	0.4	0	0
13	0.3	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.2	2.1	3.6	1.1	2.1	1.5	1.1	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.1	0.3	24	3.6	0.1	0.7	0	0
14	0.4	0.4	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	24	0.4	0.2	0.4	0	0
15	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.4	C	C	0.4	0.6	0.5	0.5	0.7	1.4	1.0	0.7	0.7	0.7	0.9	0.9	22	1.4	0.4	0.6	0	0
16	0.7	0.9	0.7	0.6	0.7	0.7	0.6	0.8	0.9	0.6	0.6	0.7	0.7	0.5	0.4	0.5	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	24	0.9	0.4	0.6	0	0
17	0.4	0.4	0.4	0.4	0.4	0.6	0.7	0.7	0.3	0.4	0.5	0.5	0.5	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	24	0.7	0.3	0.5	0	0
18	0.4	0.4	0.9	3.9	7.1	3.6	7.7	9.9	15.5	9.6	2.3	3.0	3.6	1.2	0.7	0.7	0.6	0.6	0.4	0.6	0.5	1.1	0.4	0.4	24	15.5	0.4	3.1	0	0
19	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.7	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.3	24	0.7	0.3	0.4	0	0
20	0.4	0.4	0.4	0.4	0.6	0.6	0.6	0.5	0.4	0.5	0.6	0.7	0.7	0.7	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	24	0.7	0.3	0.5	0	0
21	0.4	0.5	0.5	0.7	0.7	0.6	0.6	0.7	0.7	0.7	0.7	0.6	0.7	0.8	0.7	0.6	0.4	0.4	0.4	0.4	0.6	0.5	0.4	0.4	24	0.8	0.4	0.6	0	0
22	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.3	0.4	0.3	0.4	0.4	0.2	0.3	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	24	0.5	0.2	0.3	0	0
23	0.3	0.3	0.2	0.3	0.4	0.5	0.4	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.5	0.6	0.6	0.6	0.4	0.4	0.4	0.4	0.5	0.4	24	0.6	0.2	0.4	0	0
24	0.4	0.4	0.5	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.5	0.4	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4	24	0.6	0.3	0.4	0	0
25	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.2	0.3	0.3	0.3	0.4	0.3	0.2	0.1	0.3	0.3	0.3	0.1	0.3	0.4	0.3	0.7	0.7	24	0.7	0.1	0.3	0	0
26	1.3	1.7	2.3	1.0	0.5	0.5	3.2	2.7	4.8	3.8	3.2	3.0	4.0	8.3	20.1	15.7	15.3	14.4	6.9	5.0	7.8	6.3	2.5	1.3	24	20.1	0.5	5.6	0	0
27	1.0	0.7	0.9	1.9	1.0	0.9	0.7	0.7	0.7	0.6	0.7	0.7	0.8	0.7	0.7	0.8	0.7	0.6	0.6	0.7	0.7	0.6	0.6	0.6	24	1.9	0.6	0.8	0	0
28	0.6	0.6	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	24	0.6	0.3	0.4	0	0
29	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.6	0.9	0.4	0.4	0.4	0.3	0.4	0.3	0.2	0.3	0.3	0.4	0.4	0.4	0.3	24	0.9	0.2	0.4	0	0
30	0.2	0.2	0.3	0.4	0.3	0.2	0.4	0.6	1.5	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.4	3.3	2.1	2.7	24	3.3	0.2	0.7	0	0
31	2.2	3.8	1.9	1.0	1.2	1.3	1.2	3.2	6.4	2.4	4.8	5.9	7.7	6.8	4.7	3.3	1.5	1.1	0.7	0.7	0.7	0.7	0.7	0.6	24	7.7	0.6	2.7	0	0
Count	31	31	31	31	31	31	31	31	31	31	30	30	31	31	31	31	31	31	31	31	31	31	31	31	742					
Maximum	2.2	3.8	2.3	3.9	7.1	3.6	7.7	9.9	15.5	9.6	4.8	5.9	7.7	8.3	20.1	15.7	15.3	14.4	6.9	5.0	7.8	6.3	2.5	2.7	24					
Minimum	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	22					
Averaage	0.5	0.5	0.5	0.6	0.7	0.6	0.8	0.9	1.3	1.0	0.9	0.9	1.1	1.0	1.3	1.1	1.0	0.9	0.6	0.5	0.6	0.7	0.5	0.5						

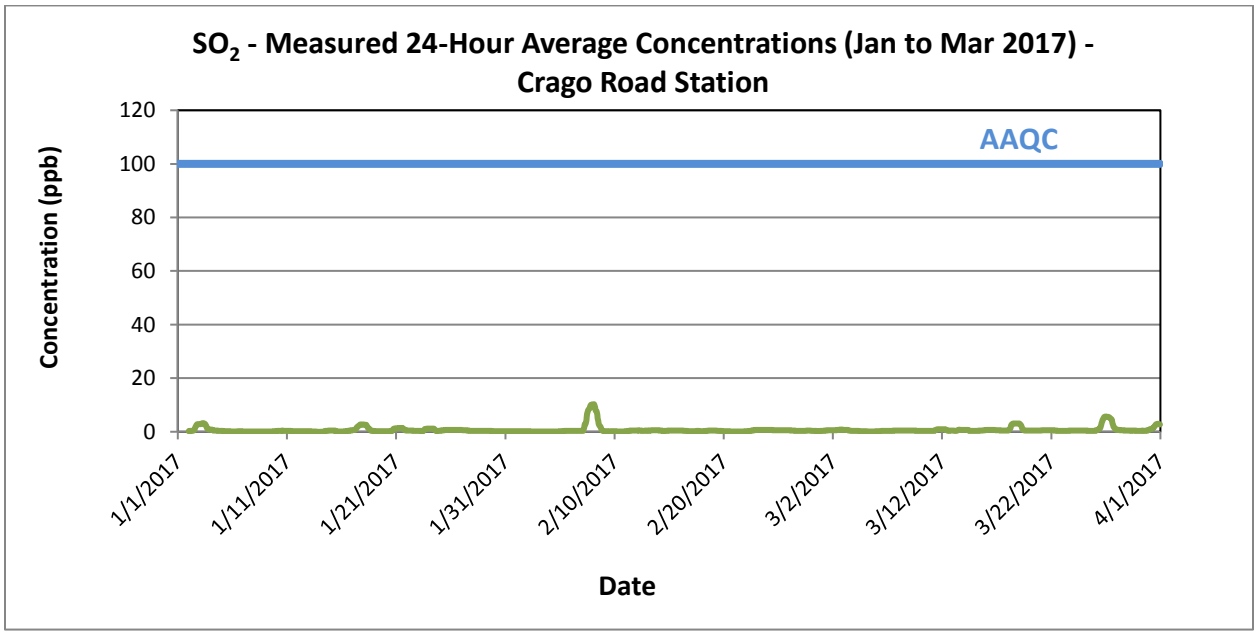
Percentiles	10	20	30	40	50	60	70	80	90	95	99	100
Data	0.2	0.3	0.4	0.4	0.4	0.4	0.5	0.7	1.1	2.7	8.1	20.1

Maximum Hourly	20.1
Maximum Daily	5.6
Monthly Average	0.8

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 SO_2 Concentrations– Crago Road Station





APPENDIX B NO_2 DATA SUMMARIES AND TIME HISTORY PLOTS

NO_2 - Crago Road
January 2017
ppb

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>200	Days>100
1	2.4	2.4	1.7	2.7	3.1	4.3	4.8	4.0	3.0	2.2	2.6	1.8	0.7	0.6	0.8	1.6	1.7	2.0	2.4	0.9	0.4	1.4	2.6	5.0	24	5.0	0.4	2.3	0	0
2	5.0	5.2	5.8	7.5	6.1	5.1	5.4	2.1	1.8	2.3	10.6	6.9	3.1	17.1	18.3	12.6	17.2	15.3	10.5	3.3	2.5	2.1	2.0	1.3	24	18.3	1.3	7.0	0	0
3	1.5	0.8	1.1	10.3	17.3	10.3	8.2	2.6	1.3	1.5	2.6	1.9	2.7	3.8	11.1	12.4	10.0	6.9	9.4	6.3	4.6	4.7	3.7	7.6	24	17.3	0.8	5.9	0	0
4	4.8	5.7	4.8	6.7	10.9	10.7	7.8	2.5	3.7	5.1	2.5	1.5	1.5	1.8	1.5	0.6	2.2	1.2	0.9	1.5	1.0	0.5	0.4	0.0	24	10.9	0.0	3.3	0	0
5	0.3	0.0	0.1	0.0	0.0	0.0	0.4	2.2	2.5	2.8	2.9	3.5	2.8	2.8	3.1	3.9	3.2	4.1	2.7	3.1	4.3	5.8	4.6	8.1	24	8.1	0.0	2.6	0	0
6	9.2	6.4	6.0	5.4	8.1	6.6	8.0	11.5	12.9	12.4	7.6	5.2	7.5	6.9	6.5	9.7	5.9	5.8	6.3	7.1	8.2	9.3	11.1	10.0	24	12.9	5.2	8.1	0	0
7	9.5	15.0	16.2	16.8	12.5	12.1	10.7	9.5	7.6	6.4	6.6	12.6	6.0	3.0	2.4	3.8	5.6	3.5	1.7	4.2	7.3	5.4	5.0	7.0	24	16.8	1.7	7.9	0	0
8	8.8	8.1	8.8	6.6	2.2	1.5	0.7	1.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	4.3	8.7	15.4	14.0	9.1	11.1	24	15.4	0.0	4.2	0	0
9	13.5	10.6	10.5	10.6	12.2	10.4	8.9	1.2	0.0	0.0	0.9	0.8	1.2	1.1	2.1	3.0	3.6	3.8	7.4	20.3	17.8	18.5	16.2	2.6	24	20.3	0.0	7.4	0	0
10	2.5	2.5	2.9	3.0	3.1	2.2	2.9	1.8	1.7	1.7	1.8	3.2	2.0	2.3	2.1	3.0	2.5	2.5	2.1	4.7	2.5	3.6	2.8	1.0	24	4.7	1.0	2.5	0	0
11	0.8	0.2	1.0	0.9	1.1	1.4	1.4	3.9	3.6	3.6	2.7	1.1	1.3	1.9	1.7	3.0	1.9	18.0	9.1	7.5	4.2	2.0	1.5	3.7	24	18.0	0.2	3.2	0	0
12	2.0	4.4	5.5	5.2	3.9	1.8	6.2	6.7	5.2	4.2	3.3	3.3	4.1	4.4	5.2	3.5	1.9	2.5	2.5	2.2	3.3	4.6	5.8	3.2	24	6.7	1.8	3.9	0	0
13	2.2	3.0	1.0	0.3	0.0	1.5	0.7	1.1	4.0	2.3	1.2	0.4	0.0	0.1	0.0	0.0	0.0	0.3	0.2	0.0	0.4	0.0	0.0	0.0	24	4.0	0.0	0.8	0	0
14	0.1	0.5	0.0	0.0	0.6	1.4	2.2	1.9	1.4	1.6	4.7	4.5	4.3	2.0	2.1	1.2	0.5	2.4	8.8	11.0	14.5	19.0	20.6	23.9	24	23.9	0.0	5.4	0	0
15	25.9	20.0	22.5	23.8	22.2	20.1	22.8	20.3	19.5	13.5	0.5	0.0	0.0	0.1	0.7	1.5	1.7	2.8	2.7	4.4	10.6	12.1	21.5	8.7	24	25.9	0.0	11.6	0	0
16	1.4	17.8	21.5	24.0	24.3	24.7	25.3	24.6	24.2	24.8	18.1	10.2	12.2	14.6	13.6	14.4	16.6	13.3	13.3	14.5	23.8	28.2	27.1	25.2	24	28.2	1.4	19.1	0	0
17	26.0	24.6	21.9	21.8	24.1	16.0	15.5	17.5	18.9	20.0	21.0	13.4	8.2	20.4	18.0	19.1	21.6	13.1	5.6	5.6	4.5	5.2	7.1	7.8	24	26.0	4.5	15.7	0	0
18	15.8	14.2	18.6	12.7	13.7	16.6	16.2	19.4	19.7	15.1	10.6	4.7	4.5	4.0	5.1	7.2	6.5	8.8	5.1	6.2	5.2	2.9	4.3	4.6	24	19.7	2.9	10.1	0	0
19	5.4	6.1	4.5	4.9	8.5	14.5	12.9	9.5	8.7	13.8	14.8	9.3	6.3	5.1	3.6	5.4	9.7	7.7	9.0	7.5	3.3	1.3	3.8	2.2	24	14.8	1.3	7.4	0	0
20	0.9	1.2	1.3	2.0	3.7	3.8	1.4	3.1	1.7	1.6	3.0	4.8	1.6	3.3	11.2	3.9	9.5	16.6	14.0	7.9	6.8	9.1	8.7	7.2	24	16.6	0.9	5.4	0	0
21	4.5	5.4	7.2	10.6	8.9	7.5	9.8	7.7	7.0	6.4	4.2	6.9	8.5	8.2	7.3	6.4	5.5	5.9	6.4	5.3	5.5	3.9	3.1	7.0	24	10.6	3.1	6.6	0	0
22	5.1	2.8	2.7	2.4	2.1	2.3	1.3	0.8	0.7	1.8	3.6	2.7	1.3	1.7	2.1	3.0	1.3	2.7	1.7	0.8	0.8	0.4	0.0	0.2	24	5.1	0.0	1.8	0	0
23	0.0	0.0	0.1	0.1	0.3	1.3	1.9	1.7	1.9	2.5	2.2	6.3	7.9	8.7	9.8	7.8	1.8	2.2	2.5	3.0	1.4	1.0	0.8	0.9	24	9.8	0.0	2.8	0	0
24	1.0	1.3	1.3	0.9	0.8	1.9	3.2	1.4	1.5	1.8	1.8	1.1	0.9	1.5	2.1	C	C	C	9.1	9.2	10.6	18.0	15.9	21.7	21	21.7	0.8	5.1	0	0
25	15.7	3.4	3.5	10.1	5.7	9.0	7.4	9.8	13.4	8.8	11.7	7.7	5.7	4.7	2.6	4.9	6.0	4.5	4.6	3.3	2.4	4.1	10.8	10.8	24	15.7	2.4	7.1	0	0
26	13.4	10.0	6.6	8.4	10.2	19.3	18.6	17.4	11.7	5.5	8.0	5.3	3.6	2.6	2.8	2.0	2.7	3.1	6.8	7.0	3.7	3.1	2.5	2.5	24	19.3	2.0	7.4	0	0
27	1.3	1.3	2.6	2.3	3.3	2.8	4.0	4.7	5.6	5.1	4.4	1.9	1.0	1.4	1.3	1.9	2.8	3.1	4.3	4.0	4.1	3.6	3.9	2.6	24	5.6	1.0	3.1	0	0
28	3.7	3.5	3.9	3.9	3.5	3.5	4.3	4.8	2.1	2.4	2.7	2.6	2.9	2.4	2.8	4.1	2.7	2.7	2.6	2.6	3.2	2.5	3.1	5.7	24	5.7	2.1	3.3	0	0
29	6.4	6.2	3.7	2.8	1.6	2.5	2.2	2.4	3.0	1.4	0.5	0.7	0.1	0.0	0.6	0.1	0.0	0.2	0.4	1.3	1.0	1.1	1.1	0.2	24	6.4	0.0	1.6	0	0
30	0.0	0.0	0.1	0.0	0.3	0.6	0.8	1.2	1.6	0.0	0.0	0.0	0.2	1.2	1.5	4.0	4.4	3.3	3.4	8.2	9.6	8.5	7.4	5.9	24	9.6	0.0	2.6	0	0
31	9.4	16.8	6.1	4.7	4.0	4.6	4.8	4.1	4.5	5.1	3.7	1.7	4.8	5.5	3.7	3.7	4.3	4.6	4.0	4.1	4.1	6.4	4.6	4.0	24	16.8	1.7	5.1	0	0
Count	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	30	30	31	31	31	31	31	31	741					
Maximum	26.0	24.6	22.5	24.0	24.3	24.7	25.3	24.6	24.2	24.8	21.0	13.4	12.2	20.4	18.3	19.1	21.6	18.0	14.0	20.3	23.8	28.2	27.1	25.2	24					
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.4	0.0	0.0	0.0	21					
Averaage	6.4	6.4	6.2	6.8	7.0	7.1	7.1	6.5	6.3	5.7	5.2	4.1	3.4	4.3	4.7	4.9	5.1	5.5	5.3	5.7	6.0	6.5	6.8	6.5						

Percentiles	10	20	30	40	50	60	70	80	90	95	99	100
Data	0.6	1.4	2.2	2.8	3.8	4.8	6.6	9.3	14.6	19.3	24.6	28.2

Maximum Hourly	28.2
Maximum Daily	19.1
Monthly Average	5.8

Notes C - Calibration / Span Cycle NA - No Data Available T - Test A- MOE Audit M - Equipment Malfunction / Down R - Rate of Change

NO_2 - Crago Road
February 2017
ppb

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>200	Days>100
1	3.6	6.5	5.0	12.1	14.0	22.7	14.9	6.6	6.7	6.7	5.8	4.3	2.3	1.1	3.3	1.8	3.1	6.1	7.3	6.3	4.5	8.5	4.2	2.6	24	22.7	1.1	6.7	0	0
2	2.0	1.2	1.4	2.2	2.2	5.5	7.4	9.3	9.0	5.9	3.6	2.6	1.4	1.4	1.7	1.7	2.3	3.0	2.9	2.8	2.4	2.1	1.2	1.1	24	9.3	1.1	3.2	0	0
3	1.1	1.0	1.3	2.0	2.6	3.4	6.0	7.0	9.6	12.4	6.9	3.5	2.0	1.9	1.8	2.2	2.4	3.6	4.5	6.3	6.6	7.3	9.1	10.6	24	12.4	1.0	4.8	0	0
4	10.0	8.1	7.7	6.0	6.0	4.0	1.4	1.2	1.7	2.0	1.6	2.4	3.5	2.7	2.0	2.3	3.6	3.5	2.8	3.2	2.3	3.1	4.8	3.9	24	10.0	1.2	3.7	0	0
5	2.3	1.6	2.0	1.9	1.6	2.0	2.1	2.1	4.0	3.2	4.2	3.7	4.9	5.2	5.4	5.8	5.6	4.7	1.8	0.8	0.9	1.2	0.7	1.5	24	5.8	0.7	2.9	0	0
6	0.8	0.4	0.3	0.4	1.4	7.0	5.8	8.5	6.2	14.0	12.0	9.6	8.9	10.9	2.3	1.4	5.2	6.2	11.5	10.6	28.8	24.6	12.7	14.2	24	28.8	0.3	8.5	0	0
7	7.3	4.6	6.1	5.1	20.1	20.9	22.0	13.6	3.4	11.4	17.8	19.4	17.3	15.4	8.0	11.8	13.2	8.7	16.3	20.9	21.2	13.8	7.9	9.1	24	22.0	3.4	13.1	0	0
8	6.8	14.2	8.0	5.9	4.8	3.4	1.9	2.0	1.5	2.3	1.3	1.1	0.8	0.7	0.8	0.8	1.1	0.6	0.5	0.4	0.6	1.2	0.3	0.3	24	14.2	0.3	2.6	0	0
9	0.4	0.2	0.7	0.9	3.6	4.6	2.9	3.2	2.1	0.6	0.0	0.2	0.2	0.1	0.3	0.3	1.1	4.7	5.2	3.0	3.7	3.2	3.6	2.0	24	5.2	0.0	2.0	0	0
10	2.8	2.9	2.3	3.9	3.3	4.3	3.5	6.8	3.9	2.3	3.8	8.3	5.0	2.7	1.6	0.9	1.6	1.6	3.4	1.9	1.3	1.7	4.0	3.4	24	8.3	0.9	3.2	0	0
11	2.9	2.8	3.1	2.6	11.2	16.5	19.7	20.2	17.4	15.1	12.7	10.2	9.5	3.7	3.0	3.2	4.2	7.1	5.9	6.7	6.0	3.2	3.0	3.4	24	20.2	2.6	8.0	0	0
12	2.0	2.1	5.5	6.8	3.5	1.4	1.9	1.8	2.3	2.7	3.0	3.0	2.7	2.5	3.0	4.1	6.4	10.8	8.4	13.8	15.4	7.3	0.8	0.6	24	15.4	0.6	4.7	0	0
13	1.0	0.7	0.0	0.3	1.0	2.4	1.2	1.1	1.5	1.1	1.5	0.5	1.3	1.7	1.6	1.5	1.5	2.2	9.2	15.2	27.5	30.2	25.1	25.0	24	30.2	0.0	6.4	0	0
14	23.2	19.4	17.5	26.6	20.6	12.3	3.1	4.3	5.0	3.5	3.4	3.4	3.4	3.7	3.7	4.5	5.2	7.8	9.3	6.7	5.3	10.0	16.7	11.2	24	26.6	3.1	9.6	0	0
15	4.2	4.4	13.6	26.2	23.4	20.3	15.8	23.7	26.4	16.6	7.3	2.4	2.4	1.5	1.5	1.5	0.9	1.0	0.9	1.6	2.6	2.9	1.9	0.8	24	26.4	0.8	8.5	0	0
16	0.7	0.4	0.4	0.4	0.4	0.5	0.8	0.5	0.4	0.3	0.6	0.2	0.3	0.2	0.7	0.8	1.4	2.9	3.5	4.7	5.0	4.1	6.1	15.8	24	15.8	0.2	2.1	0	0
17	9.8	14.3	6.8	4.4	2.2	2.8	2.5	7.3	10.0	3.9	3.2	1.3	0.9	1.6	1.7	1.2	1.7	1.5	2.6	8.5	3.2	2.2	3.2	4.1	24	14.3	0.9	4.2	0	0
18	9.7	12.5	6.6	5.6	6.7	8.3	12.6	14.5	14.5	9.3	7.2	3.6	3.8	3.7	3.3	4.3	5.1	7.9	18.3	20.8	18.0	16.9	10.0	11.6	24	20.8	3.3	9.8	0	0
19	7.1	11.5	12.6	10.4	6.6	4.9	3.9	6.5	9.1	8.8	5.2	6.5	4.9	1.3	0.9	0.7	0.6	0.9	1.7	3.4	3.2	2.3	3.6	1.5	24	12.6	0.6	4.9	0	0
20	1.8	0.9	0.8	1.6	1.3	2.6	3.6	4.4	1.8	0.1	0.4	0.0	0.0	0.2	1.0	0.0	0.4	0.4	2.5	1.2	18.3	15.9	16.6	5.3	24	18.3	0.0	3.4	0	0
21	1.3	0.2	0.5	0.5	0.6	1.3	1.3	2.6	2.2	2.5	1.9	3.0	3.1	3.5	3.2	8.0	11.6	6.4	16.2	22.4	20.5	16.7	14.2	17.3	24	22.4	0.2	6.7	0	0
22	17.0	15.8	15.8	15.7	15.6	15.6	C	C	M	M	M	M	M	M	M	1.3	0.8	1.3	2.3	7.7	12.6	13.0	4.7	1.8	15	17.0	0.8	9.4	0	0
23	2.0	3.9	2.0	2.5	8.2	1.7	0.6	2.1	1.8	0.5	0.6	0.3	0.5	0.7	1.0	0.8	0.3	0.3	1.3	0.4	0.8	3.7	2.9	7.7	24	8.2	0.3	1.9	0	0
24	11.0	5.4	7.6	5.7	2.1	1.4	1.6	0.0	0.0	0.0	0.5	0.7	0.4	0.0	0.5	0.9	0.7	0.3	1.8	1.9	1.8	1.0	0.3	0.0	24	11.0	0.0	1.9	0	0
25	0.0	1.8	2.1	1.8	1.4	1.0	2.2	0.8	1.9	0.0	2.5	3.3	2.6	1.4	1.2	0.1	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	24	3.3	0.0	1.0	0	0
26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.4	0.0	0.0	0	0
27	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.4	2.0	3.7	3.7	2.7	1.7	2.0	2.6	1.8	1.6	3.0	6.2	16.3	14.0	10.6	7.6	5.9	24	16.3	0.0	3.6	0	0
28	6.1	6.7	7.0	7.7	7.3	8.4	7.9	8.4	9.4	6.0	2.7	2.3	3.6	3.5	1.0	1.4	0.8	0.8	2.7	0.9	2.1	5.3	3.2	6.2	24	9.4	0.8	4.6	0	0
29																									0					
30																									0					
31																									0					
Count	28	28	28	28	28	28	27	27	27	27	27	27	27	27	27	28	28	28	28	28	28	28	28	28	663					
Maximum	23.2	19.4	17.5	26.6	23.4	22.7	22.0	23.7	26.4	16.6	17.8	19.4	17.3	15.4	8.0	11.8	13.2	10.8	18.3	22.4	28.8	30.2	25.1	25.0	24					
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0					
Averaage	4.9	5.1	4.9	5.7	6.1	6.4	5.4	5.9	5.7	5.0	4.2	3.7	3.2	2.7	2.1	2.3	2.9	3.5	5.3	6.7	8.2	7.6	6.0	6.0						

Percentiles	10	20	30	40	50	60	70	80	90	95	99	100
Data	0.3	0.8	1.5	2.1	2.9	3.7	5.7	8.0	13.9	17.3	25.0	30.2

Maximum Hourly	30.2
Maximum Daily	13.1
Monthly Average	5.1

Notes C - Calibration / Span Cycle NA - No Data Available T - Test A- MOE Audit M - Equipment Malfunction / Down R - Rate of Change

NO_2 - Crago Road
March 2017
ppb

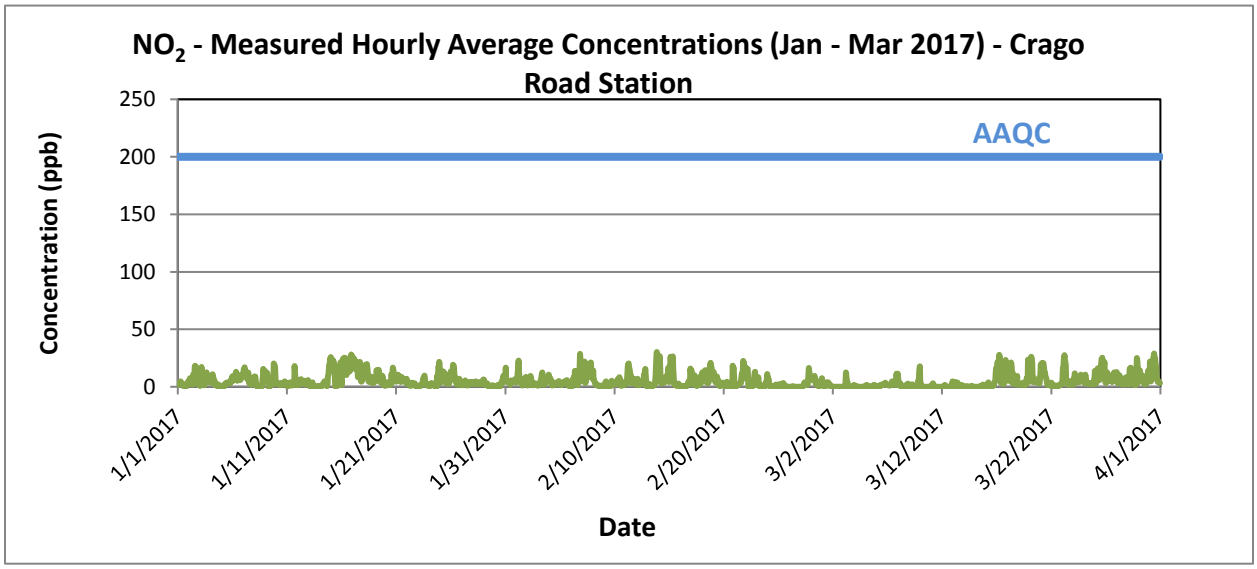
Day	Hour 0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Count	Maximum	Minimum	Average	Hrs>200	Days>100
1	7.6	4.6	2.6	0.9	0.2	2.7	1.2	1.0	0.9	1.6	3.8	2.6	1.0	3.0	3.8	1.9	1.3	2.1	0.7	1.3	0.5	0.0	0.0	0.0	24	7.6	0.0	1.9	0	0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.0	0.0	0.0	0	0
3	0.0	0.0	0.4	0.5	6.3	12.5	7.1	5.1	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	0.8	1.6	0.1	24	12.5	0.0	1.6	0	0
4	0.0	0.2	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	24	0.7	0.0	0.1	0	0
5	0.5	0.5	1.5	0.6	1.1	0.0	0.0	0.0	0.0	0.3	0.4	0.0	0.0	0.0	0.0	0.1	0.2	0.0	1.6	0.5	0.0	0.0	1.0	0.0	24	1.6	0.0	0.4	0	0
6	0.0	0.7	0.0	0.1	0.7	0.4	0.6	0.8	1.1	0.9	1.9	1.8	1.5	1.6	1.8	1.8	2.2	1.9	2.8	3.6	2.7	2.3	2.2	2.3	24	3.6	0.0	1.5	0	0
7	2.1	1.2	1.6	1.4	1.1	1.0	1.4	1.4	1.8	1.9	4.7	4.8	2.4	2.3	1.8	2.8	2.4	2.7	2.1	1.5	11.2	5.1	5.8	11.5	24	11.5	1.0	3.2	0	0
8	4.7	2.7	1.4	1.0	2.9	1.6	0.2	1.0	0.9	0.6	0.5	0.5	0.6	0.3	0.1	1.1	0.8	0.8	0.9	1.6	2.5	2.7	0.3	0.3	24	4.7	0.1	1.3	0	0
9	0.6	0.0	0.0	0.0	0.0	0.5	2.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	2.1	4.8	5.2	6.6	13.3	17.8	24	17.8	0.0	2.3	0	0
10	5.4	2.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	24	5.4	0.0	0.4	0	0
11	0.0	0.0	0.9	2.1	3.0	2.4	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	24	3.0	0.0	0.4	0	0
12	0.0	0.0	0.0	0.0	0.0	0.1	1.5	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.3	0.1	1.3	4.7	24	4.7	0.0	0.4	0	0
13	3.3	3.7	0.0	2.7	3.4	4.2	3.2	2.4	1.2	3.5	3.7	0.0	1.2	1.3	0.7	0.0	1.5	1.1	1.6	1.4	1.1	1.0	0.4	0.5	24	4.2	0.0	1.8	0	0
14	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	24	0.8	0.0	0.1	0	0
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	C	C	0.0	0.8	0.5	0.8	0.7	0.7	1.9	1.0	1.4	1.3	1.2	1.0	22	1.9	0.0	0.5	0	0
16	1.2	0.4	0.6	1.2	2.1	3.0	4.0	2.7	0.9	0.7	0.7	0.7	0.5	0.5	0.5	0.4	0.7	1.2	1.4	3.7	4.5	6.1	12.2	16.2	24	16.2	0.4	2.8	0	0
17	7.4	9.0	21.7	11.8	6.9	23.2	27.9	25.5	8.2	3.2	9.4	7.2	7.4	4.7	4.1	2.2	3.1	3.8	8.5	11.6	23.2	15.9	13.0	12.2	24	27.9	2.2	11.3	0	0
18	10.0	7.5	5.2	14.2	17.8	7.5	12.0	13.1	21.0	17.3	3.5	6.4	11.5	3.2	2.9	3.7	2.9	2.9	2.3	3.3	2.6	9.5	3.8	2.5	24	21.0	2.3	7.8	0	0
19	1.9	2.0	2.3	2.4	2.4	1.9	1.9	2.3	2.6	3.0	3.6	2.6	1.7	1.7	3.0	3.6	2.8	1.8	7.5	5.0	8.8	23.6	11.0	7.6	24	23.6	1.7	4.5	0	0
20	4.6	4.3	6.3	19.6	26.2	25.0	20.4	10.5	4.1	4.1	5.8	7.2	5.5	4.1	4.8	3.9	4.4	3.9	3.7	4.6	4.0	4.3	2.6	7.9	24	26.2	2.6	8.0	0	0
21	7.2	19.3	15.5	20.5	18.6	20.3	20.6	20.5	16.3	12.4	12.3	9.7	8.5	7.6	5.7	2.3	1.7	1.5	2.0	2.2	1.5	1.6	1.0	0.7	24	20.6	0.7	9.6	0	0
22	3.6	1.5	1.1	0.8	1.3	1.6	0.9	0.9	0.8	0.6	0.4	0.5	1.0	1.0	0.5	0.3	0.6	1.0	1.7	2.0	2.1	2.1	1.8	2.8	24	3.6	0.3	1.3	0	0
23	3.0	9.5	16.4	19.0	24.0	27.6	23.7	20.8	18.7	4.9	2.9	2.9	2.4	1.9	2.6	2.0	2.1	4.2	5.0	4.1	2.7	1.9	3.0	3.2	24	27.6	1.9	8.7	0	0
24	2.4	2.0	7.4	5.4	11.6	8.1	6.7	4.5	4.0	5.7	5.6	4.3	4.8	3.9	7.9	8.7	6.3	10.7	7.2	4.6	6.6	6.8	7.8	4.4	24	11.6	2.0	6.1	0	0
25	5.1	4.1	3.0	10.6	5.6	3.8	3.3	3.3	2.7	2.7	2.9	2.4	3.0	2.8	2.7	2.2	2.8	2.0	3.4	2.4	2.6	2.1	5.7	7.8	24	10.6	2.0	3.7	0	0
26	13.8	10.1	8.6	3.1	9.2	6.9	16.0	10.3	13.0	10.6	5.9	7.7	11.8	15.7	21.6	24.1	25.2	22.9	14.9	10.5	18.4	21.3	6.7	3.7	24	25.2	3.1	13.0	0	0
27	3.4	3.5	5.3	12.4	5.0	11.0	8.2	6.4	5.9	7.3	6.8	5.5	5.0	5.0	4.0	6.5	5.1	10.0	12.6	9.3	11.4	11.3	10.2	5.4	24	12.6	3.4	7.4	0	0
28	12.7	9.1	3.3	3.1	3.5	4.2	10.0	7.6	4.5	3.7	2.7	2.7	2.3	2.2	2.3	2.0	2.0	2.2	3.7	7.2	8.2	4.4	5.7	3.8	24	12.7	2.0	4.7	0	0
29	2.6	2.4	2.0	3.9	11.7	15.8	10.0	16.7	10.6	8.5	5.1	3.4	3.8	3.3	1.6	1.9	2.7	3.0	1.5	2.5	25.0	23.9	16.3	3.7	24	25.0	1.5	7.6	0	0
30	5.9	6.5	12.7	14.2	5.8	5.7	6.9	7.1	9.9	6.3	5.0	4.0	3.8	2.5	2.3	4.0	2.8	2.8	3.3	7.4	6.6	14.0	9.7	12.4	24	14.2	2.3	6.7	0	0
31	10.6	22.0	10.5	4.8	6.4	6.8	6.9	16.0	20.6	25.8	28.8	26.8	24.6	21.7	18.9	16.8	8.1	6.5	4.5	4.8	4.3	3.8	3.4	3.2	24	28.8	3.2	12.8	0	0
Count	31	31	31	31	31	31	31	31	31	31	30	30	31	31	31	31	31	31	31	31	31	31	31	31	742					
Maximum	13.8	22.0	21.7	20.5	26.2	27.6	27.9	25.5	21.0	25.8	28.8	26.8	24.6	21.7	21.6	24.1	25.2	22.9	14.9	11.6	25.0	23.9	16.3	17.8	24					
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					
Averaage	3.9	4.2	4.2	5.1	5.7	6.4	6.4	5.9	5.0	4.0	3.9	3.5	3.4	2.9	3.0	3.0	2.7	3.0	3.1	3.3	5.1	5.6	4.5	4.4						

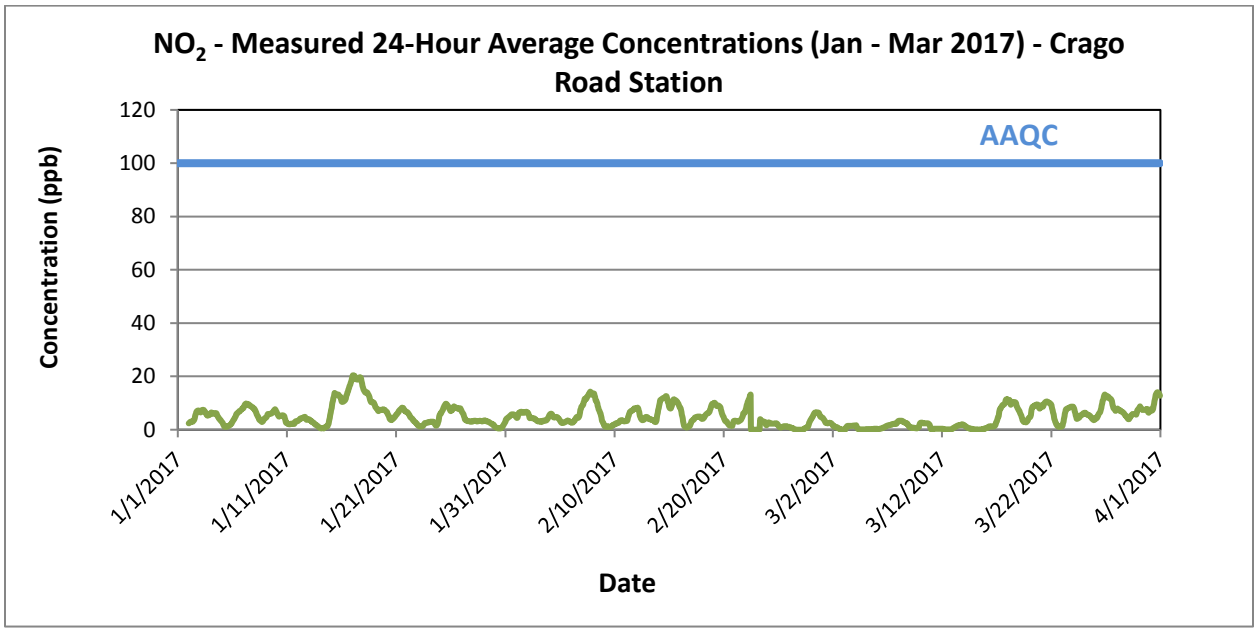
Percentiles	10	20	30	40	50	60	70	80	90	95	99	100
Data	0.0	0.0	0.5	1.3	2.2	3.0	4.4	6.9	11.8	18.6	25.1	28.8

Maximum Hourly	28.8
Maximum Daily	13.0
Monthly Average	4.2

Notes C - Calibration / Span Cycle; NA - No Data Available; T - Test; A- MOE Audit; M - Equipment Malfunction / Down; R - Rate of Change

Figure B-1 Time History Plots of Measured Hourly Average and 24-Hour Average NO_2 Concentrations – Crago Road Station





APPENDIX C NO_X DATA SUMMARIES AND TIME HISTORY PLOTS

NOx Crago Road
January 2017
ppb

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>200	Days>100
1	2.3	2.2	1.7	2.9	3.2	4.4	4.8	3.7	2.8	2.1	3.3	2.4	0.9	0.5	0.9	1.8	1.6	1.8	2.8	0.7	0.2	1.7	2.2	4.9	24	4.9	0.2	2.3	0	0
2	4.9	4.9	5.9	7.4	5.9	4.9	5.2	1.9	1.6	2.6	17.3	10.6	4.1	30.4	28.7	17.3	27.2	22.7	13.8	3.1	2.5	1.8	1.9	0.9	24	30.4	0.9	9.5	0	0
3	1.1	0.4	0.7	13.7	29.8	14.4	10.4	2.5	1.0	1.4	2.5	1.7	2.8	4.2	13.4	15.1	11.8	7.3	10.2	6.4	4.6	4.5	3.4	7.9	24	29.8	0.4	7.1	0	0
4	4.9	5.6	4.8	7.0	11.2	11.2	8.1	2.6	3.8	6.4	3.7	1.8	1.7	2.5	2.1	1.0	3.3	1.4	1.2	2.1	1.2	0.5	0.3	0.0	24	11.2	0.0	3.7	0	0
5	0.2	0.0	0.2	0.2	0.0	0.0	0.7	2.6	3.0	3.5	3.9	5.0	4.2	5.6	4.3	5.1	3.7	4.6	2.7	3.3	4.6	6.1	5.0	8.7	24	8.7	0.0	3.2	0	0
6	9.8	6.9	6.6	5.7	8.7	6.9	8.3	12.3	15.0	18.1	11.7	8.1	11.5	10.5	8.4	12.2	6.5	6.3	6.7	7.5	8.6	9.7	11.4	10.6	24	18.1	5.7	9.5	0	0
7	10.0	15.8	17.1	18.6	13.4	14.6	12.3	10.3	9.1	8.4	8.7	14.8	6.8	3.9	3.1	4.4	6.1	3.7	1.9	4.6	8.1	6.1	5.9	8.1	24	18.6	1.9	9.0	0	0
8	9.5	8.6	9.3	6.9	2.2	1.6	0.7	1.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	4.5	9.1	16.5	14.8	9.8	11.6	24	16.5	0.0	4.5	0	0
9	14.0	11.0	11.0	10.9	12.6	11.0	9.3	2.3	0.1	0.2	1.6	1.2	1.8	1.7	2.9	4.0	4.4	4.2	8.0	22.2	19.2	20.0	18.1	3.0	24	22.2	0.1	8.1	0	0
10	3.0	2.9	3.2	3.3	3.4	2.5	4.1	2.3	2.0	2.0	2.2	4.7	2.5	3.1	2.6	4.1	3.1	3.4	2.7	7.1	3.0	4.3	3.3	1.5	24	7.1	1.5	3.2	0	0
11	1.4	0.3	1.2	1.1	1.3	1.7	1.6	4.6	4.3	5.3	4.1	2.1	2.1	3.9	2.5	4.2	2.3	20.8	9.7	8.1	4.6	2.3	1.7	4.1	24	20.8	0.3	4.0	0	0
12	2.2	4.7	6.1	5.5	5.0	2.2	6.7	7.9	6.5	6.3	5.2	4.7	5.4	5.7	7.2	4.8	2.4	3.2	3.1	2.6	3.5	5.2	6.4	3.9	24	7.9	2.2	4.8	0	0
13	2.5	3.5	1.7	0.8	0.3	1.8	1.0	1.4	4.8	3.3	2.1	1.2	0.4	0.7	0.4	0.0	0.3	0.7	0.4	0.0	0.7	0.1	0.0	0.0	24	4.8	0.0	1.2	0	0
14	0.4	0.6	0.0	0.0	0.8	1.6	2.5	2.3	1.9	2.2	6.7	6.4	6.1	2.9	3.0	1.8	0.7	2.7	9.4	12.0	16.7	21.6	23.8	34.4	24	34.4	0.0	6.7	0	0
15	37.2	23.4	26.0	29.9	25.9	22.4	30.5	22.9	23.6	17.7	1.0	0.0	0.3	0.6	1.0	2.0	2.1	3.3	3.3	4.8	11.2	12.7	22.4	10.0	24	37.2	0.0	13.9	0	0
16	1.8	20.7	24.4	27.6	30.3	31.1	37.2	42.2	49.5	51.4	31.0	14.6	17.7	21.2	17.6	17.6	18.9	14.3	14.0	15.5	37.4	59.4	68.4	67.2	24	68.4	1.8	30.5	0	0
17	56.3	40.7	34.3	34.5	33.8	17.7	16.8	22.8	26.9	38.2	47.9	26.8	10.5	30.8	27.4	30.7	39.5	20.0	6.6	6.4	5.1	5.9	7.9	8.6	24	56.3	5.1	24.8	0	0
18	17.3	15.4	24.5	13.9	14.7	18.3	17.5	22.6	29.4	20.8	14.5	6.4	5.8	5.3	6.5	8.4	7.4	9.4	5.8	7.3	6.3	3.6	4.9	5.4	24	29.4	3.6	12.1	0	0
19	7.0	6.8	5.0	5.6	9.2	15.5	14.2	10.3	9.5	15.8	19.9	12.1	8.1	6.5	4.5	6.4	12.2	8.5	9.9	8.5	4.2	1.9	5.2	2.9	24	19.9	1.9	8.7	0	0
20	1.4	1.9	2.0	2.5	4.3	5.0	2.0	4.7	2.4	2.2	4.2	7.3	2.8	5.3	20.2	5.4	15.8	33.7	27.3	10.5	8.1	11.2	10.8	8.5	24	33.7	1.4	8.3	0	0
21	5.6	6.6	9.5	14.0	12.5	8.8	11.6	10.0	9.7	10.6	7.1	14.0	16.3	14.4	12.1	9.2	6.8	7.1	8.4	6.6	6.5	4.8	4.0	9.2	24	16.3	4.0	9.4	0	0
22	7.7	3.6	3.3	3.0	2.6	3.2	2.0	1.4	1.2	2.8	5.7	5.3	2.7	2.8	3.3	4.1	1.9	3.5	2.1	1.1	1.2	0.8	0.3	0.5	24	7.7	0.3	2.7	0	0
23	0.2	0.3	0.4	0.3	0.6	1.7	2.4	2.1	2.5	3.4	3.4	11.7	14.4	18.0	20.9	14.6	2.9	3.0	3.1	3.7	1.8	1.5	1.2	1.4	24	20.9	0.2	4.8	0	0
24	1.4	1.8	1.8	1.4	1.2	2.3	3.7	1.9	2.1	2.6	2.8	2.1	1.6	2.5	3.1	C	C	C	9.4	9.6	10.8	18.9	16.9	29.4	21	29.4	1.2	6.1	0	0
25	19.8	3.6	3.6	10.3	5.8	9.2	7.9	11.0	17.1	12.0	21.4	13.6	8.8	7.6	3.6	7.0	9.1	6.0	6.5	4.5	3.5	4.8	12.1	11.6	24	21.4	3.5	9.2	0	0
26	15.5	12.3	7.2	10.5	11.3	28.0	26.7	25.3	16.3	6.8	11.5	8.9	6.0	4.2	4.0	2.7	3.0	3.3	7.1	7.5	4.0	3.2	2.6	2.7	24	28.0	2.6	9.6	0	0
27	1.5	1.7	3.3	2.8	3.7	2.8	4.1	4.9	6.6	6.9	6.4	3.0	1.8	2.2	2.1	2.9	3.5	3.3	4.8	4.1	4.8	3.6	3.9	2.6	24	6.9	1.5	3.6	0	0
28	3.9	3.9	4.3	4.2	3.8	3.7	4.4	5.3	2.3	2.7	3.5	3.3	3.7	2.6	3.2	4.8	3.1	3.1	2.7	2.8	3.8	2.9	3.2	6.0	24	6.0	2.3	3.6	0	0
29	6.8	6.4	4.0	3.0	1.6	2.9	2.4	2.6	3.6	2.1	0.7	1.2	0.4	0.2	0.8	0.2	0.0	0.1	0.2	1.3	1.0	1.1	0.9	0.1	24	6.8	0.0	1.8	0	0
30	0.0	0.0	0.2	0.0	0.2	0.6	0.7	1.2	1.8	0.0	0.0	0.4	0.6	1.9	2.5	5.2	5.2	3.4	3.4	8.5	9.9	8.9	7.7	5.9	24	9.9	0.0	2.8	0	0
31	9.7	17.4	6.2	4.8	4.0	4.7	4.8	4.3	4.8	5.8	4.6	2.1	5.4	6.1	4.1	3.9	4.4	4.7	4.0	4.2	4.1	6.4	4.6	4.0	24	17.4	2.1	5.4	0	0
Count	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	30	30	31	31	31	31	31	31	741					
Maximum	56.3	40.7	34.3	34.5	33.8	31.1	37.2	42.2	49.5	51.4	47.9	26.8	17.7	30.8	28.7	30.7	39.5	33.7	27.3	22.2	37.4	59.4	68.4	67.2	24					
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.7	1.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.2	0.1	0.0	0.0	21					
Averaage	8.4	7.5	7.4	8.1	8.5	8.3	8.5	8.2	8.6	8.5	8.3	6.4	5.1	6.7	7.0	6.7	7.0	7.0	6.3	6.3	7.0	8.1	8.7	8.9						

Percentiles	10	20	30	40	50	60	70	80	90	95	99	100
Data	0.7	1.8	2.6	3.4	4.4	5.9	8.0	11.2	17.7	26.8	41.6	68.4

Maximum Hourly	68.4
Maximum Daily	30.5
Monthly Average	7.6

Notes C - Calibration / Span Cycle NA - No Data Available T - Test A- MOE Audit M - Equipment Malfunction / Down R - Rate of Change

NOx Crago Road
February 2017
ppb

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	3.6	6.5	5.1	12.3	14.5	28.5	17.8	7.3	7.9	9.6	9.0	6.0	3.3	1.6	4.4	2.7	3.6	6.4	7.6	6.5	4.6	8.8	4.2	2.6	24	28.5	1.6	7.7	0	0
2	2.1	1.3	1.5	2.2	2.3	5.6	7.5	9.7	10.4	7.6	5.1	4.0	2.3	2.3	2.7	2.4	2.8	3.1	3.0	2.8	2.4	2.2	1.3	1.2	24	10.4	1.2	3.7	0	0
3	1.0	1.0	1.3	1.9	2.6	3.6	6.2	7.4	11.6	17.2	10.0	5.4	3.1	2.7	2.5	3.3	2.9	4.0	4.9	6.6	6.8	7.5	9.6	11.0	24	17.2	1.0	5.6	0	0
4	10.4	8.4	8.0	6.2	6.1	4.2	1.5	1.3	1.8	2.2	2.2	3.5	4.8	3.7	2.5	2.8	4.1	3.7	3.2	3.2	2.4	3.3	4.9	4.3	24	10.4	1.3	4.1	0	0
5	2.6	1.6	2.3	2.3	1.7	2.2	2.3	2.1	4.6	3.9	5.6	4.5	6.0	6.3	6.9	6.5	6.2	4.9	1.8	0.8	0.9	1.3	0.8	1.5	24	6.9	0.8	3.3	0	0
6	0.9	0.6	0.3	0.4	1.3	7.0	6.0	9.4	6.5	16.0	14.6	12.6	10.9	13.3	2.6	1.8	5.7	6.3	11.8	12.2	39.2	27.5	13.4	14.6	24	39.2	0.3	9.8	0	0
7	7.5	4.6	6.1	5.3	26.8	28.8	32.3	16.8	3.7	15.1	28.8	31.3	26.0	21.1	10.2	16.6	18.6	11.3	25.0	34.9	33.3	16.2	8.4	10.8	24	34.9	3.7	18.3	0	0
8	7.3	15.8	8.3	6.2	5.0	3.6	2.0	2.2	1.6	2.7	1.8	1.7	1.3	1.1	1.2	1.1	1.3	0.9	0.5	0.6	0.8	1.8	0.5	0.5	24	15.8	0.5	2.9	0	0
9	0.4	0.2	0.7	0.9	3.7	4.8	3.4	3.6	2.5	0.9	0.4	0.7	0.8	0.6	0.9	0.8	1.4	5.0	5.6	3.1	3.8	3.3	3.7	2.0	24	5.6	0.2	2.2	0	0
10	2.9	3.0	2.4	3.9	3.3	4.4	3.7	7.0	4.2	2.9	5.1	11.7	6.2	3.9	2.2	0.9	1.9	1.8	4.9	2.2	1.5	1.9	5.3	3.6	24	11.7	0.9	3.8	0	0
11	3.0	2.9	3.4	2.8	11.5	17.2	20.4	22.6	21.3	20.3	17.7	14.1	13.4	4.9	3.7	3.9	4.5	7.3	6.0	6.9	6.4	3.4	3.1	3.7	24	22.6	2.8	9.4	0	0
12	2.3	2.5	6.3	8.4	4.0	1.4	1.9	1.9	2.3	2.9	3.3	3.6	3.1	3.1	3.8	4.8	7.0	11.3	8.4	15.6	16.2	7.6	1.0	0.7	24	16.2	0.7	5.1	0	0
13	1.2	0.6	0.1	0.2	1.0	2.8	1.3	1.3	2.1	1.8	2.6	1.3	2.1	2.5	2.5	2.2	2.0	2.4	9.3	15.3	47.1	42.5	28.5	29.8	24	47.1	0.1	8.4	0	0
14	30.7	21.2	18.3	41.2	24.3	13.3	3.6	5.9	6.5	4.2	4.3	4.7	4.4	5.0	4.8	5.2	5.8	8.3	10.2	7.3	5.5	10.8	19.9	13.3	24	41.2	3.6	11.6	0	0
15	4.4	4.4	14.2	31.2	29.3	24.4	16.3	34.4	42.3	25.6	10.6	3.3	3.3	2.2	2.5	2.2	1.4	1.3	1.0	1.6	2.9	3.1	2.1	1.0	24	42.3	1.0	11.0	0	0
16	0.8	0.4	0.5	0.7	0.6	0.7	1.0	0.8	1.0	1.0	1.9	1.3	1.0	1.0	1.6	1.6	2.1	3.2	3.6	4.9	5.1	4.2	6.4	16.2	24	16.2	0.4	2.6	0	0
17	10.1	14.6	7.0	4.5	2.3	2.8	2.5	7.8	11.3	4.9	4.0	1.5	1.3	2.4	2.4	1.4	2.0	1.6	2.5	8.5	3.2	2.3	3.3	4.5	24	14.6	1.3	4.5	0	0
18	10.3	13.2	6.8	5.6	6.8	8.6	13.3	18.5	22.9	13.4	10.1	4.7	4.9	4.6	4.1	4.9	5.3	8.2	18.6	20.7	18.1	17.6	10.2	11.9	24	22.9	4.1	11.0	0	0
19	7.3	11.7	12.8	10.4	6.6	5.1	3.9	6.9	10.8	11.0	6.8	8.9	6.5	1.6	1.1	0.7	0.6	1.0	1.9	3.5	3.4	2.4	4.0	1.6	24	12.8	0.6	5.4	0	0
20	1.9	1.0	0.9	1.8	1.4	2.8	3.6	4.6	1.9	0.3	0.8	0.3	0.0	0.3	1.8	0.1	0.6	0.4	2.5	1.2	18.9	16.1	16.9	5.5	24	18.9	0.0	3.6	0	0
21	1.6	0.3	0.6	0.6	0.6	1.5	1.3	2.9	2.4	2.9	2.3	3.6	3.6	4.0	3.4	8.4	12.2	6.6	19.4	30.3	31.4	22.6	19.6	30.3	24	31.4	0.3	8.8	0	0
22	33.2	33.2	35.2	35.8	23.7	33.5	C	C	M	M	M	M	M	M	M	18.9	0.9	1.4	2.5	7.9	13.0	13.7	5.2	1.9	15	35.8	0.9	17.3	0	0
23	2.2	4.0	2.2	3.3	11.5	2.2	0.7	2.4	2.7	0.8	0.9	1.0	1.2	1.3	1.6	1.7	0.8	0.6	1.7	0.6	1.2	4.7	3.5	13.0	24	13.0	0.6	2.7	0	0
24	30.9	8.5	14.1	9.4	3.1	1.5	1.8	0.1	0.0	0.0	1.0	1.3	1.2	0.2	0.9	1.4	1.2	0.3	2.0	2.2	2.3	1.8	0.8	0.0	24	30.9	0.0	3.6	0	0
25	0.0	2.1	2.4	2.1	2.2	1.4	3.5	1.0	2.6	0.1	3.6	4.2	4.0	2.6	2.2	0.5	0.3	0.2	0.7	0.0	0.0	0.0	0.0	0.0	24	4.2	0.0	1.5	0	0
26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	24	0.8	0.0	0.1	0	0
27	0.0	0.2	0.0	0.0	0.0	0.0	0.4	1.8	2.7	6.3	6.4	4.4	2.7	3.2	4.0	2.6	2.1	3.1	6.4	17.6	15.1	11.5	7.7	6.0	24	17.6	0.0	4.3	0	0
28	6.2	6.7	7.0	7.9	7.6	8.5	8.1	9.1	11.5	7.3	3.5	2.9	4.2	4.2	1.3	1.6	0.8	0.9	2.8	0.9	2.2	5.7	3.4	6.5	24	11.5	0.8	5.0	0	0
29																									0					
30																									0					
31																									0					
Count	28	28	28	28	28	28	27	27	27	27	27	27	27	27	27	28	28	28	28	28	28	28	28	28	663					
Maximum	33.2	33.2	35.2	41.2	29.3	33.5	32.3	34.4	42.3	25.6	28.8	31.3	26.0	21.1	10.2	18.9	18.6	11.3	25.0	34.9	47.1	42.5	28.5	30.3	24					
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0					
Averaage	6.6	6.1	6.0	7.4	7.3	7.9	6.2	7.0	7.4	6.7	6.0	5.3	4.5	3.7	2.9	3.6	3.5	3.8	6.0	7.8	10.3	8.7	6.7	7.1						

Percentiles	10	20	30	40	50	60	70	80	90	95	99	100
Data	0.6	1.2	1.8	2.5	3.3	4.4	6.3	9.1	16.1	24.2	35.0	47.1

Maximum Hourly	47.1
Maximum Daily	18.3
Monthly Average	6.3

Notes C - Calibration / Span Cycle NA - No Data Available T - Test A- MOE Audit M - Equipment Malfunction / Down R - Rate of Change

NOx Crago Road
March 2017
ppb

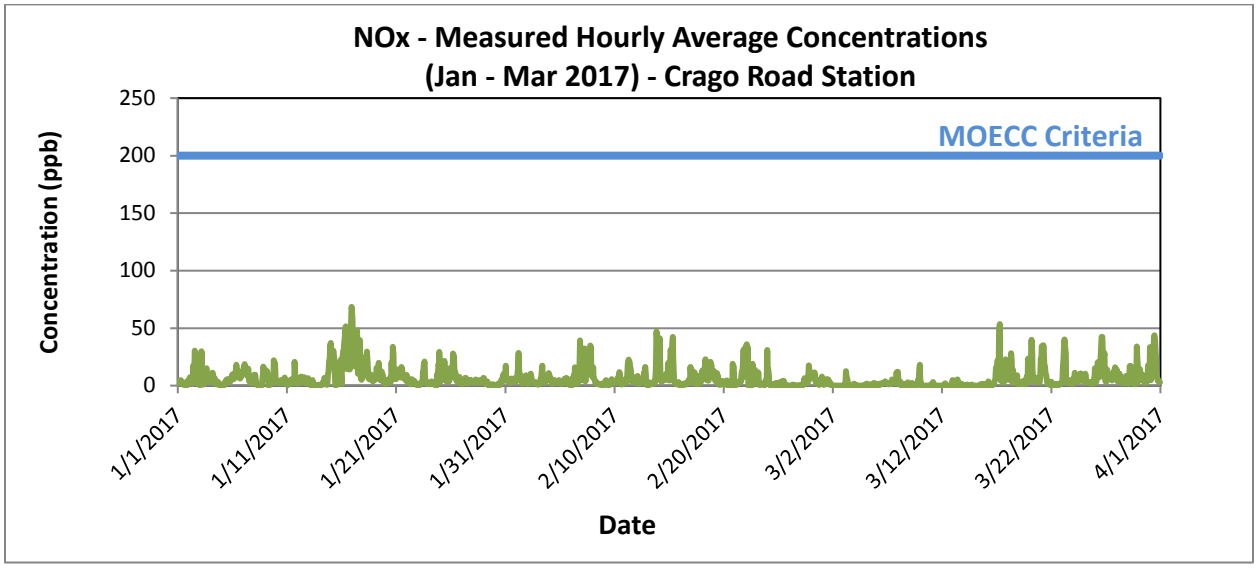
Day	Hour 0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Count	Maximum	Minimum	Average	Hrs>400	Days>200
1	7.9	4.9	2.9	1.2	0.5	2.8	1.4	1.9	1.5	2.2	5.7	3.7	2.0	4.0	5.2	2.4	1.7	3.0	1.1	2.0	0.5	0.0	0.0	0.0	24	7.9	0.0	2.4	0	0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	0.0	0.0	0.0	0	0
3	0.0	0.0	0.2	0.3	6.2	12.5	7.3	5.3	5.1	0.5	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.9	1.6	0.2	24	12.5	0.0	1.7	0	0
4	0.0	0.2	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	24	0.7	0.0	0.1	0	0
5	0.6	0.6	1.6	0.6	1.1	0.0	0.0	0.0	0.0	0.2	1.0	0.0	0.0	0.0	0.0	0.5	0.7	0.0	2.2	0.7	0.0	0.0	1.8	0.0	24	2.2	0.0	0.5	0	0
6	0.1	0.9	0.1	0.1	1.0	0.6	0.9	0.8	1.3	1.0	2.1	2.1	2.1	2.0	2.0	2.2	2.5	2.0	3.0	3.8	2.8	2.5	2.3	2.4	24	3.8	0.1	1.7	0	0
7	2.1	1.4	1.8	1.4	1.2	1.2	1.6	1.6	1.9	2.2	5.3	5.1	2.7	2.9	2.3	3.0	2.7	3.3	2.4	1.8	11.5	5.6	6.1	12.0	24	12.0	1.2	3.5	0	0
8	4.9	2.9	1.4	1.1	3.4	1.8	0.3	1.2	1.5	0.9	1.1	1.1	1.0	0.5	0.5	1.5	1.1	1.0	1.0	1.8	2.6	2.7	0.3	0.2	24	4.9	0.2	1.5	0	0
9	0.7	0.0	0.0	0.0	0.0	0.5	2.2	0.6	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.2	0.0	1.1	2.2	4.8	5.3	6.6	13.4	18.2	24	18.2	0.0	2.3	0	0
10	5.5	2.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	24	5.5	0.0	0.4	0	0
11	0.0	0.0	1.0	2.1	3.2	2.6	0.0	0.0	0.0	0.0	0.0	0.0	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	3.2	0.0	0.4	0	0
12	0.0	0.0	0.0	0.0	0.0	0.2	1.7	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.3	0.0	1.4	4.9	24	4.9	0.0	0.5	0	0
13	3.5	3.9	0.1	3.0	3.5	4.3	3.3	2.6	1.4	5.2	5.4	0.1	2.0	2.0	1.2	0.0	1.6	1.3	1.6	1.5	1.2	1.0	0.4	0.7	24	5.4	0.0	2.1	0	0
14	0.1	0.1	0.0	0.0	0.1	0.2	0.7	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	24	1.0	0.0	0.1	0	0
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	C	C	0.4	1.1	0.7	0.8	0.5	0.8	1.5	0.6	1.3	1.0	1.0	0.6	22	1.5	0.0	0.5	0	0
16	0.8	0.0	0.2	0.8	1.7	2.8	3.8	2.7	0.9	0.9	0.8	0.7	0.4	0.6	0.6	0.2	0.8	1.1	1.1	3.2	4.2	5.7	12.0	15.9	24	15.9	0.0	2.6	0	0
17	7.1	8.6	22.1	12.4	6.8	34.9	49.5	53.5	11.0	4.1	12.1	9.0	9.0	5.5	5.0	2.2	3.5	3.8	8.3	11.7	22.9	15.8	12.9	12.1	24	53.5	2.2	14.3	0	0
18	9.6	7.2	5.1	15.1	19.2	8.0	14.3	15.0	28.2	21.6	3.5	8.0	13.6	3.3	2.6	3.5	2.6	2.7	1.9	3.0	2.4	9.1	3.4	2.1	24	28.2	1.9	8.5	0	0
19	1.6	1.7	2.0	2.0	2.0	1.5	1.5	2.0	2.3	2.9	3.9	2.7	1.6	1.5	3.4	4.1	2.8	1.5	7.9	4.8	8.4	23.4	10.6	7.7	24	23.4	1.5	4.3	0	0
20	4.4	3.9	6.0	20.8	34.7	39.7	30.9	13.6	4.1	4.3	7.0	7.6	5.9	4.1	5.3	4.0	4.6	3.6	3.5	4.4	3.8	4.2	2.3	7.5	24	39.7	2.3	9.6	0	0
21	6.8	23.5	18.3	34.1	34.6	28.2	29.3	35.1	24.3	17.6	16.7	12.7	10.4	8.9	6.4	2.5	1.5	1.2	1.8	2.0	1.3	1.4	0.8	0.4	24	35.1	0.4	13.3	0	0
22	3.3	1.1	0.8	0.7	1.2	1.5	0.7	0.7	0.7	0.7	0.4	0.5	1.3	1.4	0.4	0.1	0.5	0.6	1.4	1.8	1.9	1.8	1.7	2.5	24	3.3	0.1	1.2	0	0
23	2.7	9.1	16.5	23.7	31.9	40.1	36.1	30.9	27.9	5.7	3.1	3.2	2.5	1.9	2.7	2.0	2.0	4.6	4.7	3.6	2.4	1.6	2.9	3.1	24	40.1	1.6	11.0	0	0
24	2.0	1.8	7.0	5.0	11.2	7.8	7.1	4.5	3.9	6.2	6.5	4.6	4.9	3.9	8.5	10.0	6.3	10.6	7.1	4.3	6.4	6.6	7.7	4.3	24	11.2	1.8	6.2	0	0
25	5.0	4.0	2.8	10.2	5.3	3.4	2.9	3.0	2.4	2.5	2.8	2.4	3.0	2.9	2.9	2.0	3.1	1.9	3.4	2.2	2.3	1.8	5.9	8.2	24	10.2	1.8	3.6	0	0
26	15.1	11.1	9.6	3.1	9.1	6.7	20.4	12.7	17.6	14.8	7.4	10.2	15.6	25.1	37.0	42.3	42.4	35.1	18.4	11.8	24.8	28.1	6.9	3.6	24	42.4	3.1	17.9	0	0
27	3.4	3.5	5.5	14.0	5.0	10.9	8.2	6.6	6.0	8.3	7.7	6.6	6.6	6.2	4.6	8.2	5.5	11.2	13.2	10.0	16.0	14.0	10.6	5.7	24	16.0	3.4	8.2	0	0
28	14.0	10.6	3.6	3.3	3.8	4.6	10.4	8.6	5.0	5.0	3.3	3.3	2.7	2.3	2.5	1.9	1.9	2.1	3.7	7.0	8.4	4.4	5.5	3.6	24	14.0	1.9	5.1	0	0
29	2.4	2.1	1.7	3.7	11.8	16.9	10.2	17.1	11.2	9.3	5.5	3.6	4.1	3.6	1.4	1.7	2.9	2.9	1.2	2.3	34.1	26.2	18.0	3.3	24	34.1	1.2	8.2	0	0
30	5.7	6.2	12.8	14.2	5.4	5.4	6.9	7.5	9.8	6.3	5.1	4.2	3.8	2.2	2.1	3.9	2.5	2.5	3.3	7.2	6.3	17.5	11.3	14.0	24	17.5	2.1	6.9	0	0
31	13.8	33.5	12.0	4.8	6.8	7.3	7.5	20.1	29.9	31.1	43.0	43.6	39.9	33.5	27.6	21.9	8.6	6.5	4.3	4.5	4.1	3.6	3.1	2.9	24	43.6	2.9	17.2	0	0
Count	31	31	31	31	31	31	31	31	31	31	30	30	31	31	31	31	31	31	31	31	31	31	31	31	742					
Maximum	15.1	33.5	22.1	34.1	34.7	40.1	49.5	53.5	29.9	31.1	43.0	43.6	39.9	33.5	37.0	42.3	42.4	35.1	18.4	11.8	34.1	28.1	18.0	18.2	24					
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					
Averaage	4.0	4.7	4.4	5.8	6.8	8.0	8.4	8.1	6.4	4.9	5.0	4.5	4.4	3.8	4.0	3.9	3.3	3.4	3.2	3.3	5.7	6.0	4.6	4.4						

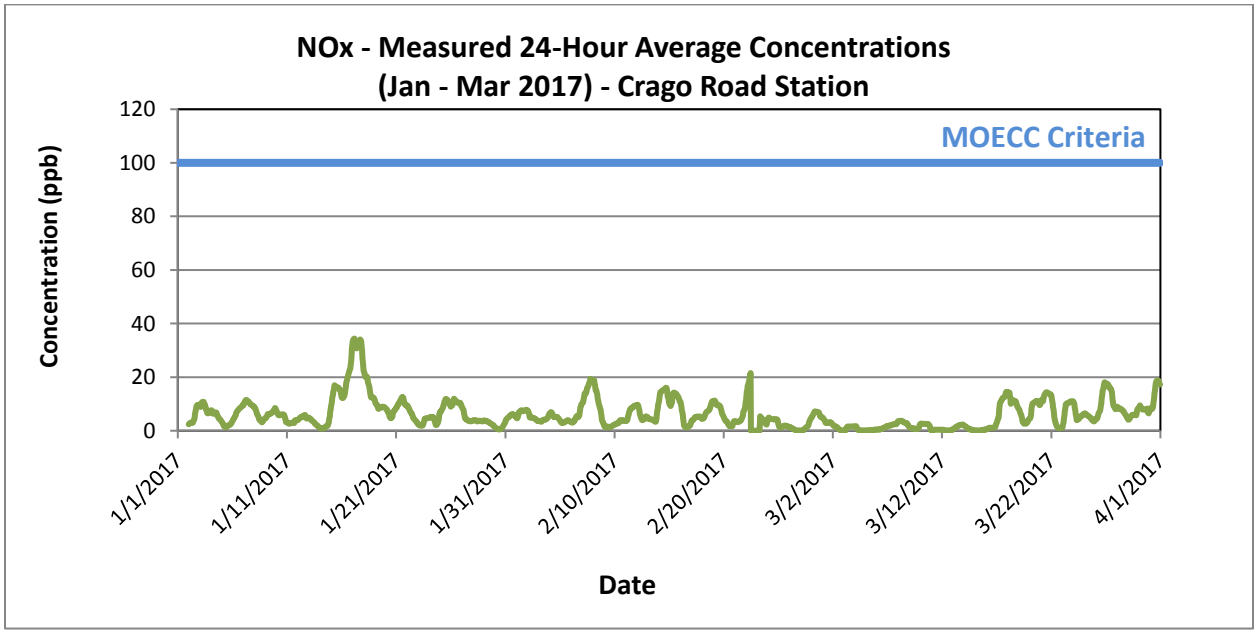
Percentiles	10	20	30	40	50	60	70	80	90	95	99	100
Data	0.0	0.0	0.6	1.4	2.2	3.1	4.6	7.1	13.4	23.4	39.8	53.5

Maximum Hourly	53.5
Maximum Daily	17.9
Monthly Average	5.0

Notes C - Calibration / Span Cycle NA - No Data Available T - Test A- MOE Audit M - Equipment Malfunction / Down R - Rate of Change

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





APPENDIX D $PM_{2.5}$ DATA SUMMARIES AND TIME HISTORY PLOTS

$PM_{2.5}$ - Crago Road January 2017 (µg/m³)

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	12.0	13.4	9.9	7.9	7.2	6.9	6.5	4.4	3.7	3.4	3.5	2.9	3.3	3.6	6.4	8.7	10.2	12.4	11.3	10.3	14.3	15.4	20.8	23.4	24	23.4	2.9	9.2
2	26.2	25.3	24.4	23.1	20.1	17.5	16.5	15.0	11.7	9.0	9.9	9.6	8.6	25.6	10.1	9.5	10.2	7.3	7.0	7.7	8.1	7.7	8.6	8.4	24	26.2	7.0	13.6
3	7.4	7.8	10.1	33.7	36.2	16.3	10.2	4.1	15.8	6.0	0.5	0.4	0.4	0.5	2.5	2.1	1.6	0.5	0.6	0.4	0.4	0.3	0.1	0.2	24	36.2	0.1	6.6
4	0.3	0.5	1.0	1.0	1.5	1.2	0.4	0.1	0.1	0.3	0.7	0.9	0.7	0.5	0.4	0.4	0.4	0.9	2.3	4.0	5.2	5.2	8.1	11.3	24	11.3	0.1	2.0
5	6.5	5.4	5.4	5.7	5.1	5.3	5.6	6.1	6.8	7.9	7.6	7.4	6.3	10.8	12.4	6.2	4.9	4.7	5.1	4.9	4.7	5.0	4.7	5.1	24	12.4	4.7	6.2
6	5.9	10.8	7.3	6.8	6.5	6.5	7.4	8.2	8.3	7.4	5.6	4.3	4.8	4.8	5.0	5.7	4.2	4.0	3.9	4.4	5.0	5.7	6.7	6.9	24	10.8	3.9	6.1
7	8.6	10.8	9.7	9.5	9.7	10.4	10.1	10.1	8.9	6.1	6.2	7.2	4.9	4.1	3.4	4.9	7.3	7.3	8.7	13.0	11.4	11.0	10.4	10.4	24	13.0	3.4	8.5
8	9.5	8.3	8.4	5.4	3.9	3.1	2.1	1.9	1.9	1.7	2.3	2.2	2.1	2.2	2.1	2.2	2.5	3.0	4.8	7.4	8.3	6.3	5.8	5.2	24	9.5	1.7	4.3
9	5.6	5.3	5.1	4.7	3.5	2.5	3.2	3.4	3.3	5.6	8.6	7.3	5.8	4.0	5.2	7.7	9.7	11.5	13.9	16.3	17.0	17.9	17.0	10.5	24	17.9	2.5	8.1
10	11.2	10.8	8.3	8.1	7.8	8.7	7.5	6.9	6.2	6.1	6.0	7.6	9.1	8.5	7.4	7.5	7.2	7.1	6.4	6.6	8.5	6.5	5.0	5.2	24	11.2	5.0	7.5
11	5.3	4.1	6.6	15.2	18.0	16.1	11.7	11.7	9.5	8.4	10.0	10.5	9.9	8.7	7.5	6.9	6.7	11.3	8.6	9.2	3.9	2.0	2.2	2.5	24	18.0	2.0	8.6
12	3.7	5.4	7.1	5.1	3.9	1.7	3.8	3.5	12.6	11.7	7.7	7.2	7.6	9.8	7.7	4.7	2.9	3.5	4.3	4.6	4.5	4.8	3.9	2.3	24	12.6	1.7	5.6
13	2.2	4.2	3.3	2.6	2.9	3.2	3.2	3.2	4.4	4.4	4.3	4.1	2.7	2.5	2.5	2.5	2.9	3.1	2.6	2.2	2.1	2.1	2.7	4.5	24	4.5	2.1	3.1
14	5.7	4.7	4.7	5.0	4.4	3.9	3.8	3.6	5.5	11.2	9.9	10.2	6.6	5.7	5.9	3.4	5.1	7.8	14.1	20.6	24.6	22.9	22.4	18.8	24	24.6	3.4	9.6
15	18.7	16.0	15.9	15.0	15.1	14.4	14.5	12.4	10.2	9.3	2.4	2.2	2.0	1.8	2.4	3.1	3.5	4.1	6.2	8.7	11.7	13.7	15.0	11.4	24	18.7	1.8	9.6
16	14.0	21.1	25.0	27.0	29.4	32.8	33.2	34.2	38.5	37.3	33.4	27.7	27.7	30.2	29.7	28.6	29.9	29.5	30.0	29.2	31.3	32.3	29.9	29.6	24	38.5	14.0	29.6
17	25.7	26.5	24.8	23.7	22.8	18.9	24.6	26.6	28.1	32.5	32.7	16.7	8.5	20.7	24.2	24.0	24.1	16.3	6.9	5.6	6.0	6.0	5.1	4.6	24	32.7	4.6	19.0
18	5.8	7.2	10.1	9.0	9.4	11.0	12.9	13.1	16.6	17.9	12.3	4.4	4.3	3.5	2.7	2.3	3.8	4.8	4.0	6.0	10.9	13.4	14.4	13.9	24	17.9	2.3	8.9
19	15.2	17.4	11.4	12.7	14.3	13.3	11.9	11.3	11.3	14.6	14.0	10.9	6.3	4.4	3.7	5.4	9.2	13.1	15.1	12.0	7.9	7.6	6.7	6.1	24	17.4	3.7	10.7
20	5.7	5.3	4.1	5.0	8.3	8.4	4.9	4.9	4.7	5.3	6.0	7.1	5.8	7.4	9.1	7.2	17.8	20.3	11.2	10.2	11.1	13.8	16.3	16.5	24	20.3	4.1	9.0
21	18.7	15.1	13.2	15.9	8.5	12.1	17.4	16.0	15.6	14.5	11.6	17.8	22.7	18.1	15.1	9.3	7.7	12.4	11.2	11.0	12.4	12.9	13.2	13.9	24	22.7	7.7	14.0
22	12.6	12.4	12.7	12.7	15.5	16.9	12.4	10.4	8.1	9.0	9.7	6.8	2.8	2.5	3.6	4.6	4.8	5.5	4.5	3.1	2.9	2.5	2.5	3.6	24	16.9	2.5	7.6
23	4.9	6.5	6.7	6.6	6.3	5.3	4.9	5.3	3.2	3.5	3.2	4.5	5.5	5.0	2.5	2.5	3.1	3.6	4.0	3.7	3.7	4.5	4.9	4.2	24	6.7	2.5	4.5
24	4.3	4.3	4.1	3.7	3.4	2.7	2.7	3.3	3.9	3.7	3.6	3.0	2.7	4.1	4.1	C	C	10.3	9.9	14.0	13.4	11.1	8.6	7.5	22	14.0	2.7	5.8
25	5.5	3.0	2.9	3.5	4.1	6.1	5.8	7.8	8.4	10.8	7.2	2.4	3.4	2.4	2.8	4.5	5.4	5.7	5.1	5.6	5.8	6.4	8.8	12.4	24	12.4	2.4	5.7
26	13.8	13.0	13.2	16.2	20.6	23.0	19.1	15.5	9.2	4.0	3.6	1.8	1.1	1.2	1.4	1.5	0.7	1.0	1.7	1.2	0.6	0.7	0.9	0.5	24	23.0	0.5	6.9
27	0.4	0.5	0.5	0.5	0.5	0.8	0.6	0.6	0.7	0.8	0.8	0.5	0.4	0.4	0.4	0.5	0.6	1.0	1.3	1.5	1.4	3.0	4.0	3.6	24	4.0	0.4	1.0
28	3.9	5.9	21.9	10.7	4.2	4.7	4.4	5.1	8.2	15.6	14.1	14.3	12.3	11.6	10.3	10.5	7.9	7.9	10.0	11.7	11.5	12.7	14.1	12.5	24	21.9	3.9	10.2
29	8.0	3.1	1.3	1.1	1.0	0.8	0.8	1.0	1.1	0.8	0.8	0.7	0.8	0.9	1.0	0.8	0.8	0.7	0.6	0.6	0.6	0.8	1.3	1.2	24	8.0	0.6	1.3
30	1.5	1.6	1.6	1.9	2.0	2.2	2.1	2.1	2.4	1.8	2.0	2.0	2.1	2.8	2.8	4.2	3.4	3.2	4.4	6.5	7.2	7.3	4.7	4.3	24	7.3	1.5	3.2
31	5.1	5.7	6.0	5.2	2.8	2.3	2.3	2.8	4.2	5.1	5.5	3.9	5.3	6.5	6.4	5.8	6.5	7.7	7.8	8.0	9.8	9.8	9.0	8.4	24	9.8	2.3	5.9
Count	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	30	31	31	31	31	31	31	31	742			
Maximum	26.2	26.5	25.0	33.7	36.2	32.8	33.2	34.2	38.5	37.3	33.4	27.7	27.7	30.2	29.7	28.6	29.9	29.5	30.0	29.2	31.3	32.3	29.9	29.6	24			
Minimum	0.3	0.5	0.5	0.5	0.5	0.8	0.4	0.1	0.1	0.3	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.4	0.4	0.3	0.1	0.2	22			
Averaage	8.8	9.1	9.3	9.8	9.6	9.0	8.6	8.2	8.8	8.9	7.9	6.7	6.0	6.9	6.5	6.2	6.8	7.5	7.3	8.1	8.6	8.7	9.0	8.7				

Percentiles	10	20	30	40	50	60	70	80	90	95	99	100
Data	1.2	2.7	3.9	4.9	6.1	7.6	9.7	12.4	16.6	24.2	32.8	38.5

Maximum Hourly	38.5
Maximum Daily	29.6
Monthly Average	8.1

Notes C - Calibration / Span Cycle NA - No Data Available T - Test A- MOE Audit M - Equipment Malfunction / Down R - Rate of Change

$PM_{2.5}$ - Crago Road February 2017 (µg/m³)

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	8.2	9.3	9.2	11.0	13.3	18.2	10.1	5.7	4.1	3.3	3.0	2.7	1.3	1.0	1.6	1.1	1.2	2.4	2.9	2.8	2.7	2.7	1.6	1.0	24	18.2	1.0	5.0
2	1.0	0.9	0.8	0.8	0.9	1.1	1.5	1.8	1.9	2.5	2.4	2.4	2.5	2.8	2.4	2.1	2.4	4.0	4.0	4.4	4.4	4.4	5.6	5.4	24	5.6	0.8	2.6
3	5.5	6.2	6.1	5.5	4.9	5.7	7.1	7.5	9.0	9.2	6.6	5.3	4.5	4.0	4.1	4.3	4.3	5.3	4.8	6.3	6.5	6.3	7.9	6.0	24	9.2	4.0	6.0
4	6.4	6.0	4.7	4.6	4.1	2.9	2.8	3.0	4.5	6.3	6.3	6.2	7.9	7.7	7.0	8.0	11.5	11.1	9.6	8.8	6.5	6.3	8.0	7.0	24	11.5	2.8	6.5
5	6.4	6.3	5.9	6.3	6.2	6.8	7.8	9.4	11.8	11.6	12.2	13.3	14.8	14.7	15.0	16.7	16.7	13.1	4.8	1.5	1.2	1.1	1.2	1.5	24	16.7	1.1	8.6
6	1.3	1.3	1.3	1.3	1.5	2.4	2.6	2.9	5.0	3.8	2.6	3.0	3.6	3.1	1.8	2.2	5.3	6.1	7.8	9.7	16.1	11.9	11.8	11.7	24	16.1	1.3	5.0
7	10.5	9.7	9.9	9.9	11.4	8.8	8.5	9.9	8.2	7.3	8.8	13.4	14.2	13.4	8.9	6.5	4.0	2.1	3.6	2.9	3.2	3.8	5.6	7.0	24	14.2	2.1	8.0
8	9.9	18.1	9.0	8.4	6.8	1.9	2.0	2.7	1.8	2.3	1.9	1.8	1.7	1.4	1.4	1.8	2.9	2.8	2.6	2.6	2.5	2.2	3.1	3.9	24	18.1	1.4	4.0
9	3.4	3.0	3.4	3.3	3.8	5.0	4.7	4.5	4.1	2.9	2.2	1.6	1.4	1.2	0.9	0.9	1.4	3.0	2.5	2.5	2.6	2.5	2.3	2.3	24	5.0	0.9	2.7
10	2.5	2.4	2.1	2.7	2.6	3.8	2.5	2.7	2.4	2.1	2.1	4.8	3.7	3.5	2.9	2.6	4.0	4.3	4.0	3.7	4.3	3.8	4.1	4.5	24	4.8	2.1	3.3
11	5.3	5.5	5.5	6.2	8.2	10.2	12.5	14.2	16.6	19.7	23.3	25.4	25.3	22.5	21.7	19.1	18.4	18.0	16.2	15.3	13.0	12.1	10.8	10.9	24	25.4	5.3	14.8
12	7.5	6.6	8.7	8.5	7.5	6.3	6.7	7.3	9.4	11.4	12.3	12.3	11.8	11.5	11.0	11.2	13.3	17.1	10.7	10.4	16.9	4.8	1.0	1.4	24	17.1	1.0	9.4
13	1.5	2.0	2.8	3.2	3.0	2.4	1.6	1.9	2.3	2.6	2.2	2.1	2.1	2.3	2.2	2.4	2.8	3.5	5.4	7.2	11.6	14.3	9.6	11.3	24	14.3	1.5	4.3
14	15.0	9.5	11.7	13.3	12.4	10.2	7.2	8.2	7.3	6.9	6.8	6.0	6.3	6.3	7.2	8.0	9.5	13.8	17.6	15.1	16.4	17.4	19.3	18.5	24	19.3	6.0	11.3
15	10.4	13.8	15.2	15.6	20.2	10.0	9.4	7.6	5.2	3.6	1.8	1.3	1.7	2.0	1.5	2.3	3.3	3.7	3.9	4.0	4.3	4.4	4.4	3.7	24	20.2	1.3	6.4
16	3.0	2.8	2.9	2.7	2.7	2.9	3.0	3.1	2.1	1.7	1.8	1.9	1.9	1.9	2.2	2.9	3.4	3.7	4.6	5.7	6.3	5.2	5.9	8.2	24	8.2	1.7	3.4
17	6.6	5.9	4.7	3.8	3.4	3.7	3.8	4.6	5.4	5.0	3.2	2.8	3.5	3.9	4.1	5.2	6.5	8.7	12.0	14.8	12.9	9.6	11.7	10.9	24	14.8	2.8	6.5
18	12.5	13.1	14.5	14.4	14.3	15.3	16.2	16.6	15.0	13.5	9.9	6.0	6.0	6.0	7.0	8.7	9.5	10.5	12.5	12.9	14.1	13.7	13.1	12.4	24	16.6	6.0	12.0
19	9.7	9.9	9.9	8.0	5.6	5.3	4.5	4.8	4.9	4.1	3.2	5.2	4.0	2.2	2.1	2.3	2.6	3.2	3.8	4.4	4.1	3.6	4.2	3.4	24	9.9	2.1	4.8
20	3.5	3.6	4.3	5.9	6.6	6.3	6.7	6.0	4.6	4.2	4.5	4.6	4.0	4.3	4.4	4.2	4.1	5.2	6.3	6.4	12.5	9.9	8.7	4.2	24	12.5	3.5	5.6
21	1.5	1.4	1.6	2.5	3.2	3.0	3.0	3.1	5.1	5.5	5.0	4.6	4.6	4.2	4.6	7.0	8.4	7.1	9.8	12.6	15.5	17.3	14.0	14.4	24	17.3	1.4	6.6
22	14.8	14.4	16.9	25.7	39.1	41.9	C	C	64.6	40.0	35.2	21.8	21.1	16.2	18.5	16.1	16.5	19.8	19.1	15.7	18.5	17.4	16.5	17.5	22	64.6	14.4	24.0
23	21.5	22.7	19.3	15.7	15.7	13.4	13.0	11.8	11.0	12.3	13.4	12.6	13.2	15.3	16.8	12.0	6.6	2.9	3.2	2.6	4.0	3.8	4.2	7.0	24	22.7	2.6	11.4
24	7.9	7.9	7.2	8.3	6.9	4.6	5.0	4.0	3.0	4.1	5.2	4.4	4.1	5.0	6.5	7.3	7.4	7.3	9.5	8.8	6.4	6.0	7.3	8.4	24	9.5	3.0	6.4
25	10.1	9.6	8.6	9.5	10.3	10.4	11.9	12.1	19.2	23.7	86.5	20.9	6.5	2.5	2.9	2.4	1.7	1.6	1.8	2.1	2.5	1.9	1.7	3.5	24	86.5	1.6	11.0
26	2.2	2.0	1.7	1.6	1.6	1.7	1.6	1.6	1.9	1.7	1.7	1.8	1.7	0.8	0.0	1.1	2.6	3.2	3.6	3.7	4.1	4.2	4.9	6.1	24	6.1	0.0	2.4
27	8.9	8.3	7.6	7.5	7.8	7.5	8.2	9.1	8.9	9.9	11.2	11.1	11.1	10.9	10.9	11.0	9.0	5.2	8.4	7.7	7.5	9.0	7.5	7.1	24	11.2	5.2	8.8
28	7.3	8.7	8.7	8.9	9.1	10.8	11.8	12.5	13.0	11.7	10.1	9.8	8.8	7.7	9.4	9.9	7.9	7.4	7.2	6.9	6.2	8.0	8.5	9.4	24	13.0	6.2	9.1
29																									0			
30																									0			
31																									0			
Count	28	28	28	28	28	28	27	27	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	670			
Maximum	21.5	22.7	19.3	25.7	39.1	41.9	16.2	16.6	64.6	40.0	86.5	25.4	25.3	22.5	21.7	19.1	18.4	19.8	19.1	15.7	18.5	17.4	19.3	18.5	24			
Minimum	1.0	0.9	0.8	0.8	0.9	1.1	1.5	1.6	1.8	1.7	1.7	1.3	1.3	0.8	0.0	0.9	1.2	1.6	1.8	1.5	1.2	1.1	1.0	1.0	0			
Averaage	7.3	7.5	7.3	7.7	8.3	7.9	6.5	6.6	9.0	8.3	10.2	7.5	6.9	6.4	6.4	6.4	6.7	7.0	7.2	7.2	8.1	7.4	7.3	7.5				

Percentiles	10	20	30	40	50	60	70	80	90	95	99	100
Data	1.8	2.6	3.5	4.4	5.9	7.2	9.0	11.5	14.8	17.5	25.5	86.5

Maximum Hourly	86.5
Maximum Daily	24.0
Monthly Average	7.5

Notes C - Calibration / Span Cycle NA - No Data Available T - Test A- MOE Audit M - Equipment Malfunction / Down R - Rate of Change

$PM_{2.5}$ - Crago Road
March 2017
(µg/m³)

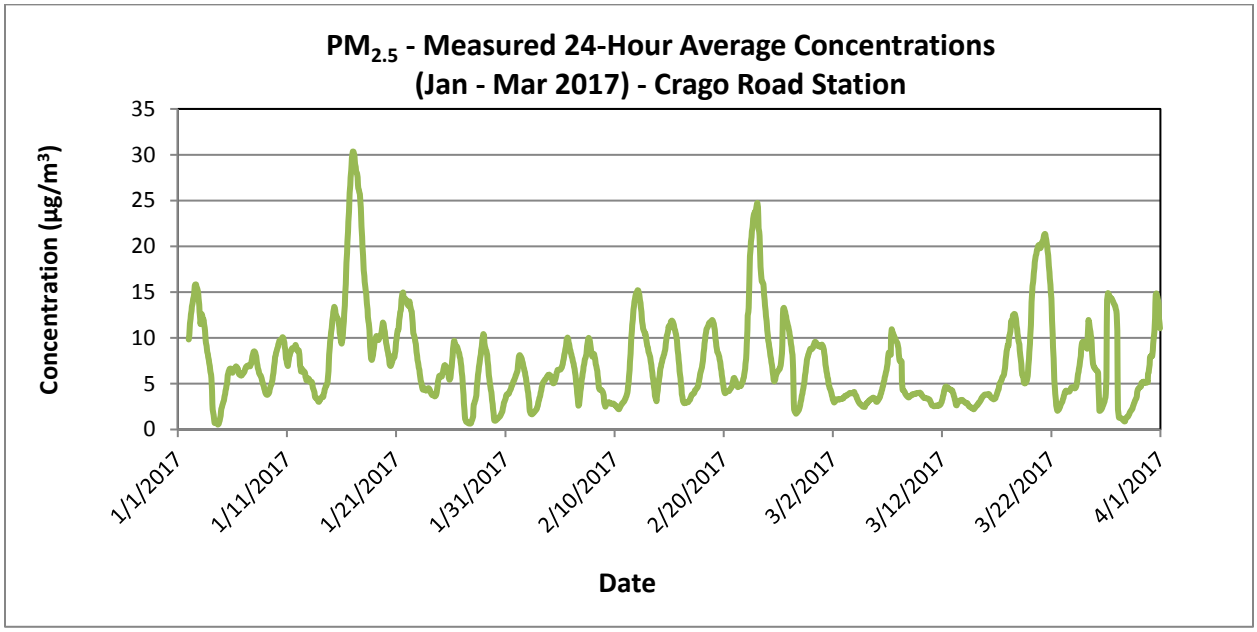
Day	Hour 0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Count	Maximum	Minimum	Average
1	10.5	6.5	6.8	5.6	2.6	2.8	1.8	1.6	2.7	2.8	2.5	1.9	1.6	2.2	2.0	2.7	2.6	3.5	3.6	4.9	3.0	2.4	3.1	4.9	24	10.5	1.6	3.5
2	4.2	4.0	3.4	4.1	4.2	4.1	4.2	4.2	3.0	3.1	2.2	2.1	1.6	1.5	2.2	2.9	3.1	3.7	4.2	4.3	4.2	3.5	3.6	3.9	24	4.3	1.5	3.4
3	6.0	6.3	5.3	4.4	4.9	4.9	4.3	4.3	4.8	3.5	3.1	2.9	2.8	2.6	2.4	2.6	3.0	3.8	4.1	4.3	4.0	4.0	6.3	3.8	24	6.3	2.4	4.1
4	2.8	3.2	3.7	3.0	1.6	1.5	1.5	1.6	1.5	1.4	1.3	1.3	1.4	1.6	1.6	1.6	1.9	2.4	3.0	3.7	4.1	4.5	5.4	6.8	24	6.8	1.3	2.6
5	5.4	5.1	4.6	3.6	3.5	3.0	3.1	3.0	2.9	2.7	2.2	2.0	1.7	1.9	3.1	2.9	2.5	2.5	2.7	2.7	3.6	3.4	2.9	2.7	24	5.4	1.7	3.1
6	4.4	5.3	5.6	5.4	5.5	5.6	5.4	4.7	6.3	6.4	6.2	6.6	6.4	7.0	7.9	7.8	7.5	7.9	9.0	8.5	8.1	7.8	8.7	9.1	24	9.1	4.4	6.8
7	13.2	18.8	18.6	8.6	4.9	4.0	2.5	3.9	56.6	23.3	3.4	2.6	2.9	3.6	4.5	5.5	5.1	4.9	5.2	5.7	6.4	5.8	5.5	5.2	24	56.6	2.5	9.2
8	4.6	4.8	4.4	4.1	4.1	3.8	3.5	2.8	2.9	2.7	2.4	2.1	2.0	2.0	2.2	2.3	2.5	3.3	4.0	4.1	4.6	4.8	4.9	5.0	24	5.0	2.0	3.5
9	6.2	5.9	5.3	4.9	4.6	4.7	4.6	4.2	3.3	2.5	2.5	2.2	2.3	2.6	2.8	3.1	3.0	3.3	3.9	4.5	4.6	4.6	5.7	6.0	24	6.2	2.2	4.0
10	5.2	5.0	3.4	2.8	2.8	3.0	3.0	2.9	2.0	1.8	1.9	2.2	2.2	2.1	2.4	3.0	2.9	3.2	3.1	3.1	3.6	3.8	3.0	2.8	24	5.2	1.8	3.0
11	2.0	1.8	2.1	2.4	2.6	2.5	2.3	2.2	2.3	2.2	2.3	2.4	2.6	2.5	1.8	3.9	2.1	2.8	3.8	4.3	4.6	5.0	5.9	5.1	24	5.9	1.8	3.0
12	6.2	7.1	7.8	7.2	7.6	7.7	7.6	6.7	3.8	2.0	1.5	1.4	1.5	1.6	1.5	1.6	1.8	2.2	3.2	3.4	4.0	3.7	6.1	3.1	24	7.8	1.4	4.2
13	3.1	3.1	3.0	2.9	2.4	2.2	2.9	2.4	2.6	4.9	5.0	2.5	3.4	2.5	2.6	2.6	2.7	3.0	3.3	3.6	3.7	3.8	3.2	2.7	24	5.0	2.2	3.1
14	2.2	2.1	1.9	1.7	2.2	2.2	2.5	2.1	1.8	2.1	2.0	2.1	1.9	1.7	1.5	1.5	2.3	3.0	2.9	2.7	2.6	2.7	2.9	4.0	24	4.0	1.5	2.3
15	4.4	3.6	3.3	3.5	3.6	3.2	3.2	4.3	3.5	4.2	C	C	4.4	3.5	3.4	4.2	3.9	4.2	4.2	4.4	4.0	3.6	3.7	4.0	22	4.4	3.2	3.8
16	3.9	3.8	3.6	3.5	3.7	3.9	3.9	3.5	2.3	1.7	1.9	2.2	2.3	2.4	2.5	3.6	2.9	3.6	4.5	4.7	4.7	5.2	6.6	6.5	24	6.6	1.7	3.6
17	6.9	7.8	8.4	6.5	6.4	9.1	10.2	8.3	4.0	2.8	5.4	5.6	6.2	4.9	4.4	4.4	7.3	10.3	13.5	14.3	17.2	18.6	15.7	14.6	24	18.6	2.8	8.9
18	12.4	11.4	7.0	20.7	19.6	9.8	19.2	19.8	19.2	4.3	3.4	13.5	14.5	5.6	5.1	6.3	6.0	6.4	6.0	7.2	6.3	8.7	4.7	4.2	24	20.7	3.4	10.0
19	4.2	4.4	4.4	4.5	4.7	4.5	4.5	4.4	4.0	4.3	4.1	4.0	4.1	4.6	5.2	6.1	7.3	8.1	9.7	11.4	14.3	20.0	19.8	22.2	24	22.2	4.0	7.7
20	22.7	25.7	26.9	31.6	34.6	34.4	31.7	19.1	15.0	14.4	17.1	18.2	18.1	15.4	10.8	11.8	12.5	13.2	14.4	16.1	17.8	17.3	18.3	19.2	24	34.6	10.8	19.8
21	21.4	27.8	34.2	37.0	35.9	32.5	29.5	30.9	24.9	17.2	18.5	17.4	11.2	6.7	4.1	1.4	1.5	1.2	1.3	1.4	1.5	1.6	1.7	2.1	24	37.0	1.2	15.1
22	1.9	1.9	2.2	2.2	2.1	2.2	2.1	2.2	2.6	2.5	2.6	2.9	2.9	2.6	2.6	2.6	2.8	3.1	4.0	4.6	4.3	4.6	4.8	4.0	24	4.8	1.9	2.9
23	4.0	5.2	6.0	6.1	6.9	7.0	7.0	4.9	3.9	2.4	2.2	2.0	2.2	2.1	2.7	2.2	3.4	5.3	7.2	7.4	6.7	4.3	5.1	5.0	24	7.4	2.0	4.6
24	4.1	4.2	4.8	5.2	6.5	7.8	8.8	8.4	9.6	10.9	11.0	9.6	9.0	9.1	11.4	10.1	10.8	15.1	24.8	20.8	10.9	7.0	5.4	2.6	24	24.8	2.6	9.5
25	3.6	4.2	3.6	2.9	2.9	3.7	5.5	6.6	33.4	45.7	28.3	2.1	1.8	2.1	2.2	1.9	1.6	1.3	1.1	1.2	1.2	1.2	2.3	1.8	24	45.7	1.1	6.8
26	1.7	2.2	2.0	2.0	1.9	2.0	3.7	3.2	3.4	2.6	2.4	2.4	2.5	2.9	4.2	3.7	4.6	5.3	4.0	3.4	3.7	5.7	6.9	7.7	24	7.7	1.7	3.5
27	11.0	44.5	134.8	72.8	14.3	7.9	1.1	0.7	0.6	0.6	0.8	1.0	1.3	1.6	1.8	1.8	1.6	1.6	1.9	1.0	1.4	2.0	2.3	2.2	24	134.8	0.6	12.9
28	2.7	1.0	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.3	0.4	0.5	2.3	4.3	5.3	4.6	3.3	2.6	24	5.3	0.2	1.3
29	3.0	3.1	3.2	3.0	2.9	2.9	2.6	2.1	2.3	2.3	2.2	3.4	3.6	4.3	4.0	3.5	3.5	3.8	4.6	5.1	10.5	15.5	10.6	4.4	24	15.5	2.1	4.4
30	4.5	4.1	4.6	3.9	3.4	3.8	10.2	4.4	3.2	2.9	3.1	3.6	3.2	3.3	2.6	3.2	4.0	5.0	5.1	9.0	6.3	37.4	14.4	12.4	24	37.4	2.6	6.6
31	16.2	23.0	7.6	3.5	4.7	6.0	7.7	19.7	20.2	11.8	18.0	13.4	36.6	43.1	24.7	6.2	0.5	0.5	0.4	0.4	0.2	0.3	0.4	0.3	24	43.1	0.2	11.1
Count	31	31	31	31	31	31	31	31	31	31	30	30	31	31	31	31	31	31	31	31	31	31	31	31	742			
Maximum	22.7	44.5	134.8	72.8	35.9	34.4	31.7	30.9	56.6	45.7	28.3	18.2	36.6	43.1	24.7	11.8	12.5	15.1	24.8	20.8	17.8	37.4	19.8	22.2	24			
Minimum	1.7	1.0	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.3	0.4	0.5	0.4	0.4	0.2	0.3	0.4	0.3	22			
Averaage	6.6	8.3	10.7	8.7	6.7	6.2	6.5	6.1	8.0	6.2	5.3	4.5	5.1	4.8	4.2	3.8	3.8	4.5	5.3	5.7	5.7	7.0	6.2	5.8				

Percentiles	10	20	30	40	50	60	70	80	90	95	99	100
Data	1.7	2.2	2.7	3.1	3.7	4.3	5.1	6.9	13.4	19.7	36.8	134.8

Maximum Hourly	134.8
Maximum Daily	19.8
Monthly Average	6.1

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



APPENDIX E CONTINUOUS PARAMETER EDIT LOG

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**		**Serial Number:**	**1228**	
Data edit period	**Start date:**	**1-Jan-17**	**End date:**	**31-Mar-17**		**Time Zone : EST**		
Edit #	**Edit date**	**Editor's Name**	**Edit Action**	**Starting**		**Ending**		**Reason**
				Date (dd/mm/yyyy)	**Hour (xx:xx)**	**Date (dd/mm/yyyy)**	**Hour (xx:xx)**	
1	24-Feb-17	BB	Invalidate	24-Jan-17	15:00	24-Jan-17	18:00	Monthly calibration
2	24-Feb-17	BB	Data Review	20-Jan-17	12:00	20-Jan-17	20:00	An elevated SO_2 concentration of 7.7 ppb was noted on 20-Jan-17 at 17:00. Elevated SO_2 was also measured at the Courtice WPCP. Winds were blowing from the east suggesting the source was likely St. Mary's Cement. Data determined to be valid.
3	5-Apr-17	BB	Data Review	7-Feb-17	04:00	7-Feb-17	20:00	An elevated SO_2 concentration of between 25 and 40 ppb was noted on 7-Feb-17 between 4:00 and 20:00. Elevated SO_2 was also measured at the Courtice WPCP During this time. Winds were blowing from the east. Possible source could be emissions from St. Mary's Cement or CN rail traffic. Data determined to be valid.
4	5-Apr-17	BB	Invalidate	22-Feb-17	06:00	22-Feb-17	08:00	Monthly Calibration
5	5-Apr-17	BB	Invalidate	15-Mar-17	10:00	15-Mar-17	11:00	Monthly Calibration
6	11-Apr-17	BB	Data Review	31-Mar-17	10:00	31-Mar-17	14:00	An elevated SO_2 concentration of between 4.7 and 7.8 ppb was noted. Elevated SO_2 was also measured at the Courtice WPCP During this time. Winds were blowing from the east. Possible source could be emissions from St. Mary's Cement or CN rail traffic. Data determined to be valid.
7	19-Apr-17	GJC	Slope Correction	24-Jan-17	15:00	22-Feb-17	06:00	MOECC audited VES' SO_2 calibration bottle on March 2, 2017 and found the bottle's concentration read approximately 5% high. The February 22, 2017 calibration levels were adjusted by 5% to account for this. For the January 24, 2017 calibration, the bottle concentration was assumed to have drifted by 2.5% (bottled was previously calibrated in Dec 2016). Based on these adjustments to the calibration gas concentrations, span adjustments for this time period are not required.

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 parameter:	**NOx**	**Instrument make & model:**	**API Model 200E Chemiluminescence Analyzer**		**Serial Number:**	**1424**	
Data edit period	**Start date:**	**1-Jan-17**	**End date:**	**31-Mar-17**	**Time Zone : EST**		

Edit #	**Edit date**	**Editor's Name**	**Edit Action**	**Starting**		**Ending**		**Reason**
				Date (dd/mm/yyyy)	**Hour (xx:xx)**	**Date (dd/mm/yyyy)**	**Hour (xx:xx)**	
1	24-Feb-17	BB	Invalidate	24-Jan-17	15:00	24-Jan-17	18:00	Monthly calibration
2	24-Feb-17	BB	Data Review	16-Jan-17	19:00	17-Jan-17	16:00	An elevated NO_x concentration of 69.9 ppb was noted on 16-Jan-17. For this hour, the measured NO concentration was similar to NO_2 which suggests an intermediate distance emission source. Winds were blowing from the north. Elevated NO_x concentrations were also observed at the Courtice WPCP Station at the same time. Possible influence of Highway 401 or CP rail line. Data determined to be valid.
3	5-Apr-17	BB	Data Review	7-Feb-17	04:00	7-Feb-17	22:00	An elevated NOX concentration of between 30 and 45 ppb was noted on 7-Feb-17 between 4:00 and 22:00. Elevated NOX was also measured at the Courtice WPCP During this time. Winds were blowing from the east. Concentrations of NO were similar to concentrations of NO_2, indicating an intermediate distance combustion source. Possible sources could be emissions from St. Mary's Cement or CN rail traffic. Data determined to be valid.
4	5-Apr-17	BB	Zero Correction	1-Jan-17	00:00	24-Jan-17	14:00	NO zero drift after December 2016 calibration of 4.12 ppb, and a NO2 zero drift of -2.7 ppb. Adjusted NO by 4.12 ppb, NO2 by -2.7 ppb, and NOX by 1.42 ppb.
5	5-Apr-17	BB	Zero Correction	24-Jan-17	18:00	22-Feb-17	05:00	NO2 drift of -3.7 ppb after February calibration. Adjusted both NO2 and NOX zero offsets by -3.7 ppb.
6	5-Apr-17	BB	Invalidate	22-Feb-17	08:00	22-Feb-17	14:00	Large zero drift in NOX measurements, and appears non-linear. Log book indicates that a negative drift occurred after calibration, and an additional site visit was required to correct NOX zeros. Data invalidated.
7	5-Apr-17	BB	Invalidate	22-Feb-17	06:00	22-Feb-17	07:00	Monthly Calibration
8	5-Apr-17	BB	Invalidate	15-Mar-17	10:00	15-Mar-17	11:00	Monthly Calibration
9	11-Apr-17	BB	Data Review	31-Mar-17	10:00	31-Mar-17	14:00	An elevated NOX concentration of between 30 and 45 ppb was noted. Elevated NOX was also measured at the Courtice WPCP During this time. Winds were blowing from the east. Concentrations of NO were similar to concentrations of NO_2, indicating an intermediate distance combustion source. Possible sources could be emissions from St. Mary's Cement or CN rail traffic. Data determined to be valid.

Examples of Acceptable Edit Actions:

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

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:	**PM2.5**	**Instrument make & model:**		**Thermo Sharp 5030 Synchronized Hybrid**		**Serial Number:**	**CM 0269**	
Data edit period	**Start date:**	**1-Jan-17**	**End date:**	**31-Mar-17**		**Time Zone : EST**		
Edit #	**Edit date**	**Editor's Name**	**Edit Action**	**Starting**		**Ending**		**Reason**
				Date (dd/mm/yyyy)	**Hour (xx:xx)**	**Date (dd/mm/yyyy)**	**Hour (xx:xx)**	
1	24-Feb-17	BB	Invalidate	24-Jan-17	15:00	24-Jan-17	17:00	Monthly calibration
2	24-Feb-17	BB	Data Review	28-Jan-17	01:00	28-Jan-17	03:00	An elevated PM2.5 concentration of 21.9 µg/m^3 was noted on 28-Jan-17 at 2:00 AM. For this hour, concentrations were higher than at Courtice WPCP, Rundle or Oshawa. Measurements of PM2.5 matched concentrations at these other locations before and after this hour. A review of the minute data indicates a gradual increase and decrease in concentration. Winds were from the west. Possible sources include local traffic on Crago Road and the DYEC. Data determined to be valid.
3	5-Apr-17	BB	Data Review	22-Feb-17	04:00	22-Feb-17	12:00	An elevated PM2.5 concentration of between 40 and 65 µg/m^3 was noted on 22-Feb-17 between 4:00 AM and 12:00 PM. Concentrations were also elevated at the Courtice WPCP, Rundle and Oshawa Stations during this time suggesting regional sources were contributors. Winds were from the east. Possible local sources include earth works activities to the east and St. Mary's Cement. Data determined to be valid.
4	5-Apr-17	BB	Invalidate	22-Feb-17	06:00	22-Feb-17	07:00	Monthly Calibration
5	5-Apr-17	BB	Invalidate	15-Mar-17	10:00	15-Mar-17	11:00	Monthly Calibration
6	11-Apr-17	BB	Data Review	7-Mar-17	07:00	7-Mar-17	08:00	An elevated PM2.5 concentration of 56.6 µg/m^3 was noted at 7:00 AM. For this hour, concentrations were higher than at Courtice WPCP, Rundle or Oshawa. Measurements of PM2.5 matched concentrations at these other locations before and after this hour. A review of the minute data indicates a gradual increase and decrease in concentration. Winds were from the east. Possible sources include St. Mary's Cement. Data determined to be valid.
7	11-Apr-17	BB	Data Review	25-Mar-17	08:00	25-Mar-17	10:00	An elevated PM2.5 concentration of 47.7 µg/m^3 was noted at 9:00 AM. For this hour, concentrations were higher than at Courtice WPCP, Rundle or Oshawa. Measurements of PM2.5 matched concentrations at these other locations before and after this hour. A review of the minute data indicates a gradual increase and decrease in concentration. Winds were from the east. Possible sources include St. Mary's Cement. Data determined to be valid.
8	11-Apr-17	BB	Data Review	27-Mar-17	00:00	27-Mar-17	02:00	An elevated PM2.5 concentration of 135 µg/m^3 was noted at 1 AM. For this hour, concentrations were higher than at Courtice WPCP, Rundle or Oshawa. Measurements of PM2.5 matched concentrations at these other locations before and after this hour. A review of the minute data indicates a gradual increase and decrease in concentration. Winds were from the east. Possible sources include St. Mary's Cement. Data determined to be valid.

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.
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:	Temperature	Instrument make & model:		Campbell Scientific Model HMP60				
Data edit period	Start date:	1-Jan-17	End date:	31-Mar-17	Time Zone : EST			
Edit #	Edit date	Editor's Name	Edit Action	Starting		Ending		Reason
				Date (dd/mm/yyyy)	Hour (xx:xx)	Date (dd/mm/yyyy)	Hour (xx:xx)	

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-17	End date:	31-Mar-17	Time Zone : EST			
Edit #	Edit date	Editor's Name	Edit Action	Starting		Ending		Reason
				Date (dd/mm/yyyy)	Hour (xx:xx)	Date (dd/mm/yyyy)	Hour (xx:xx)	

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

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-17**	**End date:**	**31-Mar-17**		**Time Zone : EST**		
Edit #	**Edit date**	**Editor's Name**	**Edit Action**	**Starting**		**Ending**		**Reason**
				Date (dd/mm/yyyy)	**Hour (xx:xx)**	**Date (dd/mm/yyyy)**	**Hour (xx:xx)**	

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-17**	**End date:**	**31-Mar-17**		**Time Zone : EST**		
Edit #	**Edit date**	**Editor's Name**	**Edit Action**	**Starting**		**Ending**		**Reason**
				Date (dd/mm/yyyy)	**Hour (xx:xx)**	**Date (dd/mm/yyyy)**	**Hour (xx:xx)**	

Examples of Acceptable Edit Actions:
Add offset of
Delete hours
Zero Correction
Slope Correction
Manual data entry for missing, but collected data
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Marking data as out-of-range

APPENDIX F METALS DATA SUMMARY

Metals and Total Particulates	Crago Road Station																									
Location		Crago		Crago		Crago		Crago		Crago		Crago		Crago		Crago		Crago		Crago		Crago		Crago		Crago	
Date	dd/mm/yyyy	01/01/2017		07/01/2017		13/01/2017		19/01/2017		25/01/2017		31/01/2017		06/02/2017		12/02/2017		18/02/2017		24/02/2017		02/03/2017		08/03/2017		14/03/2017		20/03/2017		26/03/2017	
Start Time	hh:mm	0:00		0:00		0:00		0:00		0:00		0:00		0:00		0:00		0:00		0:00		0:00		0:00		0:00		0:00	
Sample Duration	Hours	23.77		23.09		24.44		23.35		23.9		23.71		23.33		23.71		22.67		23.89		23.19		23.58		23.36		23.62		23.69	
Technician		TH		TH		TH		TH		TH		TH		TH		TH		TH		TH		TH		TH		TH		TH		TH	
Filter Number		16120842		16120897		16121502		16122893		16122897		16092095		16092097		17011827		17011831		17011845		17011849		17012353		17012357		17012371		17012375	
Analytical Report #		B703345		B706285		B712119		B714326		B718944		B724016		B728801		B731643		B739013		B740589		B747029		B749354		B754132		B758527			
Total Volumetric Flow	Am^3/sample	1495.65		1390.68		1455.88		1453.22		1528.91		1479.40		1452.53		1485.20		1465.63		1520.16		1406.34		1489.39		1413.73		1458.71		1457.02	
Analytical Results	**Units**	**Value**	**RDL**	**Value**	**RDL**	**Value**	**RDL**	**Value**	**RDL**	**Value**	**RDL**	**Value**	**RDL**	**Value**	**RDL**	**Value**	**RDL**	**Value**	**RDL**	**Value**	**RDL**	**Value**	**RDL**	**Value**	**RDL**	**Value**	**RDL**	**Value**	**RDL**	**Value**	**RDL**
Particulate	mg	29.3	5.0	52.1	5.0	31.7	5.0	22.5	5.0	23.0	5.0	28.7	5.0	55.6	5.0	24.8	5.0	53.4	5.0	20.4	5.0	51.5	5.0	41.2	5.0	73.0	5.0	52.6	5.0	33.5	5.0
Total Mercury (Hg)	µg	<0.02	0.02	<0.02	0.02	<0.02	0.02	<0.02	0.02	<0.02	0.02	<0.02	0.02	<0.02	0.02	<0.02	0.02	<0.02	0.02	<0.02	0.02	<0.02	0.02	<0.02	0.02	0.02	0.02	<0.02	0.02	<0.02	0.02
Aluminum (Al)	µg	96	50	176	50	122	50	51	50	107	50	101	50	145	50	95	50	165	50	72	50	275	50	296	50	514	50	115	50	159	50
Antimony (Sb)	µg	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10
Arsenic (As)	µg	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0
Barium (Ba)	µg	8.1	1.0	14.7	1.0	8.1	1.0	11.0	1.0	6.8	1.0	6.6	1.0	10.3	1.0	4.9	1.0	17.5	1.0	5.8	1.0	8.0	1.0	10.2	1.0	7.8	1.0	10.2	1.0	5.2	1.0
Beryllium (Be)	µg	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0
Bismuth (Bi)	µg	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0
Boron (B)	µg	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0	<6.0	6.0
Cadmium (Cd)	µg	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0
Chromium (Cr)	µg	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	5.3	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0
Cobalt (Co)	µg	<2.0	2.0	2.8	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0
Copper (Cu)	µg	22.1	5.0	30.4	5.0	18.8	5.0	62.0	5.0	34.6	5.0	28.1	5.0	34.1	5.0	42.8	5.0	53.5	5.0	31.7	5.0	23.0	5.0	26.8	5.0	17.7	5.0	34.0	5.0	25.2	5.0
Iron (Fe)	µg	406	50	552	50	367	50	357	50	253	50	235	50	507	50	168	50	699	50	237	50	609	50	645	50	860	50	558	50	350	50
Lead (Pb)	µg	3.5	3.0	<3.0	3.0	<3.0	3.0	3.1	3.0	3.2	3.0	<3.0	3.0	<3.0	3.0	4.1	3.0	5.2	3.0	<3.0	3.0	3.2	3.0	<3.0	3.0	<3.0	3.0	5.7	3.0	<3.0	3.0
Magnesium (Mg)	µg	205	50	374	50	253	50	71	50	103	50	131	50	218	50	73	50	318	50	115	50	344	50	363	50	334	50	220	50	167	50
Manganese (Mn)	µg	20.7	1.0	18.6	1.0	12.4	1.0	8.2	1.0	7.7	1.0	7.0	1.0	12.4	1.0	5.2	1.0	19.3	1.0	6.6	1.0	20.0	1.0	23.8	1.0	25.9	1.0	13.3	1.0	7.5	1.0
Molybdenum (Mo)	µg	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0
Nickel (Ni)	µg	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0	7.9	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0	<3.0	3.0
Phosphorus (P)	µg	<25	25	<25	25	<25	25	<25	25	<25	25	<25	25	26	25	<25	25	28	25	<25	25	53	25	47	25	50	25	35	25	52	25
Selenium (Se)	µg	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10
Silver (Ag)	µg	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0
Strontium (Sr)	µg	5.5	1.0	7.9	1.0	7.5	1.0	2.6	1.0	3.5	1.0	3.5	1.0	6.9	1.0	2.9	1.0	8.6	1.0	4.1	1.0	10.3	1.0	5.5	1.0	7.7	1.0	4.7	1.0	7.0	1.0
Thallium (Tl)	µg	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10
Tin (Sn)	µg	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10
Titanium (Ti)	µg	<10	10	11	10	<10	10	<10	10	<10	10	<10	10	<10	10	<10	10	12	10	<10	10	19	10	14	10	32	10	<10	10	<10	10
Vanadium (V)	µg	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0
Zinc (Zn)	µg	60.7	5.0	33.4	5.0	24.5	5.0	31.1	5.0	39.2	5.0	19.7	5.0	30.7	5.0	31.7	5.0	46.5	5.0	13.2	5.0	21.7	5.0	27.1	5.0	24.6	5.0	52.6	5.0	21.3	5.0
Zirconium (Zr)	µg	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0
Total Uranium (U)	µg	<0.45	0.45	<0.45	0.45	<0.45	0.45	<0.45	0.45	<0.45	0.45	<0.45	0.45	<0.45	0.45	<0.45	0.45	<0.45	0.45	<0.45	0.45	<0.45	0.45	<0.45	0.45	<0.45	0.45	<0.45	0.45	<0.45	0.45

Calculated Concentrations	Quarter 1			Crago 1	Crago 2	Crago 3	Crago 4	Crago 5	Crago 6	Crago 7	Crago 8	Crago 9	Crago 10	Crago 11	Crago 12	Crago 13	Crago 14	Crago 15
	Units	Maximum	Minimum	1/1/2017	1/7/2017	1/13/2017	1/19/2017	1/25/2017	1/31/2017	2/6/2017	2/12/2017	2/18/2017	2/24/2017	3/2/2017	3/8/2017	3/14/2017	3/20/2017	3/26/2017
Particulate	$\mu g/m^3$	38.28	13.42	19.59	37.46	21.77	15.48	15.04	19.40	38.28	16.70	36.43	13.42	36.62	27.66	51.64	36.06	22.99
Total Mercury (Hg)	$\mu g/m^3$	7.19E-06	6.54E-06	6.69E-06	7.19E-06	6.87E-06	6.88E-06	6.54E-06	6.76E-06	6.88E-06	6.73E-06	6.82E-06	6.58E-06	7.11E-06	6.71E-06	1.41E-05	6.86E-06	6.86E-06
Aluminum (Al)	$\mu g/m^3$	1.27E-01	3.51E-02	6.42E-02	1.27E-01	8.38E-02	3.51E-02	7.00E-02	6.83E-02	9.98E-02	6.40E-02	1.13E-01	4.74E-02	1.96E-01	1.99E-01	3.64E-01	7.88E-02	1.09E-01
Antimony (Sb)	$\mu g/m^3$	3.60E-03	3.27E-03	3.34E-03	3.60E-03	3.43E-03	3.44E-03	3.27E-03	3.38E-03	3.44E-03	3.37E-03	3.41E-03	3.29E-03	3.56E-03	3.36E-03	3.54E-03	3.43E-03	3.43E-03
Arsenic (As)	$\mu g/m^3$	2.16E-03	1.96E-03	2.01E-03	2.16E-03	2.06E-03	2.06E-03	1.96E-03	2.03E-03	2.07E-03	2.02E-03	2.05E-03	1.97E-03	2.13E-03	2.01E-03	2.12E-03	2.06E-03	2.06E-03
Barium (Ba)	$\mu g/m^3$	1.19E-02	3.30E-03	5.42E-03	1.06E-02	5.56E-03	7.57E-03	4.45E-03	4.46E-03	7.09E-03	3.30E-03	1.19E-02	3.82E-03	5.69E-03	6.85E-03	5.52E-03	6.99E-03	3.57E-03
Beryllium (Be)	$\mu g/m^3$	3.60E-04	3.27E-04	3.34E-04	3.60E-04	3.43E-04	3.44E-04	3.27E-04	3.38E-04	3.44E-04	3.37E-04	3.41E-04	3.29E-04	3.56E-04	3.36E-04	3.54E-04	3.43E-04	3.43E-04
Bismuth (Bi)	$\mu g/m^3$	2.16E-03	1.96E-03	2.01E-03	2.16E-03	2.06E-03	2.06E-03	1.96E-03	2.03E-03	2.07E-03	2.02E-03	2.05E-03	1.97E-03	2.13E-03	2.01E-03	2.12E-03	2.06E-03	2.06E-03
Boron (B)	$\mu g/m^3$	2.16E-03	1.96E-03	2.01E-03	2.16E-03	2.06E-03	2.06E-03	1.96E-03	2.03E-03	2.07E-03	2.02E-03	2.05E-03	1.97E-03	2.13E-03	2.01E-03	2.12E-03	2.06E-03	2.06E-03
Cadmium (Cd)	$\mu g/m^3$	7.19E-04	6.54E-04	6.69E-04	7.19E-04	6.87E-04	6.88E-04	6.54E-04	6.76E-04	6.88E-04	6.73E-04	6.82E-04	6.58E-04	7.11E-04	6.71E-04	7.07E-04	6.86E-04	6.86E-04
Chromium (Cr)	$\mu g/m^3$	3.62E-03	1.64E-03	1.67E-03	1.80E-03	1.72E-03	1.72E-03	1.64E-03	1.69E-03	1.72E-03	1.68E-03	3.62E-03	1.64E-03	1.78E-03	1.68E-03	1.77E-03	1.71E-03	1.72E-03
Cobalt (Co)	$\mu g/m^3$	2.01E-03	6.54E-04	6.69E-04	2.01E-03	6.87E-04	6.88E-04	6.54E-04	6.76E-04	6.88E-04	6.73E-04	6.82E-04	6.58E-04	7.11E-04	6.71E-04	7.07E-04	6.86E-04	6.86E-04
Copper (Cu)	$\mu g/m^3$	4.27E-02	1.29E-02	1.48E-02	2.19E-02	1.29E-02	4.27E-02	2.26E-02	1.90E-02	2.35E-02	2.88E-02	3.65E-02	2.09E-02	1.64E-02	1.80E-02	1.25E-02	2.33E-02	1.73E-02
Iron (Fe)	$\mu g/m^3$	4.77E-01	1.13E-01	2.71E-01	3.97E-01	2.52E-01	2.46E-01	1.65E-01	1.59E-01	3.49E-01	1.13E-01	4.77E-01	1.56E-01	4.33E-01	4.33E-01	6.08E-01	3.83E-01	2.40E-01
Lead (Pb)	$\mu g/m^3$	3.55E-03	9.87E-04	2.34E-03	1.08E-03	1.03E-03	2.13E-03	2.09E-03	1.01E-03	1.03E-03	2.76E-03	3.55E-03	9.87E-04	2.28E-03	1.01E-03	1.06E-03	3.91E-03	1.03E-03
Magnesium (Mg)	$\mu g/m^3$	2.69E-01	4.89E-02	1.37E-01	2.69E-01	1.74E-01	4.89E-02	6.74E-02	8.85E-02	1.50E-01	4.92E-02	2.17E-01	7.56E-02	2.45E-01	2.44E-01	2.36E-01	1.51E-01	1.15E-01
Manganese (Mn)	$\mu g/m^3$	1.38E-02	3.50E-03	1.38E-02	1.34E-02	8.52E-03	5.64E-03	5.04E-03	4.73E-03	8.54E-03	3.50E-03	1.32E-02	4.34E-03	1.42E-02	1.60E-02	1.83E-02	9.12E-03	5.15E-03
Molybdenum (Mo)	$\mu g/m^3$	1.08E-03	9.81E-04	1.00E-03	1.08E-03	1.03E-03	1.03E-03	9.81E-04	1.01E-03	1.03E-03	1.01E-03	1.02E-03	9.87E-04	1.07E-03	1.01E-03	1.06E-03	1.03E-03	1.03E-03
Nickel (Ni)	$\mu g/m^3$	5.39E-03	9.81E-04	1.00E-03	1.08E-03	1.03E-03	1.03E-03	9.81E-04	1.01E-03	1.03E-03	1.01E-03	5.39E-03	9.87E-04	1.07E-03	1.01E-03	1.06E-03	1.03E-03	1.03E-03
Phosphorus (P)	$\mu g/m^3$	1.91E-02	8.18E-03	8.36E-03	8.99E-03	8.59E-03	8.60E-03	8.18E-03	8.45E-03	1.79E-02	8.42E-03	1.91E-02	8.22E-03	3.77E-02	3.16E-02	3.54E-02	2.40E-02	3.57E-02
Selenium (Se)	$\mu g/m^3$	3.60E-03	3.27E-03	3.34E-03	3.60E-03	3.43E-03	3.44E-03	3.27E-03	3.38E-03	3.44E-03	3.37E-03	3.41E-03	3.29E-03	3.56E-03	3.36E-03	3.54E-03	3.43E-03	3.43E-03
Silver (Ag)	$\mu g/m^3$	1.80E-03	1.64E-03	1.67E-03	1.80E-03	1.72E-03	1.72E-03	1.64E-03	1.69E-03	1.72E-03	1.68E-03	1.71E-03	1.64E-03	1.78E-03	1.68E-03	1.77E-03	1.71E-03	1.72E-03
Strontium (Sr)	$\mu g/m^3$	5.87E-03	1.79E-03	3.68E-03	5.68E-03	5.15E-03	1.79E-03	2.29E-03	2.37E-03	4.75E-03	1.95E-03	5.87E-03	2.70E-03	7.32E-03	3.69E-03	5.45E-03	3.22E-03	4.80E-03
Thallium (Tl)	$\mu g/m^3$	3.60E-03	3.27E-03	3.34E-03	3.60E-03	3.43E-03	3.44E-03	3.27E-03	3.38E-03	3.44E-03	3.37E-03	3.41E-03	3.29E-03	3.56E-03	3.36E-03	3.54E-03	3.43E-03	3.43E-03
Tin (Sn)	$\mu g/m^3$	3.60E-03	3.27E-03	3.34E-03	3.60E-03	3.43E-03	3.44E-03	3.27E-03	3.38E-03	3.44E-03	3.37E-03	3.41E-03	3.29E-03	3.56E-03	3.36E-03	3.54E-03	3.43E-03	3.43E-03
Titanium (Ti)	$\mu g/m^3$	8.19E-03	3.27E-03	3.34E-03	7.91E-03	3.43E-03	3.44E-03	3.27E-03	3.38E-03	3.44E-03	3.37E-03	8.19E-03	3.29E-03	1.35E-02	9.40E-03	2.26E-02	3.43E-03	3.43E-03
Vanadium (V)	$\mu g/m^3$	1.80E-03	1.64E-03	1.67E-03	1.80E-03	1.72E-03	1.72E-03	1.64E-03	1.69E-03	1.72E-03	1.68E-03	1.71E-03	1.64E-03	1.78E-03	1.68E-03	1.77E-03	1.71E-03	1.72E-03
Zinc (Zn)	$\mu g/m^3$	4.06E-02	8.68E-03	4.06E-02	2.40E-02	1.68E-02	2.14E-02	2.56E-02	1.33E-02	2.11E-02	2.13E-02	3.17E-02	8.68E-03	1.54E-02	1.82E-02	1.74E-02	3.61E-02	1.46E-02
Zirconium (Zr)	$\mu g/m^3$	1.80E-03	1.64E-03	1.67E-03	1.80E-03	1.72E-03	1.72E-03	1.64E-03	1.69E-03	1.72E-03	1.68E-03	1.71E-03	1.64E-03	1.78E-03	1.68E-03	1.77E-03	1.71E-03	1.72E-03
Total Uranium (U)	$\mu g/m^3$	1.62E-04	1.47E-04	1.50E-04	1.62E-04	1.55E-04	1.55E-04	1.47E-04	1.52E-04	1.55E-04	1.51E-04	1.54E-04	1.48E-04	1.60E-04	1.51E-04	1.59E-04	1.54E-04	1.54E-04

APPENDIX G PAHS DATA SUMMARY

Polycyclic Aromatic Hydrocarbons	Crago Station															
Location			Crago		Crago		Crago		Crago		Crago		Crago		Crago	
Date	dd/mm/yyyy		7/01/2017		19/01/2017		31/01/2017		12/02/2017		24/02/2017		8/03/2017		20/03/2017	
Start Time	hh:mm		0:00		0:00		0:00		0:00		0:00		0:00		0:00	
Sample Duration	hours		23.24		23.16		23.29		23.23		23.83		24.22		24.05	
Technician			TH		TH		TH		TH		TH		TH		TH	
Filter Number			DQS474-01		DQS524-01		DQS694-01		DSD997-01		DSE216-01		DWR773-01		DWR788-01	
Maxaam ID			DSX351		DUJ012		DWB593		DXM362		DZC789		EAQ986		ECJ303	
Maxxam Job #			B706301		B714363		B724010		B731631		B740583		B749282		B758530	
Total Volumetric Flow	Am^3/sample		325.13		358.15		354.98		359.04		329.44		348.99		356.76	
Analytical Results	Units		Value	RDL	Value	RDL	Value	RDL	Value	RDL	Value	RDL	Value	RDL	Value	RDL
Benzo(a)pyrene	µg		0.0521	0.030	0.0112	0.020	0.0234	0.030	0.0381	0.020	0.0053	0.030	0.0144	0.020	0.0172	0.060
1-Methylnaphthalene	µg		1.85	0.15	2.64	0.10	1.22	0.15	1.57	0.10	1.08	0.15	0.47	0.10	1.43	0.15
2-Methylnaphthalene	µg		2.74	0.15	4.32	0.10	1.81	0.15	2.36	0.10	1.62	0.15	0.74	0.10	2.33	0.15
Acenaphthene	µg		0.216	0.075	0.494	0.050	0.183	0.075	0.128	0.050	0.303	0.075	0.154	0.050	0.378	0.075
Acenaphthylene	µg		0.096	0.075	<0.050	0.050	<0.075	0.075	0.110	0.050	<0.075	0.075	<0.050	0.050	<0.075	0.075
Anthracene	µg		<0.075	0.075	<0.050	0.050	<0.075	0.075	<0.050	0.050	<0.075	0.075	<0.050	0.050	<0.075	0.075
Benzo(a)anthracene	µg		<0.075	0.075	<0.050	0.050	<0.075	0.075	<0.050	0.050	<0.075	0.075	<0.050	0.050	<0.075	0.075
Benzo(a)fluorene	µg		<0.15	0.15	<0.10	0.10	<0.15	0.15	<0.10	0.10	<0.15	0.15	<0.10	0.10	<0.15	0.15
Benzo(b)fluoranthene	µg		<0.075	0.075	<0.050	0.050	<0.075	0.075	<0.050	0.050	<0.075	0.075	<0.050	0.050	<0.075	0.075
Benzo(b)fluorene	µg		<0.15	0.15	<0.10	0.10	<0.15	0.15	<0.10	0.10	<0.15	0.15	<0.10	0.10	<0.15	0.15
Benzo(e)pyrene	µg		<0.15	0.15	<0.10	0.10	<0.15	0.15	<0.10	0.10	<0.15	0.15	<0.10	0.10	<0.15	0.15
Benzo(g,h,i)perylene	µg		<0.075	0.075	<0.050	0.050	<0.075	0.075	<0.050	0.050	<0.075	0.075	<0.050	0.050	<0.075	0.075
Benzo(k)fluoranthene	µg		<0.075	0.075	<0.050	0.050	<0.075	0.075	<0.050	0.050	<0.075	0.075	<0.050	0.050	<0.075	0.075
Biphenyl	µg		0.88	0.15	1.02	0.10	0.78	0.15	0.99	0.10	0.75	0.15	0.23	0.10	0.80	0.15
Chrysene	µg		<0.075	0.075	<0.050	0.050	<0.075	0.075	<0.050	0.050	<0.075	0.075	<0.050	0.050	<0.075	0.075
Dibenz(a,h)anthracene	µg		<0.075	0.075	<0.050	0.050	<0.075	0.075	<0.050	0.050	<0.075	0.075	<0.050	0.050	<0.075	0.075
Dibenzo(a,c) anthracene + Picene [1]	µg		<0.15	0.15	<0.10	0.10	<0.15	0.15	<0.10	0.10	<0.15	0.15	<0.10	0.10	<0.15	0.15
Fluoranthene	µg		0.249	0.075	0.248	0.050	0.282	0.075	0.248	0.050	0.198	0.075	0.124	0.050	0.243	0.075
Indeno(1,2,3-cd)pyrene	µg		<0.075	0.075	<0.050	0.050	<0.075	0.075	<0.050	0.050	<0.075	0.075	<0.050	0.050	<0.075	0.075
Naphthalene	µg		12.4	0.11	13.9	0.072	9.40	0.11	11.7	0.072	7.12	0.11	3.20	0.072	11.8	0.11
o-Terphenyl	µg		<0.15	0.15	<0.10	0.10	<0.15	0.15	<0.10	0.10	<0.15	0.15	<0.10	0.10	<0.15	0.15
Perylene	µg		<0.15	0.15	<0.10	0.10	<0.15	0.15	<0.10	0.10	<0.15	0.15	<0.10	0.10	<0.15	0.15
Phenanthrene	µg		0.735	0.075	1.06	0.050	0.885	0.075	0.848	0.050	0.867	0.075	0.298	0.050	0.648	0.075
Pyrene	µg		0.186	0.075	0.110	0.050	0.183	0.075	0.146	0.050	0.111	0.075	0.068	0.050	0.102	0.075
Tetralin	µg		0.59	0.15	1.28	0.10	0.45	0.15	0.70	0.10	0.45	0.15	0.41	0.10	0.88	0.15

Calculated Concentrations	Quarter 1			Crago 1	Crago 2	Crago 3	Crago 4	Crago 5	Crago 6	Crago 7
	Units	Maximum	Minimum	1/7/2017	1/19/2017	1/31/2017	12/02/2017	24/02/2017	8/03/2017	20/03/2017
Benzo(a)pyrene	ng/m^3	1.60E-01	1.61E-02	1.60E-01	3.13E-02	6.59E-02	1.06E-01	1.61E-02	4.13E-02	4.82E-02
1-Methylnaphthalene	ng/m^3	7.37E+00	1.35E+00	5.69E+00	7.37E+00	3.44E+00	4.37E+00	3.28E+00	1.35E+00	4.01E+00
2-Methylnaphthalene	ng/m^3	1.21E+01	2.12E+00	8.43E+00	1.21E+01	5.10E+00	6.57E+00	4.92E+00	2.12E+00	6.53E+00
Acenaphthene	ng/m^3	1.38E+00	3.57E-01	6.64E-01	1.38E+00	5.16E-01	3.57E-01	9.20E-01	4.41E-01	1.06E+00
Acenaphthylene	ng/m^3	3.06E-01	6.98E-02	2.95E-01	6.98E-02	1.06E-01	3.06E-01	1.14E-01	7.16E-02	1.05E-01
Anthracene	ng/m^3	1.15E-01	6.96E-02	1.15E-01	6.98E-02	1.06E-01	6.96E-02	1.14E-01	7.16E-02	1.05E-01
Benzo(a)anthracene	ng/m^3	1.15E-01	6.96E-02	1.15E-01	6.98E-02	1.06E-01	6.96E-02	1.14E-01	7.16E-02	1.05E-01
Benzo(a)fluorene	ng/m^3	2.31E-01	1.39E-01	2.31E-01	1.40E-01	2.11E-01	1.39E-01	2.28E-01	1.43E-01	2.10E-01
Benzo(b)fluoranthene	ng/m^3	1.15E-01	6.96E-02	1.15E-01	6.98E-02	1.06E-01	6.96E-02	1.14E-01	7.16E-02	1.05E-01
Benzo(b)fluorene	ng/m^3	2.31E-01	1.39E-01	2.31E-01	1.40E-01	2.11E-01	1.39E-01	2.28E-01	1.43E-01	2.10E-01
Benzo(e)pyrene	ng/m^3	2.31E-01	1.39E-01	2.31E-01	1.40E-01	2.11E-01	1.39E-01	2.28E-01	1.43E-01	2.10E-01
Benzo(g,h,i)perylene	ng/m^3	1.15E-01	6.96E-02	1.15E-01	6.98E-02	1.06E-01	6.96E-02	1.14E-01	7.16E-02	1.05E-01
Benzo(k)fluoranthene	ng/m^3	1.15E-01	6.96E-02	1.15E-01	6.98E-02	1.06E-01	6.96E-02	1.14E-01	7.16E-02	1.05E-01
Biphenyl	ng/m^3	2.85E+00	6.59E-01	2.71E+00	2.85E+00	2.20E+00	2.76E+00	2.28E+00	6.59E-01	2.24E+00
Chrysene	ng/m^3	1.15E-01	6.96E-02	1.15E-01	6.98E-02	1.06E-01	6.96E-02	1.14E-01	7.16E-02	1.05E-01
Dibenz(a,h)anthracene	ng/m^3	1.15E-01	6.96E-02	1.15E-01	6.98E-02	1.06E-01	6.96E-02	1.14E-01	7.16E-02	1.05E-01
Dibenzo(a,c) anthracene + Picene	ng/m^3	2.31E-01	1.39E-01	2.31E-01	1.40E-01	2.11E-01	1.39E-01	2.28E-01	1.43E-01	2.10E-01
Fluoranthene	ng/m^3	7.94E-01	3.55E-01	7.66E-01	6.92E-01	7.94E-01	6.91E-01	6.01E-01	3.55E-01	6.81E-01
Indeno(1,2,3-cd)pyrene	ng/m^3	1.15E-01	6.96E-02	1.15E-01	6.98E-02	1.06E-01	6.96E-02	1.14E-01	7.16E-02	1.05E-01
Naphthalene	ng/m^3	3.88E+01	9.17E+00	3.81E+01	3.88E+01	2.65E+01	3.26E+01	2.16E+01	9.17E+00	3.31E+01
o-Terphenyl	ng/m^3	2.31E-01	1.39E-01	2.31E-01	1.40E-01	2.11E-01	1.39E-01	2.28E-01	1.43E-01	2.10E-01
Perylene	ng/m^3	2.31E-01	1.39E-01	2.31E-01	1.40E-01	2.11E-01	1.39E-01	2.28E-01	1.43E-01	2.10E-01
Phenanthrene	ng/m^3	2.96E+00	8.54E-01	2.26E+00	2.96E+00	2.49E+00	2.36E+00	2.63E+00	8.54E-01	1.82E+00
Pyrene	ng/m^3	5.72E-01	1.95E-01	5.72E-01	3.07E-01	5.16E-01	4.07E-01	3.37E-01	1.95E-01	2.86E-01
Tetralin	ng/m^3	3.57E+00	1.17E+00	1.81E+00	3.57E+00	1.27E+00	1.95E+00	1.37E+00	1.17E+00	2.47E+00
Total PAH	ng/m^3	7.15E+01	1.79E+01	6.38E+01	7.15E+01	4.51E+01	5.39E+01	4.03E+01	1.79E+01	5.44E+01

Note:
RDL = Reportable Detection Limit

1. These parameters have not been subjected to Maxxam's standard validation process nor has it been accredited for the submitted matrix.

APPENDIX H DIOXINS AND FURANS DATA SUMMARY

Dioxins and Furans	Crago Station											
Location		Crago			Crago			Crago			Crago		
Date	dd/mm/yyyy	7/01/2017			31/01/2017			24/02/2017			20/03/2017		
Start Time	hh:mm	0:00			0:00			0:00			0:00		
Sample Duration	hours	23.24			23.29			23.83			24.05		
Technician		TH			TH			TH			TH		
Filter Number		DQS474-01			DQS694-01			DSE216-01			DWR788-01		
Maxaam ID		DSX351			DWB593			DZC789			ECJ303		
Maxxam Job #		B706301			B724010			B740583			B758530		
Total Volumetric Flow	Am^3/sample	325.13			354.98			329.44			356.76		
Analytical Results	Units	Value	EDL	WHO_{2005} TEF	Value	EDL	WHO_{2005} TEF	Value	EDL	WHO_{2005} TEF	Value	EDL	WHO_{2005} TEF
2,3,7,8-Tetra CDD *	pg	<3.0	3.0	1	<3.8	3.8	1	<3.3	3.3	1	<3.8	3.8	1
1,2,3,7,8-Penta CDD *	pg	<4.0	4.0	1	<3.5	3.5	1	<3.2	3.2	1	<3.6	3.6	1
1,2,3,4,7,8-Hexa CDD *	pg	2.8	2.6	0.1	<3.7	3.7	0.1	<3.0	3.0	0.1	<3.6	3.6	0.1
1,2,3,6,7,8-Hexa CDD *	pg	5.6	2.8	0.1	<4.0	4.0	0.1	<3.2	3.2	0.1	<3.9	3.9	0.1
1,2,3,7,8,9-Hexa CDD *	pg	8.8	2.5	0.1	<3.5	3.5	0.1	<2.9	2.9	0.1	<4.2 (1)	4.2	0.1
1,2,3,4,6,7,8-Hepta CDD *	pg	61.8	2.2	0.01	26.5	2.8	0.01	<10 (1)	10	0.01	32.6	3.8	0.01
Octa CDD *	pg	127	2.9	0.0003	73.5	2.9	0.0003	39.0	3.1	0.0003	89.6	3.8	0.0003
Total Tetra CDD *	pg	<3.0	3.0		<3.8	3.8		9.6	3.3		<3.8	3.8	
Total Penta CDD *	pg	7.1	4.0		<3.5	3.5		<3.2	3.2		<5.2 (1)	5.2	
Total Hexa CDD *	pg	59.0	2.6		12.8	3.7		<6.0 (1)	6.0		14.7	3.6	
Total Hepta CDD *	pg	137	2.2		61.3	2.8		12.4	3.2		69.1	3.8	
2,3,7,8-Tetra CDF **	pg	4.2	2.8	0.1	<4.1	4.1	0.1	<3.2	3.2	0.1	<4.3 (2)	4.3	0.1
1,2,3,7,8-Penta CDF **	pg	<2.9	2.9	0.03	<3.9	3.9	0.03	<3.0	3.0	0.03	<3.4	3.4	0.03
2,3,4,7,8-Penta CDF **	pg	<3.0	3.0	0.3	<4.0	4.0	0.3	<3.1	3.1	0.3	<3.4	3.4	0.3
1,2,3,4,7,8-Hexa CDF **	pg	<3.0	3.0	0.1	<3.3	3.3	0.1	<3.0	3.0	0.1	<3.3	3.3	0.1
1,2,3,6,7,8-Hexa CDF **	pg	<3.0	3.0	0.1	<3.2	3.2	0.1	<3.0	3.0	0.1	<3.3	3.3	0.1
2,3,4,6,7,8-Hexa CDF **	pg	<3.2	3.2	0.1	<3.5	3.5	0.1	<3.2	3.2	0.1	<3.4	3.4	0.1
1,2,3,7,8,9-Hexa CDF **	pg	<3.5	3.5	0.1	<3.8	3.8	0.1	<3.3	3.3	0.1	<3.5	3.5	0.1
1,2,3,4,6,7,8-Hepta CDF **	pg	4.6	2.8	0.01	3.5	2.6	0.01	3.4	3.0	0.01	6.0	2.7	0.01
1,2,3,4,7,8,9-Hepta CDF **	pg	<3.7	3.7	0.01	<3.3	3.3	0.01	<3.5	3.5	0.01	<3.1	3.1	0.01
Octa CDF **	pg	5.4	2.5	0.0003	<3.9	3.9	0.0003	<3.6 (1)	3.6	0.0003	<4.9 (1)	4.9	0.0003
Total Tetra CDF **	pg	4.2	2.8		<4.1	4.1		<3.2	3.2		4.3	3.2	
Total Penta CDF **	pg	4.1	3.0		<4.0	4.0		<3.1	3.1		<3.4	3.4	
Total Hexa CDF **	pg	<3.2	3.2		<3.4	3.4		<3.1	3.1		<4.6 (1)	4.6	
Total Hepta CDF **	pg	4.6	3.2		3.5	2.9		3.4	3.3		6.0	2.9	
Toxic Equivalency	pg												

Notes:
* CDD = Chloro Dibenzo-p-Dioxin ** CDF = Chloro Dibenzo-p-Furan

Calculated Concentrations	Quarter 1			Crago	Crago	Crago	Crago
				1	2	3	4
	Units	Maximum	Minimum	7/01/2017	31/01/2017	24/02/2017	20/03/2017
2,3,7,8-Tetra CDD *	pg/m^3	5.35E-03	4.61E-03	0.005	0.005	0.005	0.005
1,2,3,7,8-Penta CDD *	pg/m^3	6.15E-03	4.86E-03	0.006	0.005	0.005	0.005
1,2,3,4,7,8-Hexa CDD *	pg/m^3	8.61E-03	4.55E-03	0.009	0.005	0.005	0.005
1,2,3,6,7,8-Hexa CDD *	pg/m^3	1.72E-02	4.86E-03	0.017	0.006	0.005	0.005
1,2,3,7,8,9-Hexa CDD *	pg/m^3	2.71E-02	4.40E-03	0.027	0.005	0.004	0.006
1,2,3,4,6,7,8-Hepta CDD *	pg/m^3	1.90E-01	1.52E-02	0.190	0.075	0.015	0.091
Octa CDD *	pg/m^3	3.91E-01	1.18E-01	0.391	0.207	0.118	0.251
Total Tetra CDD *	pg/m^3	2.91E-02	4.61E-03	0.005	0.005	0.029	0.005
Total Penta CDD *	pg/m^3	2.18E-02	4.86E-03	0.022	0.005	0.005	0.007
Total Hexa CDD *	pg/m^3	1.81E-01	9.11E-03	0.181	0.036	0.009	0.041
Total Hepta CDD *	pg/m^3	4.21E-01	3.76E-02	0.421	0.173	0.038	0.194
2,3,7,8-Tetra CDF **	pg/m^3	1.29E-02	4.86E-03	0.013	0.006	0.005	0.006
1,2,3,7,8-Penta CDF **	pg/m^3	5.49E-03	4.46E-03	0.004	0.005	0.005	0.005
2,3,4,7,8-Penta CDF **	pg/m^3	5.63E-03	4.61E-03	0.005	0.006	0.005	0.005
1,2,3,4,7,8-Hexa CDF **	pg/m^3	4.65E-03	4.55E-03	0.005	0.005	0.005	0.005
1,2,3,6,7,8-Hexa CDF **	pg/m^3	4.62E-03	4.51E-03	0.005	0.005	0.005	0.005
2,3,4,6,7,8-Hexa CDF **	pg/m^3	4.93E-03	4.77E-03	0.005	0.005	0.005	0.005
1,2,3,7,8,9-Hexa CDF **	pg/m^3	5.38E-03	4.91E-03	0.005	0.005	0.005	0.005
1,2,3,4,6,7,8-Hepta CDF **	pg/m^3	1.68E-02	9.86E-03	0.014	0.010	0.010	0.017
1,2,3,4,7,8,9-Hepta CDF **	pg/m^3	5.69E-03	4.34E-03	0.006	0.005	0.005	0.004
Octa CDF **	pg/m^3	1.66E-02	5.46E-03	0.017	0.005	0.005	0.007
Total Tetra CDF **	pg/m^3	1.29E-02	4.86E-03	0.013	0.006	0.005	0.012
Total Penta CDF **	pg/m^3	1.26E-02	4.70E-03	0.013	0.006	0.005	0.005
Total Hexa CDF **	pg/m^3	6.45E-03	4.70E-03	0.005	0.005	0.005	0.006
Total Hepta CDF **	pg/m^3	1.68E-02	9.86E-03	0.014	0.010	0.010	0.017
Toxic Equivalency	pg/m^3						
TOTAL TOXIC EQUIVALENCY	pg TEQ/m^3	2.30E-02	1.55E-02	0.023	0.017	0.016	0.017
Calculated TEQ Concentrations	**Units**			**Crago**	**Crago**	**Crago**	**Crago**
				1/7/2017	**1/31/2017**	**2/24/2017**	**3/20/2017**
2,3,7,8-Tetra CDD *	pg TEQ/m^3			0.005	0.005	0.005	0.005
1,2,3,7,8-Penta CDD	pg TEQ/m^3			0.006	0.005	0.005	0.005
1,2,3,4,7,8-Hexa CDD	pg TEQ/m^3			0.0009	0.0005	0.0005	0.0005
1,2,3,6,7,8-Hexa CDD	pg TEQ/m^3			0.0017	0.0006	0.0005	0.0005
1,2,3,7,8,9-Hexa CDD	pg TEQ/m^3			0.0027	0.0005	0.0004	0.0006
1,2,3,4,6,7,8-Hepta CDD	pg TEQ/m^3			0.0019	0.0007	0.0002	0.0009
Octa CDD	pg TEQ/m^3			0.00012	0.00006	0.00004	0.00008
Total Tetra CDD	pg TEQ/m^3						
Total Penta CDD	pg TEQ/m^3						
Total Hexa CDD	pg TEQ/m^3						
Total Hepta CDD	pg TEQ/m^3						
2,3,7,8-Tetra CDF **	pg TEQ/m^3			0.0013	0.0006	0.0005	0.0006
1,2,3,7,8-Penta CDF	pg TEQ/m^3			0.0001	0.0002	0.0001	0.0001
2,3,4,7,8-Penta CDF	pg TEQ/m^3			0.001	0.002	0.001	0.001
1,2,3,4,7,8-Hexa CDF	pg TEQ/m^3			0.0005	0.0005	0.0005	0.0005
1,2,3,6,7,8-Hexa CDF	pg TEQ/m^3			0.0005	0.0005	0.0005	0.0005
2,3,4,6,7,8-Hexa CDF	pg TEQ/m^3			0.0005	0.0005	0.0005	0.0005
1,2,3,7,8,9-Hexa CDF	pg TEQ/m^3			0.0005	0.0005	0.0005	0.0005
1,2,3,4,6,7,8-Hepta CDF	pg TEQ/m^3			0.00014	0.00010	0.00010	0.00017
1,2,3,4,7,8,9-Hepta CDF	pg TEQ/m^3			0.00006	0.00005	0.00005	0.00004
Octa CDF	pg TEQ/m^3			0.000005	0.000002	0.000002	0.000002
Total Tetra CDF	pg TEQ/m^3						
Total Penta CDF	pg TEQ/m^3						
Total Hexa CDF	pg TEQ/m^3						
Total Hepta CDF	pg TEQ/m^3						
TOTAL TOXIC EQUIVALENCY	pg TEQ/m^3			0.023	0.017	0.016	0.017

Notes:
EDL = Estimated Detection Limit
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds