REPORT

DURHAM YORK ENERGY CENTRE

DURHAM, ONTARIO

Q4 AMBIENT AIR QUALITY MONITORING REPORT: CRAGO

RWDI # 1803743

April 3, 2019

Companion Report: February 13th , 2019 for Courtice, Rundle Road and Fenceline Stations

SUBMITTED TO

The Director, Legislative Services-
Regional Clerk or Designate,
The Regional Municipality of Durham

605 Rossland Road, East, 1st Floor,
Corporate Services-Legislative Services
Division, Whitby, ON L1N 6A3

cc: Lyndsay Waller
lyndsay.waller@durham.ca

SUBMITTED BY

Matthew Lantz, B.Sc., C.Tech., QSTI
Project Manager/Senior Specialist
matt.lantz@rwdi.com

RWDI AIR Inc.
Consulting Engineers & Scientists
600 Southgate Drive
Guelph Ontario Canada N1G 4P6
T: 519.823.1311
F: 519.823.1316

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1 INTRODUCTION

RWDI AIR Inc. (RWDI) was retained by The Regional Municipality of Durham and York (Region of Durham) to conduct discrete and continuous ambient monitoring at the Durham York Energy Centre (DYEC) stations. The facility address is 1835 Energy Drive, Clarington, Ontario. The DYEC is a facility that manages diverted municipal solid waste from the surrounding Regions to create energy from waste combustion. Operation of the DYEC commenced commercially on February 1, 2016. The site location is shown below in **Figure 1**.

Condition 11 of the Environmental Assessment Notice of Approval and Condition 7(4) of the Environmental Compliance Approval (ECA) requires ambient air monitoring to be undertaken by the DYEC. An Ambient Air Monitoring and Reporting Plan was prepared and approved by the Ministry of Environment, Conservation and Parks (MECP) to satisfy these conditions. Four (4) monitoring stations were established to monitor ambient air quality around the DYEC. Three (3) of the stations, Courtice, Rundle Road and Fence Line are reported to the MECP in a companion report date February 13, 2019, the Crago Station is reported only to the Region and is addressed in this report.

The monitoring plan was developed based on the Regional Council mandate to provide ambient monitoring in the area of the DYEC. The purpose of the ambient monitoring program is to:

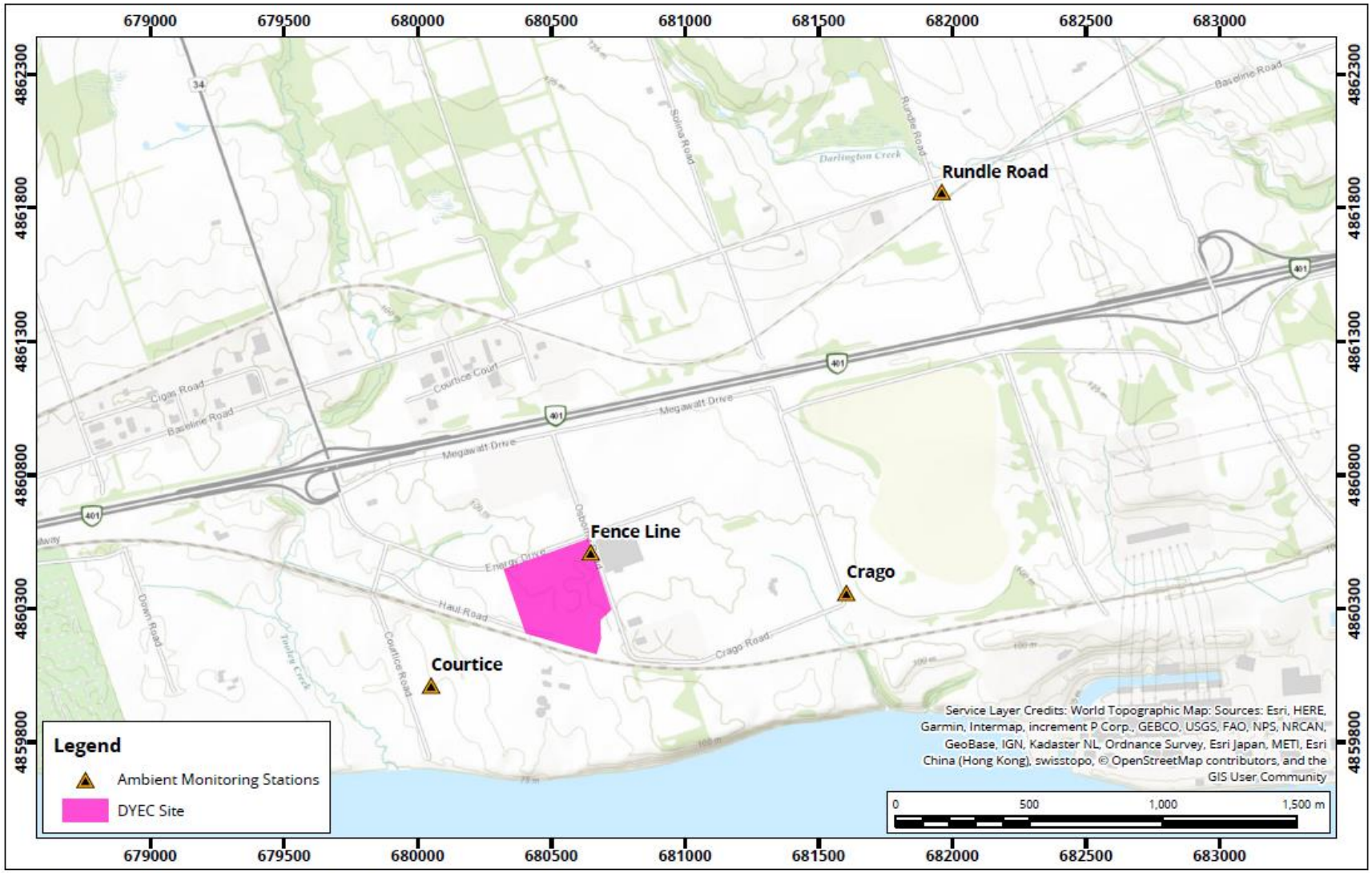
1. Quantify any measurable ground level concentrations resulting from emissions from the DYEC cumulative to local air quality, including validating the predicted concentrations from the dispersion modelling conducted in the Environmental Assessment (2009a);
2. Monitor concentration levels of EFW-related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

The facility has three (3) monitoring stations which collect continuous and discrete ambient measurements, known as the Courtice Station, Rundle Road Station and Crago Station, and one (1) ambient monitoring station which collects discrete measurements only, known as the Fence Line Station. The station locations are shown in **Figure 1**. The Crago station has been operational since late 2014, and was installed at the request of the Durham Regional Council. It is operated following the same protocols as the other monitoring stations. RWDI has overseen the operation of the stations on behalf of the Region of Durham since August 1, 2018.

The Courtice, Rundle Road and Crago Stations continuously monitor the following air quality parameters: Particulate Matter less than 2.5 microns ($PM_{2.5}$), Nitrogen Oxides (NO_X) and Sulfur Dioxide (SO_2). In addition, all discretely monitor the following air quality parameters: Total Suspended Particulate (TSP), Metals, Dioxins and Furans (D&F) and Polycyclic Aromatic Hydrocarbons (PAHs). The Fence Line Station discretely monitors Total Suspended Particulate (TSP) and metals only. It was decommissioned in 2018, December 4th being the last sample run. All Q4 results for Courtice, Rundle Road and Fence Line Stations are discussed in a different quarterly report.

Continuous meteorological data is collected at the Courtice, Rundle Road and Crago Stations. The Crago Station collects the following meteorological parameters: wind speed, wind direction, ambient temperature, precipitation and relative humidity. All Q4 meteorological results for Courtice and Rundle Road Stations are discussed in a different quarterly report.

The Crago station maintained 100% of data collection for all of the meteorological parameters measured during October and up to November 13, 2018 of Q4. Due to the decommissioning of the station on November 13, 2018 the station did not meet the requirement for number of valid hours in November or December of Q4. None of the measurements for any parameter were in excess of the Ambient Air Quality Criteria during the fourth quarter.



DYEC Site and Ambient Monitoring Station Locations

True North

Drawn by: DJH | Figure: 1

Approx. Scale: 1:20,000

Date Revised: Nov 7, 2018

Map Projection: NAD 1983 UTM Zone 17N
DYEC - Region of Durham, Ontario

Project #: 1803743

1.1 Sampling Location

The Crago site was selected in consultation with Region of Durham representatives and was chosen based on considerations of nearby receptors and agreeability with MECP siting criteria. The Crago Station is predominantly southeast of the DYEC and is located close to where Crago Road and Osborne Road intersect.

2 SAMPLING METHODOLOGY

The Crago Station is equipped with the following continuous monitors: Thermo Scientific Model 5030 SHARP (Synchronized Hybrid Ambient Real-time Particulate) monitor ($PM_{2.5}$ analyzer), Teledyne Nitrogen Oxides Analyzer Model T200 (NO_X analyzer), and a Teledyne Sulfur Dioxide Analyzer Model T100 (SO_2 analyzer). It also has the following periodic monitors: High Volume (Hi-Vol) Air Sampler outfitted with a TSP inlet head as approved by the United States Environmental Protection Agency (U.S. EPA), and a Hi-Vol Air Sampler outfitted with a polyurethane foam plug and circular quartz filter for measuring PAH's and D&F's as approved by U.S. EPA.

2.1 Nitrogen Oxide Analyzer

The Teledyne T200 Nitrogen Oxide (NO_X) analyzer uses chemiluminescence detection, coupled with microprocessor technology to provide sensitivity and stability for ambient air quality applications. The instrument determines real-time concentration of nitric oxide (NO), total nitrogen oxides (NO_X) (the sum of NO and NO_2), and nitrogen dioxide (NO_2). The amount of NO is measured by detecting the chemiluminescence reaction that occurs in the reaction cell when NO molecules are exposed to ozone (O_3). The NO and O_3 molecules collide in the reaction cell and enter a higher energy state. When these excited molecules return to a stable energy state, they emit a photon of light which is proportional to the amount of NO in the sample stream of gas entering the analyzer. To determine the total NO_X ($NO+NO_2$) measurement, sample gas is periodically bypassed through a heated molybdenum converter cartridge that converts any NO_2 molecules in the sample stream into NO (any existing NO molecules in the stream remain as is). The instrument will switch the sample stream through the converter periodically and then through the reaction cell where the same chemiluminescence reaction occurs with ozone. The resultant response produced is now the sum of NO and converted NO_2 producing a NO_X measurement. The resultant NO_2 determination is the NO_X measurement subtracted from the NO measurement.

The NO_X analyzers were zero and span checked daily using the internal zero and span (IZS) system and calibrated once a month using either EPA protocol span gases and a dilution system or an ESA permeation tube calibrator. Automatic IZS checks were performed on a daily basis commencing at approximately 23:45 on one day and ending at 00:10 the next day. The checks consisted of a 10-minute zero check, a 10-minute span check and a 5-minute purge. These checks provide a way to monitor daily performance of the analyzer using an external charcoal and purafil zeroing cartridge for the zero, and an internal permeation oven with a permeation tube for the span. These IZS checks are not for calibration purposes but are merely a diagnostic tool to identify instrument

drift. Data was collected at 1-minute intervals by an external datalogger using analog output connections, and was averaged using Envista processing software over a 1-hour and 24-hour period to compare to the applicable ambient air quality criteria. The instrument also collects data using its own data acquisition system (DAS) on a 5-minute resolution.

2.2 Sulphur Dioxide Analyzer

The Teledyne T100 Sulphur Dioxide (SO_2) Analyzer is a microprocessor controlled analyzer that determines the concentration of SO_2 in a sample gas drawn through the instrument. In the sample chamber, sample gas is excited by ultraviolet light causing the SO_2 to absorb energy from the light and move to an active state (SO_2*). These active SO_2* molecules must decay into a stable state back to SO_2, and when this happens a photon of light is released which is recognized by the instrument as fluorescence. The instrument measures the amount of florescence to determine the amount of SO_2 present in the sample gas.

The SO_2 analyzers were zero and span checked daily using the IZS system and calibrated once a month using either EPA protocol span gases and a dilution system or an ESA permeation tube calibrator. Automatic IZS checks were performed on a daily basis commencing at approximately 23:45 on one day and ending at 00:10 the next day. The checks consisted of a 10-minute zero check, a 10-minute span check and a 5-minute purge. These checks provide a way to monitor daily performance of the analyzer using an external charcoal and purafil zeroing cartridge for the zero, and an internal permeation oven with a permeation tube for the span. These IZS checks are not for calibration purposes but are merely a diagnostic tool to identify instrument drift. Data was collected at 1-minute intervals by an external datalogger using analog output connections, and was averaged using Envista processing software over a 1-hour and 24-hour period to compare to the applicable ambient air quality criteria. The instrument also collects data using its own data acquisition system (DAS) on a 1-hour resolution.

2.3 SHARP 5030 $PM_{2.5}$ Analyzer

The SHARP 5030 is a hybrid nephelometric/radiometric particulate mass monitor capable of providing precise, real-time measurements with a superior detection limit. The SHARP incorporates a high sensitivity light scattering photometer whose output signal is continuously referenced to the time-averaged measurement of an integral beta attenuating mass sensor. The SHARP also incorporates a dynamic inlet heating system designed to maintain the relative humidity of the air passing through the filter tape constant.

The SHARP is calibrated once a month to ensure accuracy and validity of its data. The $PM_{2.5}$ inlet head and sharp cut cyclone is cleaned monthly as well to ensure proper performance. The monthly calibration process consists of the following: zeroing the nephelometer if necessary, calibration of ambient temperature, calibration of barometric pressure, and calibration of the flow.

2.4 TSP High Volume Air Sampler

The Tisch TE-5170 Total Suspended Particulate (TSP) high volumetric air sampler (Hi-Vols) was outfitted with a TSP inlet capable of collecting particulate of all aerodynamic diameters. The Hi-Vol is equipped with a mass flow controller, which ensures a flow rate of 40 cubic feet per minute (CFM), a chart recorder for measuring cfm flow throughout the run time, an elapsed timer and a wheel timer for starting and stopping each sample. The Hi-Vol has a Teflon coated glass fibre filter that is outfitted at the top of the sampler, and air is drawn through the filter, thereby collecting all TSP. The TSP Hi-Vol operates on a six-day cycle, each consisting of 24-hour (midnight to midnight) samples, concurrent with the National Air Pollution Surveillance (NAPS) schedule. The Hi-Vol is calibrated monthly to ensure accuracy and validity of the volume of air drawn through the filter.

The Teflon coated glass fibre filter media is pre and post weighed by ALS Environmental in Burlington, Ontario. The filters are then analyzed for total particulate weight, metals analysis and mercury.

2.5 Polyurethane Foam Samplers

The Dioxins, Furans, and PAH samples were collected using Tisch TE-1000 sampler which is listed as reference device for U.S. EPA Methods TO-9 and TO-13. The sampler uses a collection filter that is 'backed-up' by a polyurethane foam (PUF) plug. The airborne compounds present in the particulate phase are collected on the Teflon coated glass fibre filter and any compounds present in the vapour phase are absorbed in the PUF plug. Each PUF sampler is equipped with a mass flow controller, which can sustain 8 cubic feet per minute (CFM) of flow over the sampling period, an elapsed timer and a wheel timer for starting and stopping each sample. All PUF samplers operate on a twelve-day cycle, each consisting of 24-hour (midnight to midnight) samples, concurrent with the NAPS schedule. Every twelve days, the PUF plugs and filters are analyzed for PAH's, and every twenty-four days they are analyzed for both PAH's and D&F's. The PUF sampler is calibrated monthly to ensure accuracy and validity of the volume of air drawn through the filters.

The filter and PUF media/glassware is proofed and analyzed by ALS Laboratories in Burlington, Ontario. The filters and PUF/XAD plugs are then analyzed for PAH's and D&F's.

2.6 Meteorological Tower

Meteorological data was collected from the Crago Station. The meteorological tower at the Crago Station was outfitted with a MET One Instruments Model 034B wind head that recorded wind direction and wind speed. This was done so that a vector could be associated with the applicable contaminant concentrations. It was also outfitted with a Campbell Scientific HMP60 Temperature/Relative Humidity probe, and a Texas Instruments TE525M rain gauge. Meteorological data was collected at 1-minute intervals and was averaged using Envista processing software over a 1-hour period.

3 AIR QUALITY CRITERIA AND STANDARDS

The monitored contaminant concentrations were compared to air quality criteria and standards set by the MECP and by Environment Canada. The MECP developed Ambient Air Quality Criteria (AAQCs) which are the maximum desirable concentrations in the outdoor air, based on effects to the environment and health (MECP, 2012). Not all contaminants have an applicable regulatory limit; therefore, other criteria were used for comparison. These included human health risk assessment (HHRA) criteria. For $PM_{2.5}$, Environment Canada has established a Canadian Ambient Air Quality Standard (CAAQS) (Environment Canada, 2013). CAAQS are health-based air quality objectives for the outdoor air. The current CAAQS' for $PM_{2.5}$ are 28 µg/m^3 for the 3-year average of annual 98th percentile 24-hour concentration, and 10 µg/m^3 for the 3-year average of annual average concentrations (in effect as of 2015). Since the 24-hour and annual CAAQS are based on the average of three calendar years of data, it should be noted that these standards do not apply to the quarterly data presented in this report.

All applicable criteria and standards are shown in the 'Summary of Ambient Measurements' section of this report.

4 SUMMARY OF AMBIENT MEASUREMENTS

Ambient air quality monitoring results for all contaminants sampled at the Crago Station is discussed herein. Summary statistics from October 1, 2018 to November 13th, 2018 are presented in a summary format below and in a more detailed matrix format in **Appendix A** for continuous measurements and **Appendix B** for discrete measurements.

4.1 Meteorological Station Results

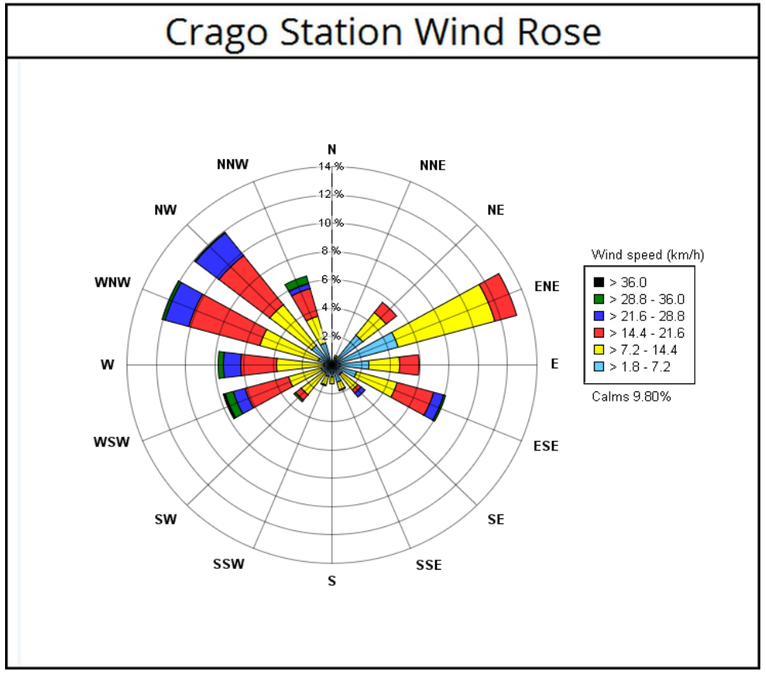
The Crago Station collected the following meteorological parameters: wind speed, wind direction, relative humidity, ambient temperature and precipitation. The Crago station maintained 100% of data collection for all of the parameters measured during October and up to November 13, 2018 of Q4. Due to the decommissioning of the station on November 13, 2018 the station did not meet the requirement for number of valid hours in November or December of Q4. Hourly statistics from the meteorological station is presented in Table 1. A wind rose showing trends in wind speed and wind direction during Q4 is provided in **Figure 2**.

Table 1: Hourly Statistics from the Crago Station

Crago Station MET Statistics	Maximum 1 hr Mean				Minimum 1 hr Mean				Monthly Mean				Total	% valid hours				
Parameter	WS	Temp	RH	Rain	WS	Temp	RH	Rain	WS	Temp	RH	Rain	Rain	WS	WD	Temp	RH	Rain
Units	(km/hr)	(°C)	(%)	mm	(km/hr)	(°C)	(%)	mm	(km/hr)	(°C)	(%)	mm	mm	(%)				
October	34	23	98	6.1	0	-3	35	0.0	11	8	77	0.1	66.7	100.0	100.0	100.0	100.0	100.0
November	36	12	97	4.8	0	-4	47	0.0	-	-	-	-	63.3	41.3	41.3	41.3	41.3	41.3
December	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	0.0	0.0	0.0	0.0
Q4 Arithmetic Mean									11	8	77	0.1	130.0	47.1	47.1	47.1	47.1	47.1

"-" data is not presented as Crago Station was decommissioned November 13. 2018.

Figure 2. Wind Rose of Hourly Wind Speed and Wind Direction – October to November, 2018



4.2 NO_X, SO_2 and $PM_{2.5}$ Summary Table Results

Table 2 provides a summary of Maximum 1-hour Means, Maximum 24-hour Means, Monthly Means, Quarterly Means, Percent valid data for the Crago station. Table 3 provides a summary of Exceedance Statistics for the Crago Station. There were no exceedances for any parameters at the Crago station during this quarter.

Table 2: Summary of Percent Valid Data for Crago Station

Crago Monitoring Station Data Statistics	Maximum 1 hr Mean					Maximum 24 hr Mean					Monthly Mean					% valid hours				
Compound	$PM_{2.5}$	NO_X	NO	NO_2	SO_2	$PM_{2.5}$	NO_X	NO	NO_2	SO_2	$PM_{2.5}$	NO_X	NO	NO_2	SO_2	$PM_{2.5}$	NO_X	NO	NO_2	SO_2
Units	($\mu g/m^3$)	ppb				($\mu g/m^3$)	ppb				($\mu g/m^3$)	ppb				(%)				
AAQC				200	250	28[A]			100	100										
October	19	64	39	25	13	10	22	9	14	4	3	7	2	5	2	99.7	95.8	95.8	95.8	95.8
November	21	53	38	23	64	12	21	8	13	9	-	-	-	-	-	41.3	41.1	41.1	41.1	41.1
December	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	0.0	0.0	0.0	0.0
Q4 Arithmetic Mean											3	8	2	6	2	47.0	45.6	45.6	45.6	45.6

[A] The 24-hour $PM_{2.5}$ criterion applies to the 98th percentile over 3 consecutive years.
"-" The November Monthly Mean, December Maximum 1 hr Mean, Maximum 24 hr Mean and Monthly Means are not presented as the % valid hours were not met as Crago Station was decommissioned November 13.

Table 3: Summary of Exceedance Statistics

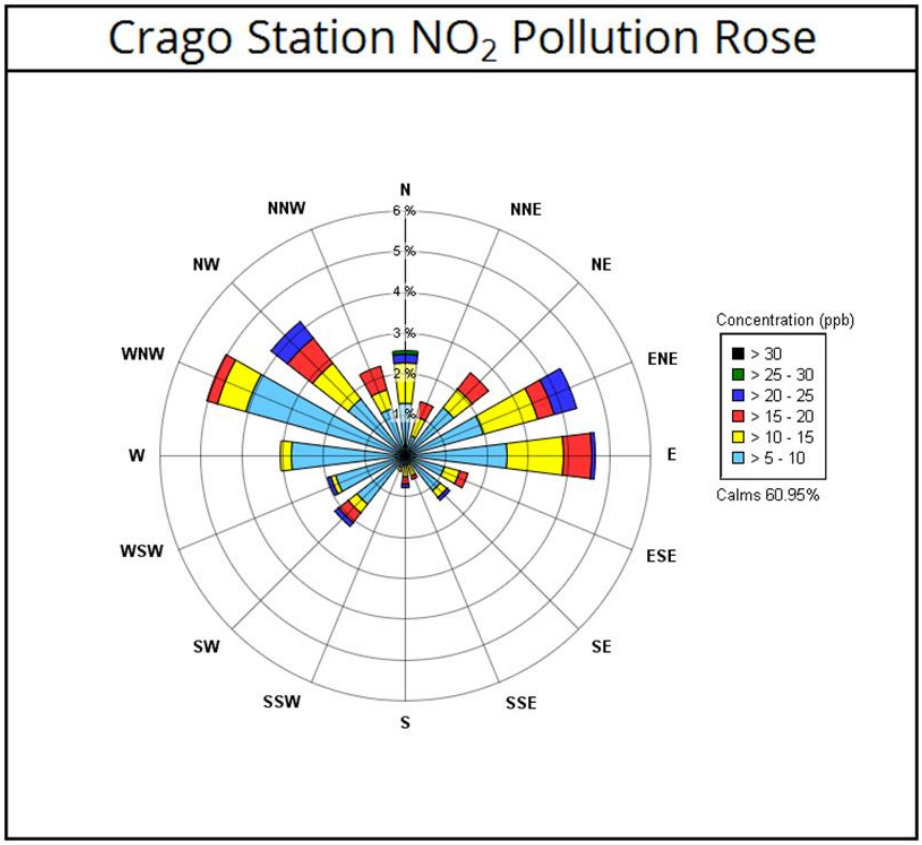
Event Statistics	Mean > 1 hr AAQC for Crago Monitoring Station			Rolling Mean > 24 hr AAQC for Crago Monitoring Station		
Compound	$PM_{2.5}$	NO_2	SO_2	$PM_{2.5}$	NO_2	SO_2
Units	No.			No.		
October	N/A	0	0	N/A	0	0
November	N/A	0	0	N/A	0	0
December	N/A	0	0	N/A	0	0
Q4 Total	-	0	0	-	0	0

4.3 Oxides of Nitrogen Results

Data recovery levels was low for oxides of nitrogen (45.6% valid data for Q4) due to the decommissioning of the station November 13, 2018. Monitoring results were compared to the AAQC for NO_2 only, as it is the only parameter that has AAQC values for 1-hour and 24-hour averaging periods (there are no AAQC's for NO or NO_X). There were no exceedances above the AAQC values for the entirety of the sampling period for 1-hour and 24-hour averaged data. The highest NO_2 value seen among the 1-hour averages was 25 ppb, which is 13% of the AAQC. The highest NO_2 value seen among the rolling 24-hour averages was 14 ppb, which is 14% of the AAQC. The measurements are summarized in Table 2 above. A pollution rose is presented in **Figure 3** for the Crago Station during Q4 composed of hourly average NO_2 concentrations. A pollution rose indicates the percentage of time that the wind originates from a given direction coupled with the pollutant measurement for that time in either ppb or micrograms per meter cubed.

In order to show where possible major sources of pollutants are coming from levels below 5 ppb were omitted from the graphic pollution rose representation. The pollution rose below shows that the majority of elevated NO_2 events at Crago occurred when the winds are from the west northwesterly and east directions. The pollution rose indicates that when the winds are out of the west northwest DYEC may be a contributor to NO_2 levels at the station. When the winds are out of the east DYEC was not a major contributor to NO_2 levels at the station.

Figure 3. Pollution Rose of Hourly Average NO_2 Concentrations – October to November 2018

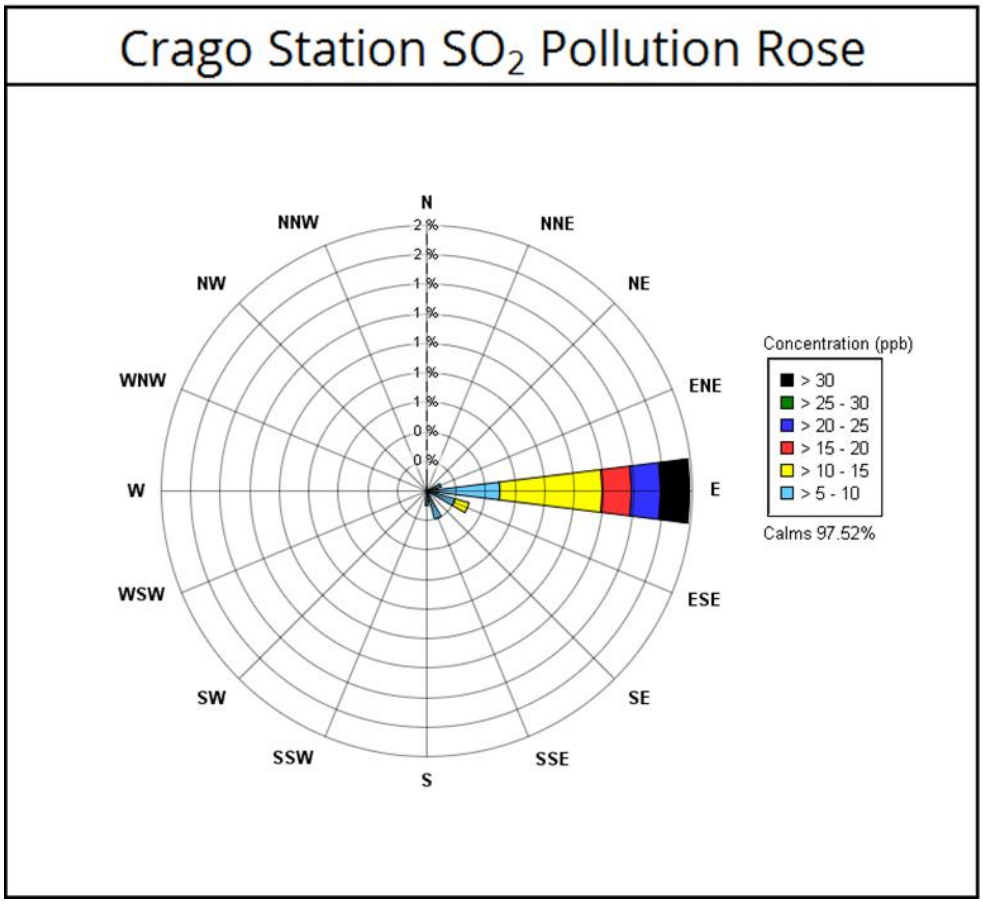


4.4 Sulphur Dioxide Results

Data recovery levels were low for sulphur dioxide (45.6% valid data) due to the decommissioning of the station November 13, 2018. Monitoring results were compared to the AAQC for 1-hour and 24-hour averaging periods. There were no exceedances above these AAQC values for the entirety of the sampling period for 1-hour and 24-hour averaged data. The highest SO_2 value seen among the 1-hour averages was 64 ppb, which is 26% of the AAQC. The highest SO_2 value seen among the 24-hour averages was 9 ppb, which is 9% of the AAQC. The results are summarized in Table 2 of this report. A pollution rose is presented in **Figure 4** for the Crago Station during Q4 composed of hourly average SO_2 concentrations.

In order to show where possible major sources of pollutants are coming from levels below 5 ppb were omitted from the graphic pollution rose representation. The pollution rose below shows that the majority of elevated SO_2 events at Crago occurred when the winds were from the east direction. The pollution rose indicates that the DYEC was not a major contributor to SO_2 levels at the station.

Figure 4. Pollution Rose of Hourly Average SO_2 Concentrations – October to November 2018

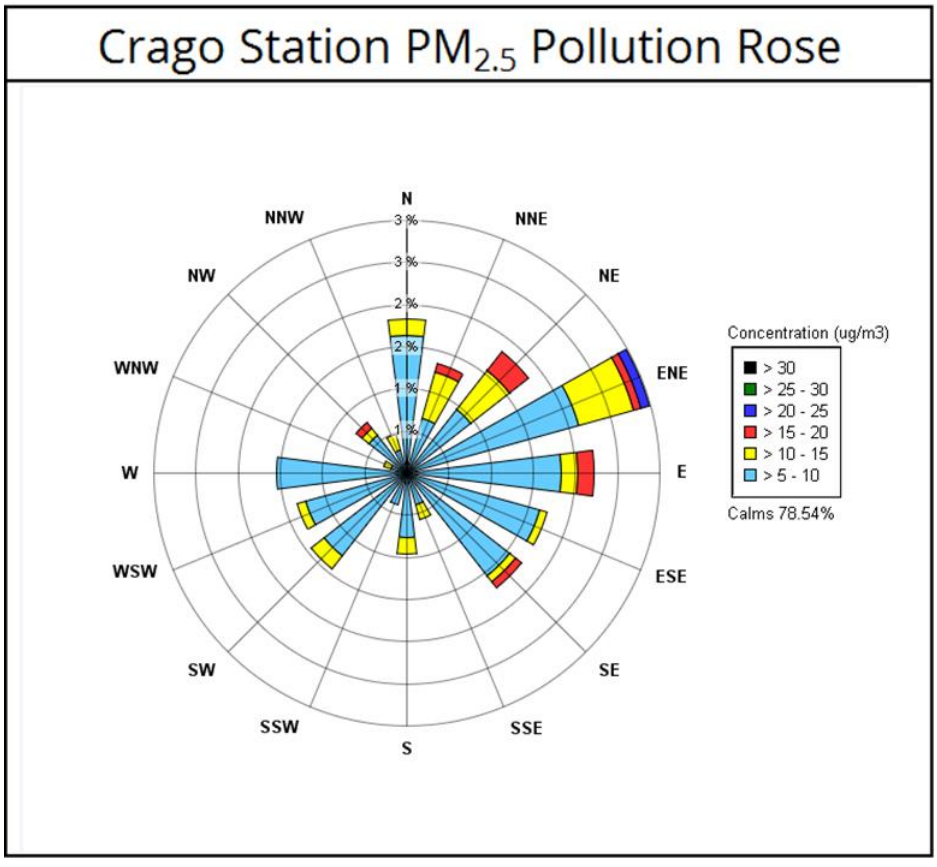


4.5 Fine Particulate Matter ($PM_{2.5}$) Results

Data recovery levels were low for particulate matter less than 2.5 microns (47% valid data) due to the decommissioning of the station November 13, 2018. The highest $PM_{2.5}$ value seen among the 1-hour averages was 21 µg/m^3 and the highest value seen among the rolling 24-hour averages was 12 µg/m^3. A pollution rose is presented in **Figure 5** for the Crago Station during Q4 composed of hourly average $PM_{2.5}$ concentrations. The results are summarized in Table 2 of this report.

In order to show where possible major sources of pollutants are coming from levels below 5 µg/m^3 were omitted from the graphic pollution rose representation. The pollution rose below shows that the majority of elevated $PM_{2.5}$ events at Crago occurred when the winds were from the east north-easterly and east directions. Low $PM_{2.5}$ also occurred when the winds were from the west direction. The pollution rose indicates that elevated $PM_{2.5}$ measurements at the station were not related to the DYEC.

Figure 5. Pollution Rose of Hourly Average $PM_{2.5}$ Concentrations – October to November 2018



4.6 TSP and Metals Hi-Vol Results

All of the TSP Hi-Vols operated on a discrete schedule every 6 days according to the NAPS schedule during Q4 with the sample days being: October 5, 11, 17, 23, 29, November 4 and 10. The TSP Hi-Vols sampling ceased after November 10, 2018 at Crago station. Data recovery levels were high for the TSP sampler at the Crago Station (100% valid data) until the station was decommissioned. There were no exceedances of any of the AAQC's or HHRA Criteria for TSP, mercury or metals during Q4. Table 4 provides a summary of the statistics for the Crago station.

Table 4: Summary of TSP Sampler Crago Station

Contaminant	Units	*MECP Criteria*	*HHRA Health Based Criteria*	No. > Criteria	Geometric Mean	Arithmetic Mean	Minimum Concentration	Q4 Maximum Concentration	October Maximum Concentration	November Maximum Concentration	December Maximum Concentration	Number of Valid Samples	% Valid data
Particulate (TSP)	µg/m³	*120*	*120*	0	15.1	16.3	9.1	28.9	28.9	15.6	N/A	7	100
Total Mercury (Hg)	µg/m³	*2*	*2*	0	5.76E-06	8.31E-06	1.43E-06	1.82E-05	1.82E-05	1.56E-06	N/A	7	100
Aluminum (Al)	µg/m³	*4.8*	-	0	1.34E-01	1.44E-01	7.60E-02	2.52E-01	2.52E-01	1.16E-01	N/A	7	100
Antimony (Sb)	µg/m³	*25*	*25*	0	5.89E-04	6.16E-04	3.10E-04	8.30E-04	8.30E-04	7.00E-04	N/A	7	100
Arsenic (As)	µg/m³	*0.3*	*0.3*	0	9.14E-04	9.14E-04	8.61E-04	9.39E-04	9.20E-04	9.39E-04	N/A	7	100
Barium (Ba)	µg/m³	*10*	*10*	0	5.00E-03	5.24E-03	3.10E-03	8.00E-03	8.00E-03	4.60E-03	N/A	7	100
Beryllium (Be)	µg/m³	*0.01*	*0.01*	0	9.71E-05	5.27E-04	2.87E-05	1.78E-03	1.78E-03	3.13E-05	N/A	7	100
Bismuth (Bi)	µg/m³	-	-	-	5.48E-04	5.49E-04	5.16E-04	5.63E-04	5.52E-04	5.63E-04	N/A	7	100
Boron (B)	µg/m³	*120*	-	0	1.22E-02	1.22E-02	1.15E-02	1.25E-02	1.23E-02	1.25E-02	N/A	7	100
Cadmium (Cd)	µg/m³	*0.025*	*0.025*	0	6.09E-04	6.10E-04	5.74E-04	6.26E-04	6.13E-04	6.26E-04	N/A	7	100
Chromium (Cr)	µg/m³	*0.5*	-	0	3.50E-03	4.00E-03	1.43E-03	6.80E-03	6.80E-03	1.56E-03	N/A	7	100
Cobalt (Co)	µg/m³	*0.1*	*0.1*	0	6.09E-04	6.10E-04	5.74E-04	6.26E-04	6.13E-04	6.26E-04	N/A	7	100
Copper (Cu)	µg/m³	*50*	-	0	1.39E-02	1.52E-02	9.00E-03	2.28E-02	2.27E-02	2.28E-02	N/A	7	100
Iron (Fe)	µg/m³	*4*	-	0	2.38E-01	2.59E-01	1.33E-01	4.77E-01	4.77E-01	2.53E-01	N/A	7	100
Lead (Pb)	µg/m³	*0.5*	*0.5*	0	1.69E-03	1.96E-03	8.61E-04	3.40E-03	3.40E-03	2.40E-03	N/A	7	100
Magnesium (Mg)	µg/m³	-	-	-	1.86E-01	2.16E-01	1.02E-01	4.36E-01	4.36E-01	1.74E-01	N/A	7	100
Manganese (Mn)	µg/m³	*0.4*	-	0	3.33E-03	7.40E-03	2.87E-04	2.06E-02	2.06E-02	3.13E-04	N/A	7	100
Molybdenum (Mo)	µg/m³	*120*	-	0	1.13E-03	2.58E-03	3.07E-04	9.82E-03	1.14E-03	9.82E-03	N/A	7	100
Nickel (Ni)	µg/m³	*0.2*	-	0	9.14E-04	9.14E-04	8.61E-04	9.39E-04	9.20E-04	9.39E-04	N/A	7	100
Phosphorus (P)	µg/m³	-	-	-	7.28E-01	9.07E-01	2.15E-01	1.50E+00	1.50E+00	2.35E-01	N/A	7	100
Selenium (Se)	µg/m³	*10*	*10*	0	3.05E-03	3.05E-03	2.87E-03	3.13E-03	3.07E-03	3.13E-03	N/A	7	100
Silver (Ag)	µg/m³	*1*	*1*	0	3.05E-04	3.05E-04	2.87E-04	3.13E-04	3.07E-04	3.13E-04	N/A	7	100
Strontium (Sr)	µg/m³	*120*	-	0	3.72E-03	3.86E-03	2.80E-03	6.30E-03	6.30E-03	3.10E-03	N/A	7	100
Thallium (Tl)	µg/m³	-	-	-	2.74E-05	2.74E-05	2.58E-05	2.82E-05	2.76E-05	2.82E-05	N/A	7	100
Tin (Sn)	µg/m³	*10*	*10*	0	9.42E-04	1.04E-03	3.07E-04	1.34E-03	1.34E-03	1.25E-03	N/A	7	100
Titanium (Ti)	µg/m³	*120*	-	0	3.35E-03	3.35E-03	3.16E-03	3.44E-03	3.37E-03	3.44E-03	N/A	7	100
Uranium (Ur)	µg/m³	*1.5*	-	0	4.31E-05	4.69E-05	2.87E-05	7.40E-05	7.40E-05	3.13E-05	N/A	7	100
Vanadium (V)	µg/m³	*2*	*1*	0	1.52E-03	1.52E-03	1.43E-03	1.56E-03	1.53E-03	1.56E-03	N/A	7	100
Zinc (Zn)	µg/m³	*120*	-	0	2.37E-02	2.55E-02	9.90E-03	4.13E-02	3.09E-02	4.13E-02	N/A	7	100
Zirconium (Zr)	µg/m³	*20*	-	0	6.09E-04	6.10E-04	5.74E-04	6.26E-04	6.13E-04	6.26E-04	N/A	7	100

Note: All non-detectable results were reported as 1/2 of the detection limit
[1] O. Reg. 419/05 Schedule 6 Upper Risk Thresholds

4.7 PAH Results

The PUF Hi-Vol operated on a discrete schedule every 12 days for PAH's according to the NAPS schedule during Q4 with the sample days being: October 5, October 17, October 29, and November 10, 2018. The PUF Hi-Vol sampling ceased after November 10, 2018 at Crago station. Data recovery levels were high for the PAH results at the Crago Station (100% valid data) until the station was decommissioned. There were no exceedances of any of the AAQC's or HHRA Criteria for any of the PAH's during Q4. Table 5 provides a summary of the statistics for the Crago station.

Table 5: Statistics Summary of PAH Results for Crago Station

Contaminant	Units	*MECP Criteria*	*HHRA Health Based Criteria*	No. > Criteria	Arithmetic Mean	Minimum Q4 Concentration	Maximum Q4 Concentration	October Maximum Concentration	November Maximum Concentration	December Maximum Concentration	Number of Valid Samples	% Valid data
1-Methylnaphthalene	ng/m^3	*12000*	-	0	1.93E+00	1.22E+00	2.42E+00	2.42E+00	1.22E+00	N/A	4	100
2-Methylnaphthalene	ng/m^3	*10000*	-	0	3.13E+00	2.30E+00	3.69E+00	3.69E+00	2.30E+00	N/A	4	100
Acenaphthene	ng/m^3	-	-	-	3.95E-01	3.17E-01	4.63E-01	4.63E-01	3.17E-01	N/A	4	100
Acenaphthylene	ng/m^3	*3500*	-	0	7.71E-02	4.35E-02	1.28E-01	1.28E-01	6.40E-02	N/A	4	100
Anthracene	ng/m^3	*200*	-	0	3.67E-02	2.15E-02	5.40E-02	5.40E-02	2.15E-02	N/A	4	100
Benzo(a)Anthracene	ng/m^3	-	-	-	1.44E-02	4.96E-03	3.17E-02	3.17E-02	4.96E-03	N/A	4	100
Benzo(a)fluorene	ng/m^3	-	-	-	2.99E-02	1.50E-03	6.69E-02	6.69E-02	2.00E-02	N/A	4	100
Benzo(a)Pyrene	ng/m^3	*0.05*[1] *5*[2] *1.1*[3]	*1*	0	2.00E-02	8.98E-03	4.02E-02	4.02E-02	1.06E-02	N/A	4	100
Benzo(b)Fluoranthene	ng/m^3	-	-	-	2.73E-02	1.23E-02	5.19E-02	5.19E-02	1.88E-02	N/A	4	100
Benzo(b)fluorene	ng/m^3	-	-	-	2.42E-02	1.50E-03	5.51E-02	5.51E-02	2.04E-02	N/A	4	100
Benzo(e)Pyrene	ng/m^3	-	-	-	2.29E-02	7.08E-04	5.10E-02	5.10E-02	7.08E-04	N/A	4	100
Benzo(g,h,i)Perylene	ng/m^3	-	-	-	2.75E-02	1.97E-02	4.52E-02	4.52E-02	2.01E-02	N/A	4	100
Benzo(k)Fluoranthene	ng/m^3	-	-	-	2.53E-02	1.45E-02	5.31E-02	5.31E-02	1.63E-02	N/A	4	100
Biphenyl	ng/m^3	-	-	-	1.16E+00	9.34E-01	1.55E+00	1.55E+00	1.20E+00	N/A	4	100
Chrysene	ng/m^3	-	-	-	3.97E-02	1.80E-02	7.68E-02	7.68E-02	2.73E-02	N/A	4	100
Dibenzo(a,h)Anthracene	ng/m^3	-	-	-	3.32E-03	7.08E-04	1.11E-02	1.11E-02	7.08E-04	N/A	4	100
Fluoranthene	ng/m^3	-	-	-	2.22E-01	1.51E-01	3.61E-01	3.61E-01	1.51E-01	N/A	4	100
Indeno(1,2,3-cd)Pyrene	ng/m^3	-	-	-	2.17E-02	1.56E-02	3.75E-02	3.75E-02	1.65E-02	N/A	4	100
Naphthalene	ng/m^3	*22500*	*22500*	0	9.11E+00	7.90E+00	1.02E+01	1.02E+01	8.53E+00	N/A	4	100
o-Terphenyl	ng/m^3	-	-	-	7.62E-03	4.89E-03	1.02E-02	1.02E-02	5.67E-03	N/A	4	100
Perylene	ng/m^3	-	-	-	9.42E-04	7.08E-04	1.55E-03	1.55E-03	7.08E-04	N/A	4	100
Phenanthrene	ng/m^3	-	-	-	8.62E-01	6.09E-01	1.36E+00	1.36E+00	6.09E-01	N/A	4	100
Pyrene	ng/m^3	-	-	-	1.46E-01	8.95E-02	2.47E-01	2.47E-01	8.95E-02	N/A	4	100
Tetralin	ng/m^3	-	-	-	1.71E+00	1.38E+00	2.32E+00	2.32E+00	1.38E+00	N/A	4	100
Total PAH[4]	ng/m^3	-	-	-	1.90E+01	1.60E+01	2.25E+01	2.25E+01	1.60E+01	N/A	4	100

NOTE: All non-detectable results were reported as 1/2 of the detection limit
[1] AAQC
[2] O. Reg. 419/05 Schedule 6 Upper Risk Thresholds
[3] O. Reg. 419/05 24 Hour Guideline
[4] Total PAH sums all PAH contaminants

4.8 Dioxin and Furan Results

The PUF Hi-Vol operated on a discrete schedule every 24 days for D&F's according to the NAPS schedule during Q4 with the sample days being: October 17, November 10, 2018. The PUF Hi-Vol sampling ceased after November 10, 2018 at Crago station. Data recovery levels were acceptable for the D&F results at the Crago Station (100% valid data) until the station was decommissioned. There were no exceedances of any of the AAQC's or HHRA Criteria for any of the D&F's during Q4. Table 6 provides a summary of the statistics for the Crago station.

Table 6: 2018 Q4 Monitoring Results for Dioxin and Furan, Crago Station

Contaminant	Units	*MECP Criteria*	*HHRA Health Based Criteria*	No. > Criteria	Arithmetic Mean	Minimum Concentration	Q4 Maximum Concentration	October Maximum Concentration	November Maximum Concentration	December Maximum Concentration	Number of Valid Samples	% Valid data
2,3,7,8-TCDD	pg/m^3	-	-	-	9.87E-04	3.12E-04	1.66E-03	1.66E-03	3.12E-04	N/A	2	100
1,2,3,7,8-PeCDD	pg/m^3	-	-	-	8.16E-04	4.53E-04	1.18E-03	1.18E-03	4.53E-04	N/A	2	100
1,2,3,4,7,8-HxCDD	pg/m^3	-	-	-	6.42E-04	4.53E-04	8.31E-04	8.31E-04	4.53E-04	N/A	2	100
1,2,3,6,7,8-HxCDD	pg/m^3	-	-	-	7.67E-04	7.40E-04	7.93E-04	7.40E-04	7.93E-04	N/A	2	100
1,2,3,7,8,9-HxCDD	pg/m^3	-	-	-	8.04E-04	7.93E-04	8.16E-04	8.16E-04	7.93E-04	N/A	2	100
1,2,3,4,6,7,8-HpCDD	pg/m^3	-	-	-	8.89E-03	6.04E-03	1.17E-02	6.04E-03	1.17E-02	N/A	2	100
OCDD	pg/m^3	-	-	-	5.61E-02	3.60E-02	7.61E-02	7.61E-02	3.60E-02	N/A	2	100
2,3,7,8-TCDF	pg/m^3	-	-	-	1.52E-03	1.23E-03	1.81E-03	1.81E-03	1.23E-03	N/A	2	100
1,2,3,7,8-PeCDF	pg/m^3	-	-	-	7.25E-04	5.29E-04	9.21E-04	5.29E-04	9.21E-04	N/A	2	100
2,3,4,7,8-PeCDF	pg/m^3	-	-	-	7.87E-04	4.98E-04	1.08E-03	4.98E-04	1.08E-03	N/A	2	100
1,2,3,4,7,8-HxCDF	pg/m^3	-	-	-	6.90E-04	3.82E-04	9.97E-04	9.97E-04	3.82E-04	N/A	2	100
1,2,3,6,7,8-HxCDF	pg/m^3	-	-	-	7.42E-04	6.23E-04	8.61E-04	8.61E-04	6.23E-04	N/A	2	100
2,3,4,6,7,8-HxCDF	pg/m^3	-	-	-	7.82E-04	5.67E-04	9.97E-04	9.97E-04	5.67E-04	N/A	2	100
1,2,3,7,8,9-HxCDF	pg/m^3	-	-	-	7.63E-04	4.39E-04	1.09E-03	1.09E-03	4.39E-04	N/A	2	100
1,2,3,4,6,7,8-HpCDF	pg/m^3	-	-	-	1.92E-03	1.66E-03	2.18E-03	1.66E-03	2.18E-03	N/A	2	100
1,2,3,4,7,8,9-HpCDF	pg/m^3	-	-	-	1.31E-03	6.52E-04	1.96E-03	1.96E-03	6.52E-04	N/A	2	100
OCDF	pg/m^3	-	-	-	1.96E-03	1.51E-03	2.41E-03	1.51E-03	2.41E-03	N/A	2	100
Total Toxic Equivalency	pg TEQ/m^3	*0.1* *1*[1]	-	0	2.87E-03	1.80E-03	3.94E-03	3.94E-03	1.80E-03	N/A	2	100

5 DATA REQUESTS

The following sections outline any instrumentation issues encountered that have caused data loss at any of the monitors at each of the stations.

Appendix C contains monthly IZS zero trends for the NO_X and SO_2 analyzers at the Crago Station.

Edit logs identifying missing data, maintenance times, calibrations and any other missing data have been included in **Appendix D**.

Due to time based drift between the NO_X and SO_2 unit time prompting overnight IZS response and the datalogger time recording the response, the overnight IZS response spanned over 15 min of the 00:00-01:00 hour from October 1-29 and 01:00-2:00 hour on November 7. Since 75% valid data was not captured, there was less than the sample size required for the hour to be valid.

6 CONCLUSIONS

This Q4 report provides a summary of the ambient air quality data collected at the Crago Station. Throughout this monitoring period, there were no exceedances of any AAQC or HHRA Health Based Criteria. Data recovery rates were acceptable and valid for all measured Q4 parameters up until the station was decommissioned on November 13th, 2018.

7 REFERENCES

1. Canadian Council of Ministers of the Environment, 2012. Guidance Document on Achievement Determination Canadian Ambient Air Quality Standards for Fine Particulate Matter and Ozone. PN 1483 978-1-896997-91-9 PDF
2. Environment Canada, 2013. Canadian Ambient Air Quality Standards. [Online]
3. Ontario Ministry of the Environment and Climate Change, 2012. [Standards Development Branch] Ontario's Ambient Air Quality Criteria (Sorted by Contaminant Name). PIBS #6570e01

APPENDIX A

Table A1: 2018 Summary Statistics for Q4

Crago Monitoring Station Data Statistics	Maximum 1 hr Mean					Maximum 24 hr Mean					Monthly Mean					% valid hours				
Compound	$PM_{2.5}$	NO_x	NO	NO_2	SO_2	$PM_{2.5}$	NO_x	NO	NO_2	SO_2	$PM_{2.5}$	NO_x	NO	NO_2	SO_2	$PM_{2.5}$	NO_x	NO	NO_2	SO_2
Units	($\mu g/m^3$)	ppb				($\mu g/m^3$)	ppb				($\mu g/m^3$)	ppb				(%)				
AAQC				200	250	28			100	100										
October	19	64	39	25	13	10	22	9	14	4	3	7	2	5	2	99.7	95.8	95.8	95.8	95.8
November	21	53	38	23	64	12	21	8	13	9	3	8	2	6	3	41.3	41.1	41.1	41.1	41.1
December	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	0.0	0.0	0.0	0.0
Q4 Arithmetic Mean											3	8	2	6	2	47.0	45.6	45.6	45.6	45.6

Event Statistics	Mean > 1 hr AAQC for Crago Monitoring Station			Rolling Mean > 24 hr AAQC for Crago Monitoring Station		
Compound	$PM_{2.5}$	NO_2	SO_2	$PM_{2.5}$	NO_2	SO_2
Units	No.			No.		
October	N/A	0	0	N/A	0	0
November	N/A	0	0	N/A	0	0
December	N/A	0	0	N/A	0	0
Q4 Total	-	0	0	-	0	0

Crago Station MET Statistics	Maximum 1 hr Mean				Minimum 1 hr Mean				Monthly Mean				Total	% valid hours				
Parameter	WS	Temp	RH	Rain	WS	Temp	RH	Rain	WS	Temp	RH	Rain	Rain	WS	WD	Temp	RH	Rain
Units	(km/hr)	(°C)	(%)	mm	(km/hr)	(°C)	(%)	mm	(km/hr)	(°C)	(%)	mm	mm	(%)				
October	34	23	98	6.1	0	-3	35	0.0	11	8	77	0.1	66.7	100.0	100.0	100.0	100.0	100.0
November	36	12	97	4.8	0	-4	47	0.0	13	4	77	0.2	63.3	41.3	41.3	41.3	41.3	41.3
December	-	-	0	-	-	-	0	-	-	-	-	-	-	0.0	0.0	0.0	0.0	0.0
Q4 Arithmetic Mean									12	6	77	0.2	130	47.1	47.1	47.1	47.1	47.1

Table A2: 2018 Q4 Station Crago Monitoring Results for $PM_{2.5}$

Data Statistics	Rolling Mean > 24 hr AAQC	Arithmetic Mean	Maximum 1 hr Mean	Maximum 24 hr Rolling Mean	Number of valid Hours	% valid data
Month	$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$
	No.	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	No.	%
October	N/A	3	19	10	742	99.7
November	N/A	3	21	12	297	41.3
December	N/A	-	-	-	0	0.0

Table A3: 2018 Q4 Station Crago Monitoring Results for NO_X

Data Statistics	Events > 1 hr AAQC	Events > 24 hr AAQC	Arithmetic Mean	Maximum 1 hr Mean	Maximum 24 hr Rolling Mean	Number of valid Hours	% valid data
Month	NO_x	NO_x	NO_x	NO_x	NO_x	NO_x	NO_x
	No.	No.	(ppb)	(ppb)	(ppb)	No.	%
October	N/A	N/A	7	64	22	713	95.8
November	N/A	N/A	8	53	21	296	41.1
December	N/A	N/A	-	-	-	0	0.0

Table A4: 2018 Q4 Station Crago Monitoring Results for NO

Data Statistics	Events > 1 hr AAQC	Events > 24 hr AAQC	Arithmetic Mean	Maximum 1 hr Mean	Maximum 24 hr Rolling Mean	Number of valid Hours	% valid data
Month	NO	NO	NO	NO	NO	NO	NO
	No.	No.	(ppb)	(ppb)	(ppb)	No.	%
October	N/A	N/A	2	39	9	713	95.8
November	N/A	N/A	2	38	8	296	41.1
December	N/A	N/A	-	-	-	0	0.0

Table A5: 2018 Q4 Station Crago Monitoring Results for NO_2

Data Statistics	Events > 1 hr AAQC	Rolling Mean > 24 hr AAQC	Arithmetic Mean	Maximum 1 hr Mean	Maximum 24 hr Rolling Mean	Number of valid Hours	% valid data
Month	NO_2	NO_2	NO_2	NO_2	NO_2	NO_2	NO_2
	No.	No.	(ppb)	(ppb)	(ppb)	No.	%
October	0	0	5	25	14	713	95.8
November	0	0	6	23	13	296	41.1
December	0	0	-	-	-	0	0.0

Table A6: 2018 Q4 Station Crago Monitoring Results for SO_2

Data Statistics	Events > 1 hr AAQC	Rollling Mean > 24 hr AAQC	Arithmetic Mean	Maximum 1 hr Mean	Maximum 24 hr Rolling Mean	Number of valid Hours	% valid data
Month	SO_2	SO_2	SO_2	SO_2	SO_2	SO_2	SO_2
	No.	No.	(ppb)	(ppb)	(ppb)	No.	%
October	0	0	1.9	13	4	713	95.8
November	0	0	2.8	64	9	296	41.1
December	0	0	-	-	-	0	0.0

Table A7: 2018 Q4 Crago Meteorological Station Windspeed Data Summary

MET Statistics	Maximum 1 hr Mean	Minimum 1 hr	Quarterly Mean	% valid hours
Month	Wind Speed	Wind Speed	Wind Speed	Wind Speed
	(km/hr)	(km/hr)	(km/hr)	(%)
October	34	0	11	100.0
November	36	0	13	41.3
December	-	-	-	0.0

Table A8: 2018 Q4 Crago Meteorological Station Wind Direction Data Summary

MET Statistics	% valid hours
Month	Wind Direction
	(%)
October	100.0
November	41.3
December	0.0

Table A9: 2018 Q4 Crago Meteorological Station Temperature Data Summary

MET Statistics	Maximum 1 hr Mean	Minimum 1 hr	Quarterly Mean	% valid hours
Month	Temperature	Temperature	Temperature	Temperature
	(°C)	(°C)	(°C)	(%)
October	23	-3	8	100.0
November	12	-4	4	41.3
December	-	-	-	0.0

Table A10: 2018 Q4 Crago Meteorological Station Relative Humidity Data Summary

MET Statistics	Maximum 1 hr Mean	Minimum 1 hr	Monthly Mean	% valid hours
Month	Relative Humidity	Relative Humidity	Relative Humidity	Relative Humidity
	(%)	(%)	(%)	(%)
October	98	35	77	100.0
November	97	47	77	41.3
December	0	0	-	0.0

Table A11: 2018 Q4 Crago Meteorological Station Precipitation Data Summary

MET Statistics	Maximum 1 hr Mean	Minimum 1 hr	Monthly Mean	Total	% valid hours
Month	Precipitation	Precipitation	Precipitation	Precipitation	Precipitation
	(mm)	(mm)	(mm)	(mm)	(mm)
October	6.1	0.0	0.1	66.7	100.0
November	4.8	0.0	0.2	63.3	41.3
December	-	-	-	-	0.0

APPENDIX B

Table B1: Summary of Sample Flow Rate and Sample Duration for D&Fs

Sample Date	Crago		
	Filter ID	Sample Duration	Sample Volume
	No.	(min)	(m^3)
October 17, 2018	CRAGO-DX/PAH-OCT17	1450	331
November 10, 2018	CRAGO-DX/PAH-NOV10	1447	353
December 4, 2018	Station Decomissioned	Station Decomissioned	Station Decomissioned
December 28, 2018	Station Decomissioned	Station Decomissioned	Station Decomissioned

Table B2: 2018 Crago Station Q4 Monitoring Results for D&F

Contaminant	Units	*MECP Criteria*	*HHRA Health Based Criteria*	17-Oct-18	10-Nov-18	MECP Criteria ($\mu g/m^3$)	No. > Criteria	Arithmetic Mean	Q4 Minimum Concentration	Q4 Maximum Concentration	October Maximum Concentration	November Maximum Concentration	December Maximum Concentration	Number of Valid Samples	% Valid data
2,3,7,8-TCDD	pg/m^3	-	-	1.66E-03	3.12E-04	-	-	9.87E-04	3.12E-04	1.66E-03	1.66E-03	3.12E-04	N/A	2	100
1,2,3,7,8-PeCDD	pg/m^3	-	-	1.18E-03	4.53E-04	-	-	8.16E-04	4.53E-04	1.18E-03	1.18E-03	4.53E-04	N/A	2	100
1,2,3,4,7,8-HxCDD	pg/m^3	-	-	8.31E-04	4.53E-04	-	-	6.42E-04	4.53E-04	8.31E-04	8.31E-04	4.53E-04	N/A	2	100
1,2,3,6,7,8-HxCDD	pg/m^3	-	-	7.40E-04	7.93E-04	-	-	7.67E-04	7.40E-04	7.93E-04	7.40E-04	7.93E-04	N/A	2	100
1,2,3,7,8,9-HxCDD	pg/m^3	-	-	8.16E-04	7.93E-04	-	-	8.04E-04	7.93E-04	8.16E-04	8.16E-04	7.93E-04	N/A	2	100
1,2,3,4,6,7,8-HpCDD	pg/m^3	-	-	6.04E-03	1.17E-02	-	-	8.89E-03	6.04E-03	1.17E-02	6.04E-03	1.17E-02	N/A	2	100
OCDD	pg/m^3	-	-	7.61E-02	3.60E-02	-	-	5.61E-02	3.60E-02	7.61E-02	7.61E-02	3.60E-02	N/A	2	100
2,3,7,8-TCDF	pg/m^3	-	-	1.81E-03	1.23E-03	-	-	1.52E-03	1.23E-03	1.81E-03	1.81E-03	1.23E-03	N/A	2	100
1,2,3,7,8-PeCDF	pg/m^3	-	-	5.29E-04	9.21E-04	-	-	7.25E-04	5.29E-04	9.21E-04	5.29E-04	9.21E-04	N/A	2	100
2,3,4,7,8-PeCDF	pg/m^3	-	-	4.98E-04	1.08E-03	-	-	7.87E-04	4.98E-04	1.08E-03	4.98E-04	1.08E-03	N/A	2	100
1,2,3,4,7,8-HxCDF	pg/m^3	-	-	9.97E-04	3.82E-04	-	-	6.90E-04	3.82E-04	9.97E-04	9.97E-04	3.82E-04	N/A	2	100
1,2,3,6,7,8-HxCDF	pg/m^3	-	-	8.61E-04	6.23E-04	-	-	7.42E-04	6.23E-04	8.61E-04	8.61E-04	6.23E-04	N/A	2	100
2,3,4,6,7,8-HxCDF	pg/m^3	-	-	9.97E-04	5.67E-04	-	-	7.82E-04	5.67E-04	9.97E-04	9.97E-04	5.67E-04	N/A	2	100
1,2,3,7,8,9-HxCDF	pg/m^3	-	-	1.09E-03	4.39E-04	-	-	7.63E-04	4.39E-04	1.09E-03	1.09E-03	4.39E-04	N/A	2	100
1,2,3,4,6,7,8-HpCDF	pg/m^3	-	-	1.66E-03	2.18E-03	-	-	1.92E-03	1.66E-03	2.18E-03	1.66E-03	2.18E-03	N/A	2	100
1,2,3,4,7,8,9-HpCDF	pg/m^3	-	-	1.96E-03	6.52E-04	-	-	1.31E-03	6.52E-04	1.96E-03	1.96E-03	6.52E-04	N/A	2	100
OCDF	pg/m^3	-	-	1.51E-03	2.41E-03	-	-	1.96E-03	1.51E-03	2.41E-03	1.51E-03	2.41E-03	N/A	2	100
Total Toxic Equivalency	$pg\ TEQ/m^3$	*0.1* *1* [1]	-	3.94E-03	1.80E-03	0.1	0	2.87E-03	1.80E-03	3.94E-03	3.94E-03	1.80E-03	N/A	2	100

NOTE: All non-detectable results were reported as 1/2 of the detection limit

[1] O. Reg. 419/05 Schedule Upper Risk Thresholds

Table B3: Summary of Sample Flow Rate and Sample Duration for PAHs

Sample Date	Crago		
	Filter ID No.	Sample Duration (min)	Sample Volume (m^3)
October 5, 2018	CRAGO-PAH-OCT5	1447	333
October 17, 2018	CRAGO-DX/PAH-OCT17	1450	331
October 29, 2018	CRAGO-PAH-OCT29	1444	341
November 10, 2018	CRAGO-DX/PAH-NOV.10	1447	353
November 22, 2018	Crago Station Decomissioned	Crago Station Decomissioned	Crago Station Decomissioned
December 4, 2018	Crago Station Decomissioned	Crago Station Decomissioned	Crago Station Decomissioned
December 16, 2018	Crago Station Decomissioned	Crago Station Decomissioned	Crago Station Decomissioned
December 28, 2018	Crago Station Decomissioned	Crago Station Decomissioned	Crago Station Decomissioned

Table B4: 2018 Crago Station Q4 Monitoring Results for PAHs

Contaminant	Units	*MECP Criteria*	*HHRA Health Based Criteria*	5-Oct-18	17-Oct-18	29-Oct-18	10-Nov-18	MECP Criteria (µg/m^3)	No. > Criteria	Arithmetic Mean	Minimum Q4 Concentration	Maximum Q4 Concentration	October Maximum Concentration	November Maximum Concentration	December Maximum Concentration	Number of Valid Samples	% Valid data
1-Methylnaphthalene	ng/m^3	*12000*	-	1.83E+00	2.42E+00	2.25E+00	1.22E+00	*12000*	0	1.93E+00	1.22E+00	2.42E+00	2.42E+00	1.22E+00	N/A	4	100
2-Methylnaphthalene	ng/m^3	*10000*	-	3.18E+00	3.69E+00	3.34E+00	2.30E+00	*10000*	0	3.13E+00	2.30E+00	3.69E+00	3.69E+00	2.30E+00	N/A	4	100
Acenaphthene	ng/m^3	-	-	4.62E-01	3.38E-01	4.63E-01	3.17E-01	-	-	3.95E-01	3.17E-01	4.63E-01	4.63E-01	3.17E-01	N/A	4	100
Acenaphthylene	ng/m^3	*3500*	-	4.35E-02	7.28E-02	1.28E-01	6.40E-02	*3500*	0	7.71E-02	4.35E-02	1.28E-01	1.28E-01	6.40E-02	N/A	4	100
Anthracene	ng/m^3	*200*	-	3.54E-02	3.60E-02	5.40E-02	2.15E-02	*200*	0	3.67E-02	2.15E-02	5.40E-02	5.40E-02	2.15E-02	N/A	4	100
Benzo(a)Anthracene	ng/m^3	-	-	7.12E-03	1.40E-02	3.17E-02	4.96E-03	-	-	1.44E-02	4.96E-03	3.17E-02	3.17E-02	4.96E-03	N/A	4	100
Benzo(a)fluorene	ng/m^3	-	-	1.50E-03	3.11E-02	6.69E-02	2.00E-02	-	-	2.99E-02	1.50E-03	6.69E-02	6.69E-02	2.00E-02	N/A	4	100
Benzo(a)Pyrene	ng/m^3	*0.05* [1] *5* [2] *1.1* [3]	*1*	8.98E-03	2.01E-02	4.02E-02	1.06E-02	*0.05*	0	2.00E-02	8.98E-03	4.02E-02	4.02E-02	1.06E-02	N/A	4	100
Benzo(b)Fluoranthene	ng/m^3	-	-	1.23E-02	2.60E-02	5.19E-02	1.88E-02	-	-	2.73E-02	1.23E-02	5.19E-02	5.19E-02	1.88E-02	N/A	4	100
Benzo(b)fluorene	ng/m^3	-	-	1.50E-03	2.00E-02	5.51E-02	2.04E-02	-	-	2.42E-02	1.50E-03	5.51E-02	5.51E-02	2.04E-02	N/A	4	100
Benzo(e)Pyrene	ng/m^3	-	-	2.30E-02	1.70E-02	5.10E-02	7.08E-04	-	-	2.29E-02	7.08E-04	5.10E-02	5.10E-02	7.08E-04	N/A	4	100
Benzo(g,h,i)Perylene	ng/m^3	-	-	1.97E-02	2.51E-02	4.52E-02	2.01E-02	-	-	2.75E-02	1.97E-02	4.52E-02	4.52E-02	2.01E-02	N/A	4	100
Benzo(k)Fluoranthene	ng/m^3	-	-	1.45E-02	1.73E-02	5.31E-02	1.63E-02	-	-	2.53E-02	1.45E-02	5.31E-02	5.31E-02	1.63E-02	N/A	4	100
Biphenyl	ng/m^3	-	-	9.34E-01	9.52E-01	1.55E+00	1.20E+00	-	-	1.16E+00	9.34E-01	1.55E+00	1.55E+00	1.20E+00	N/A	4	100
Chrysene	ng/m^3	-	-	1.80E-02	3.66E-02	7.68E-02	2.73E-02	-	-	3.97E-02	1.80E-02	7.68E-02	7.68E-02	2.73E-02	N/A	4	100
Dibenzo(a,h)Anthracene	ng/m^3	-	-	7.51E-04	7.55E-04	1.11E-02	7.08E-04	-	-	3.32E-03	7.08E-04	1.11E-02	1.11E-02	7.08E-04	N/A	4	100
Fluoranthene	ng/m^3	-	-	1.59E-01	2.17E-01	3.61E-01	1.51E-01	-	-	2.22E-01	1.51E-01	3.61E-01	3.61E-01	1.51E-01	N/A	4	100
Indeno(1,2,3-cd)Pyrene	ng/m^3	-	-	1.56E-02	1.71E-02	3.75E-02	1.65E-02	-	-	2.17E-02	1.56E-02	3.75E-02	3.75E-02	1.65E-02	N/A	4	100
Naphthalene	ng/m^3	*22500*	*22500*	7.90E+00	1.02E+01	9.85E+00	8.53E+00	*22500*	0	9.11E+00	7.90E+00	1.02E+01	1.02E+01	8.53E+00	N/A	4	100
o-Terphenyl	ng/m^3	-	-	9.73E-03	4.89E-03	1.02E-02	5.67E-03	-	-	7.62E-03	4.89E-03	1.02E-02	1.02E-02	5.67E-03	N/A	4	100
Perylene	ng/m^3	-	-	7.51E-04	7.55E-04	1.55E-03	7.08E-04	-	-	9.42E-04	7.08E-04	1.55E-03	1.55E-03	7.08E-04	N/A	4	100
Phenanthrene	ng/m^3	-	-	6.94E-01	7.85E-01	1.36E+00	6.09E-01	-	-	8.62E-01	6.09E-01	1.36E+00	1.36E+00	6.09E-01	N/A	4	100
Pyrene	ng/m^3	-	-	1.11E-01	1.37E-01	2.47E-01	8.95E-02	-	-	1.46E-01	8.95E-02	2.47E-01	2.47E-01	8.95E-02	N/A	4	100
Tetralin	ng/m^3	-	-	1.42E+00	1.72E+00	2.32E+00	1.38E+00	-	-	1.71E+00	1.38E+00	2.32E+00	2.32E+00	1.38E+00	N/A	4	100
Total PAH[4]	ng/m^3	-	-	1.69E+01	2.07E+01	2.25E+01	1.60E+01	-	-	1.90E+01	1.60E+01	2.25E+01	2.25E+01	1.60E+01	N/A	4	100

NOTE: All non-detectable results were reported as 1/2 of the detection limit

[1] AAQC

[2] O. Reg. 419/05 Schedule Upper Risk Thresholds

[3] O. Reg. 419/05 24 Hour Guideline

[4] Total PAH sums all PAH contaminants

Table B5: Summary of Sample Flow Rate and Sample Duration for TSP

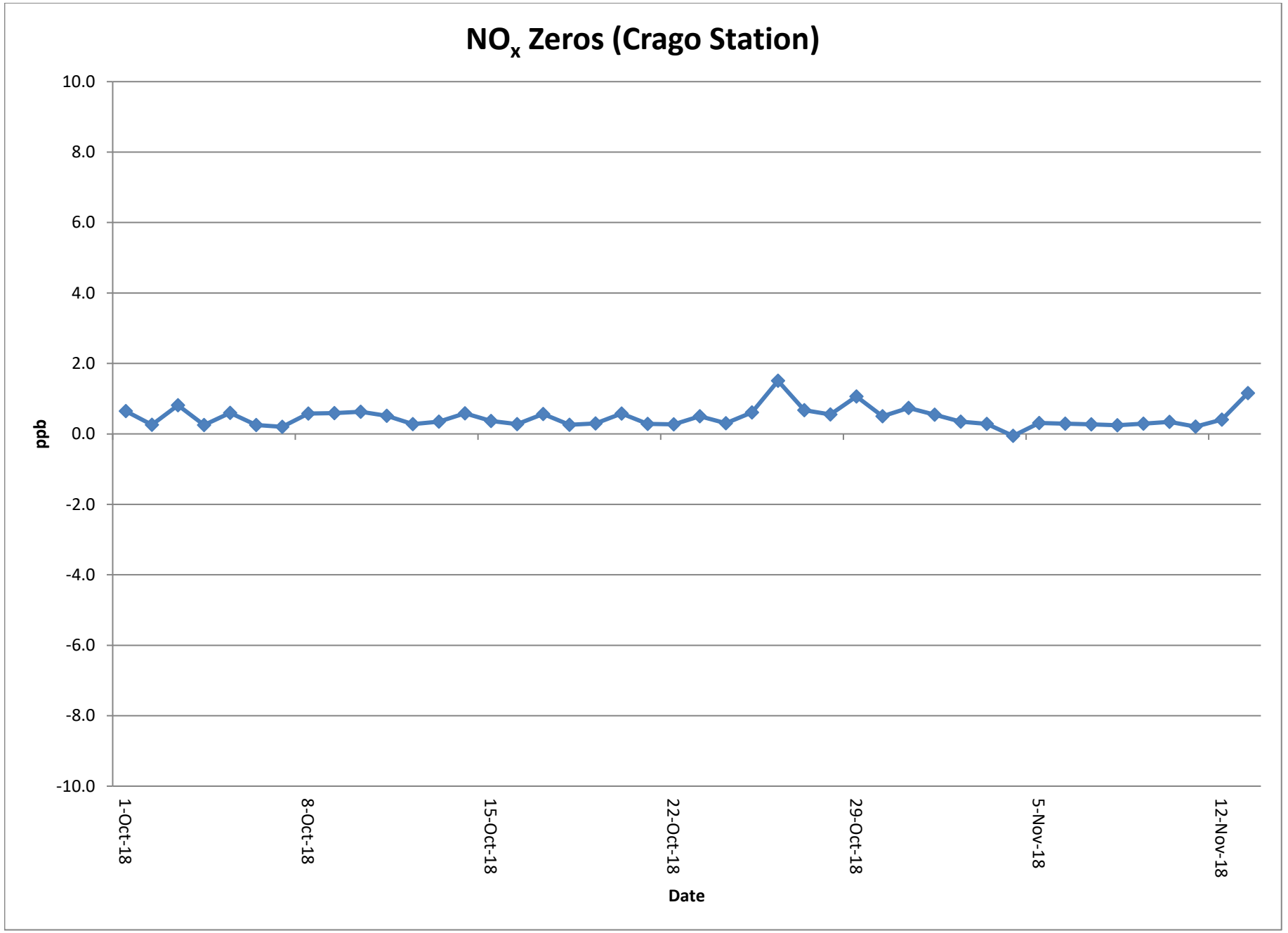
Sample Date	Crago		
	Filter ID	Sample Duration	Sample Volume
	No.	(min)	(m^3)
October 5, 2018	738323	1422	1630
October 11, 2018	738327	1452	1630
October 17, 2018	738331	1453	1630
October 23, 2018	738459	1448	1630
October 29, 2018	738463	1450	1630
November 4, 2018	L2195875-2	1453	1743
November 10, 2018	738664	1402	1598
November 16, 2018	No Longer Sampling	No Longer Sampling	No Longer Sampling
November 22, 2018	No Longer Sampling	No Longer Sampling	No Longer Sampling
November 28, 2018	No Longer Sampling	No Longer Sampling	No Longer Sampling
December 4, 2018	No Longer Sampling	No Longer Sampling	No Longer Sampling
December 10, 2018	No Longer Sampling	No Longer Sampling	No Longer Sampling
December 16, 2018	No Longer Sampling	No Longer Sampling	No Longer Sampling
December 22, 2018	No Longer Sampling	No Longer Sampling	No Longer Sampling
December 28, 2018	No Longer Sampling	No Longer Sampling	No Longer Sampling

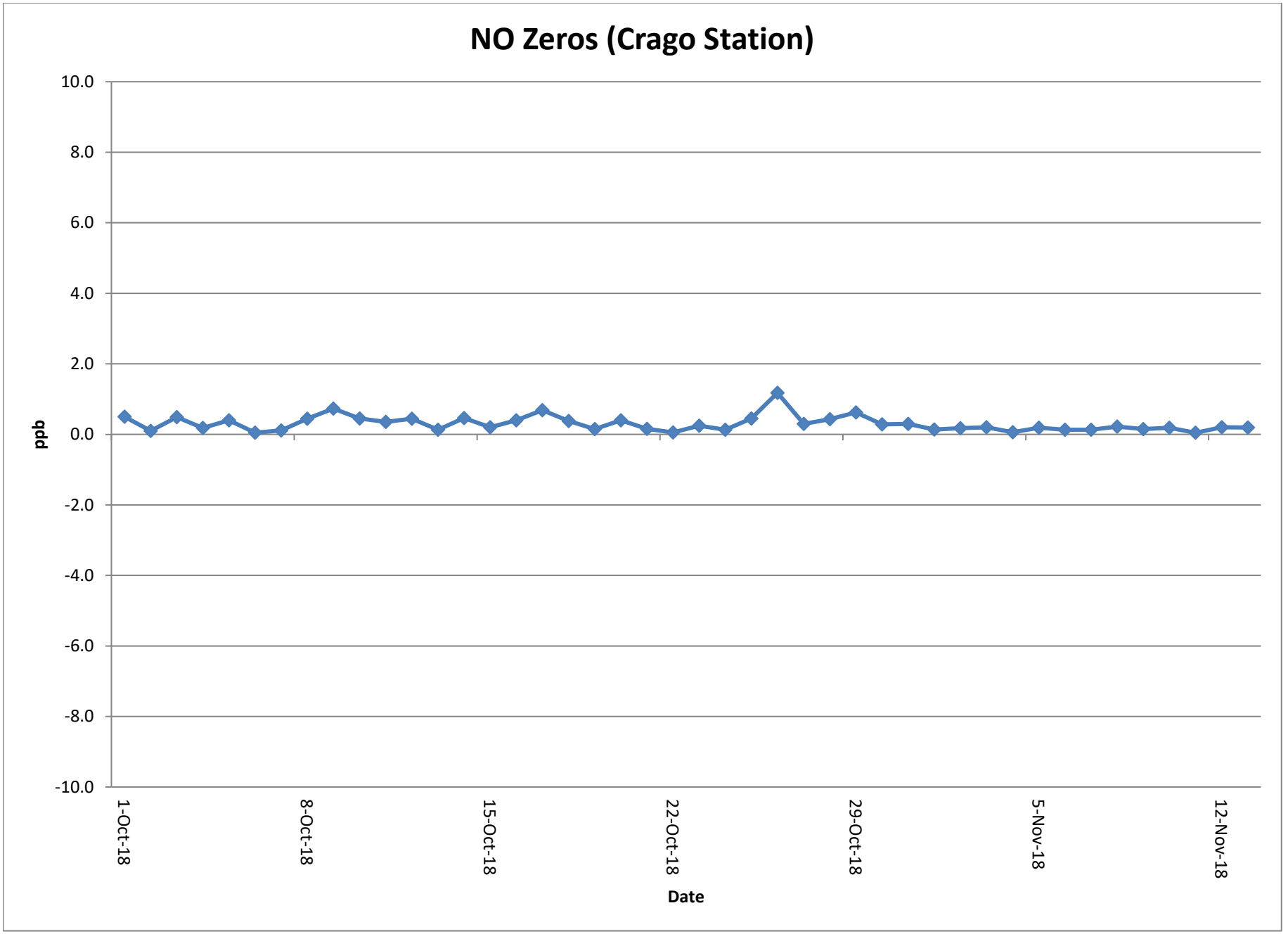
Table B6: 2018 Crago Station Q4 Monitoring Results for TSP and Metals

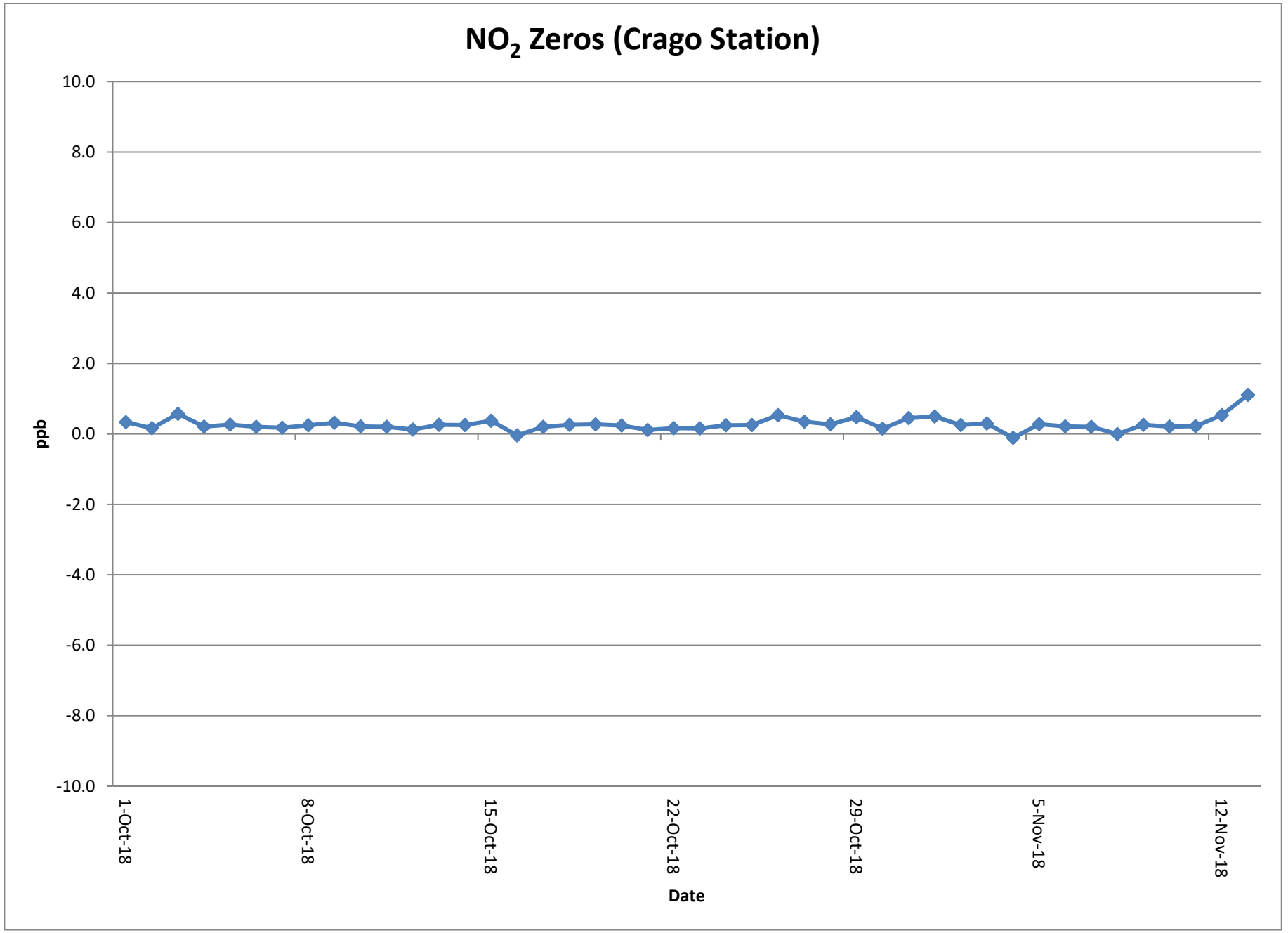
Contaminant	Units	*MECP Criteria*	*HHRA Health Based Criteria*	5-Oct-18	11-Oct-18	17-Oct-18	23-Oct-18	29-Oct-18	4-Nov-18	10-Nov-18	MECP Criteria (µg/m^3)	No. > Criteria	Geometric Mean	Arithmetic Mean	Q4 Minimum Concentration	Q4 Maximum Concentration	October Maximum Concentration	November Maximum Concentration	December Maximum Concentration	Number of Valid Samples	% Valid data
Particulate (TSP)	µg/m^3	*120*	*120*	14.0	28.9	22.5	14.5	9.1	9.6	15.6	*120*	0	15.1	16.3	9.1	28.9	28.9	15.6	N/A	7	100
Total Mercury (Hg)	µg/m^3	*2*	*2*	1.55E-05	1.82E-05	4.97E-06	7.17E-06	9.38E-06	1.43E-06	1.56E-06	*2*	0	5.76E-06	8.31E-06	1.43E-06	1.82E-05	1.82E-05	1.56E-06	N/A	7	100
Aluminum (Al)	µg/m^3	*4.8*	-	7.60E-02	2.52E-01	1.88E-01	1.61E-01	1.18E-01	9.70E-02	1.16E-01	*4.8*	0	1.34E-01	1.44E-01	7.60E-02	2.52E-01	2.52E-01	1.16E-01	N/A	7	100
Antimony (Sb)	µg/m^3	*25*	*25*	3.10E-04	6.80E-04	4.60E-04	8.30E-04	7.30E-04	6.00E-04	7.00E-04	*25*	0	5.89E-04	6.16E-04	3.10E-04	8.30E-04	8.30E-04	7.00E-04	N/A	7	100
Arsenic (As)	µg/m^3	*0.3*	*0.3*	9.20E-04	9.20E-04	9.20E-04	9.20E-04	9.20E-04	8.61E-04	9.39E-04	*0.3*	0	9.14E-04	9.14E-04	8.61E-04	9.39E-04	9.20E-04	9.39E-04	N/A	7	100
Barium (Ba)	µg/m^3	*10*	*10*	3.40E-03	5.70E-03	5.50E-03	8.00E-03	6.40E-03	3.10E-03	4.60E-03	*10*	0	5.00E-03	5.24E-03	3.10E-03	8.00E-03	8.00E-03	4.60E-03	N/A	7	100
Beryllium (Be)	µg/m^3	*0.01*	*0.01*	3.07E-05	3.07E-05	3.07E-05	1.76E-03	1.78E-03	2.87E-05	3.13E-05	*0.01*	0	9.71E-05	5.27E-04	2.87E-05	1.78E-03	1.78E-03	3.13E-05	N/A	7	100
Bismuth (Bi)	µg/m^3	-	-	5.52E-04	5.52E-04	5.52E-04	5.52E-04	5.52E-04	5.16E-04	5.63E-04	-	-	5.48E-04	5.49E-04	5.16E-04	5.63E-04	5.52E-04	5.63E-04	N/A	7	100
Boron (B)	µg/m^3	*120*	-	1.23E-02	1.23E-02	1.23E-02	1.23E-02	1.23E-02	1.15E-02	1.25E-02	*120*	0	1.22E-02	1.22E-02	1.15E-02	1.25E-02	1.23E-02	1.25E-02	N/A	7	100
Cadmium (Cd)	µg/m^3	*0.025*	*0.025*	6.13E-04	6.13E-04	6.13E-04	6.13E-04	6.13E-04	5.74E-04	6.26E-04	*0.025*	0	6.09E-04	6.10E-04	5.74E-04	6.26E-04	6.13E-04	6.26E-04	N/A	7	100
Chromium (Cr)	µg/m^3	*0.5*	-	4.80E-03	6.80E-03	4.70E-03	4.60E-03	4.10E-03	1.43E-03	1.56E-03	*0.5*	0	3.50E-03	4.00E-03	1.43E-03	6.80E-03	6.80E-03	1.56E-03	N/A	7	100
Cobalt (Co)	µg/m^3	*0.1*	*0.1*	6.13E-04	6.13E-04	6.13E-04	6.13E-04	6.13E-04	5.74E-04	6.26E-04	*0.1*	0	6.09E-04	6.10E-04	5.74E-04	6.26E-04	6.13E-04	6.26E-04	N/A	7	100
Copper (Cu)	µg/m^3	*50*	-	2.27E-02	1.01E-02	9.80E-03	2.17E-02	9.00E-03	1.00E-02	2.28E-02	*50*	0	1.39E-02	1.52E-02	9.00E-03	2.28E-02	2.27E-02	2.28E-02	N/A	7	100
Iron (Fe)	µg/m^3	*4*	-	1.33E-01	4.77E-01	3.34E-01	2.67E-01	1.59E-01	1.91E-01	2.53E-01	*4*	0	2.38E-01	2.59E-01	1.33E-01	4.77E-01	4.77E-01	2.53E-01	N/A	7	100
Lead (Pb)	µg/m^3	*0.5*	*0.5*	9.20E-04	3.40E-03	9.20E-04	3.00E-03	2.20E-03	8.61E-04	2.40E-03	*2*	0	1.69E-03	1.96E-03	8.61E-04	3.40E-03	3.40E-03	2.40E-03	N/A	7	100
Magnesium (Mg)	µg/m^3	-	-	1.02E-01	4.36E-01	3.15E-01	2.64E-01	1.19E-01	1.02E-01	1.74E-01	-	-	1.86E-01	2.16E-01	1.02E-01	4.36E-01	4.36E-01	1.74E-01	N/A	7	100
Manganese (Mn)	µg/m^3	*0.4*	-	4.17E-03	2.06E-02	1.15E-02	9.44E-03	5.46E-03	2.87E-04	3.13E-04	*0.4*	0	3.33E-03	7.40E-03	2.87E-04	2.06E-02	2.06E-02	3.13E-04	N/A	7	100
Molybdenum (Mo)	µg/m^3	*120*	-	6.50E-04	6.50E-04	3.07E-04	1.14E-03	3.07E-04	5.21E-03	9.82E-03	*120*	0	1.13E-03	2.58E-03	3.07E-04	9.82E-03	1.14E-03	9.82E-03	N/A	7	100
Nickel (Ni)	µg/m^3	*0.2*	-	9.20E-04	9.20E-04	9.20E-04	9.20E-04	9.20E-04	8.61E-04	9.39E-04	*0.2*	0	9.14E-04	9.14E-04	8.61E-04	9.39E-04	9.20E-04	9.39E-04	N/A	7	100
Phosphorus (P)	µg/m^3	-	-	9.10E-01	1.50E+00	1.15E+00	1.25E+00	1.09E+00	2.15E-01	2.35E-01	-	-	7.28E-01	9.07E-01	2.15E-01	1.50E+00	1.50E+00	2.35E-01	N/A	7	100
Selenium (Se)	µg/m^3	*10*	*10*	3.07E-03	3.07E-03	3.07E-03	3.07E-03	3.07E-03	2.87E-03	3.13E-03	*10*	0	3.05E-03	3.05E-03	2.87E-03	3.13E-03	3.07E-03	3.13E-03	N/A	7	100
Silver (Ag)	µg/m^3	*1*	*1*	3.07E-04	3.07E-04	3.07E-04	3.07E-04	3.07E-04	2.87E-04	3.13E-04	*1*	0	3.05E-04	3.05E-04	2.87E-04	3.13E-04	3.07E-04	3.13E-04	N/A	7	100
Strontium (Sr)	µg/m^3	*120*	-	3.60E-03	6.30E-03	4.10E-03	4.10E-03	2.80E-03	3.10E-03	3.00E-03	*120*	0	3.72E-03	3.86E-03	2.80E-03	6.30E-03	6.30E-03	3.10E-03	N/A	7	100
Thallium (Tl)	µg/m^3	-	-	2.76E-05	2.76E-05	2.76E-05	2.76E-05	2.76E-05	2.58E-05	2.82E-05	-	-	2.74E-05	2.74E-05	2.58E-05	2.82E-05	2.76E-05	2.82E-05	N/A	7	100
Tin (Sn)	µg/m^3	*10*	*10*	3.07E-04	1.20E-03	6.80E-04	1.34E-03	1.29E-03	1.25E-03	1.22E-03	*10*	0	9.42E-04	1.04E-03	3.07E-04	1.34E-03	1.34E-03	1.25E-03	N/A	7	100
Titanium (Ti)	µg/m^3	*120*	-	3.37E-03	3.37E-03	3.37E-03	3.37E-03	3.37E-03	3.16E-03	3.44E-03	*120*	0	3.35E-03	3.35E-03	3.16E-03	3.44E-03	3.37E-03	3.44E-03	N/A	7	100
Uranium (Ur)	µg/m^3	*1.5*	-	3.07E-05	7.40E-05	6.50E-05	6.80E-05	3.07E-05	2.87E-05	3.13E-05	*1.5*	0	4.31E-05	4.69E-05	2.87E-05	7.40E-05	7.40E-05	3.13E-05	N/A	7	100
Vanadium (V)	µg/m^3	*2*	*1*	1.53E-03	1.53E-03	1.53E-03	1.53E-03	1.53E-03	1.43E-03	1.56E-03	*2*	0	1.52E-03	1.52E-03	1.43E-03	1.56E-03	1.53E-03	1.56E-03	N/A	7	100
Zinc (Zn)	µg/m^3	*120*	-	9.90E-03	3.09E-02	2.42E-02	2.43E-02	2.15E-02	2.62E-02	4.13E-02	*120*	0	2.37E-02	2.55E-02	9.90E-03	4.13E-02	3.09E-02	4.13E-02	N/A	7	100
Zirconium (Zr)	µg/m^3	*20*	-	6.13E-04	6.13E-04	6.13E-04	6.13E-04	6.13E-04	5.74E-04	6.26E-04	*20*	0	6.09E-04	6.10E-04	5.74E-04	6.26E-04	6.13E-04	6.26E-04	N/A	7	100

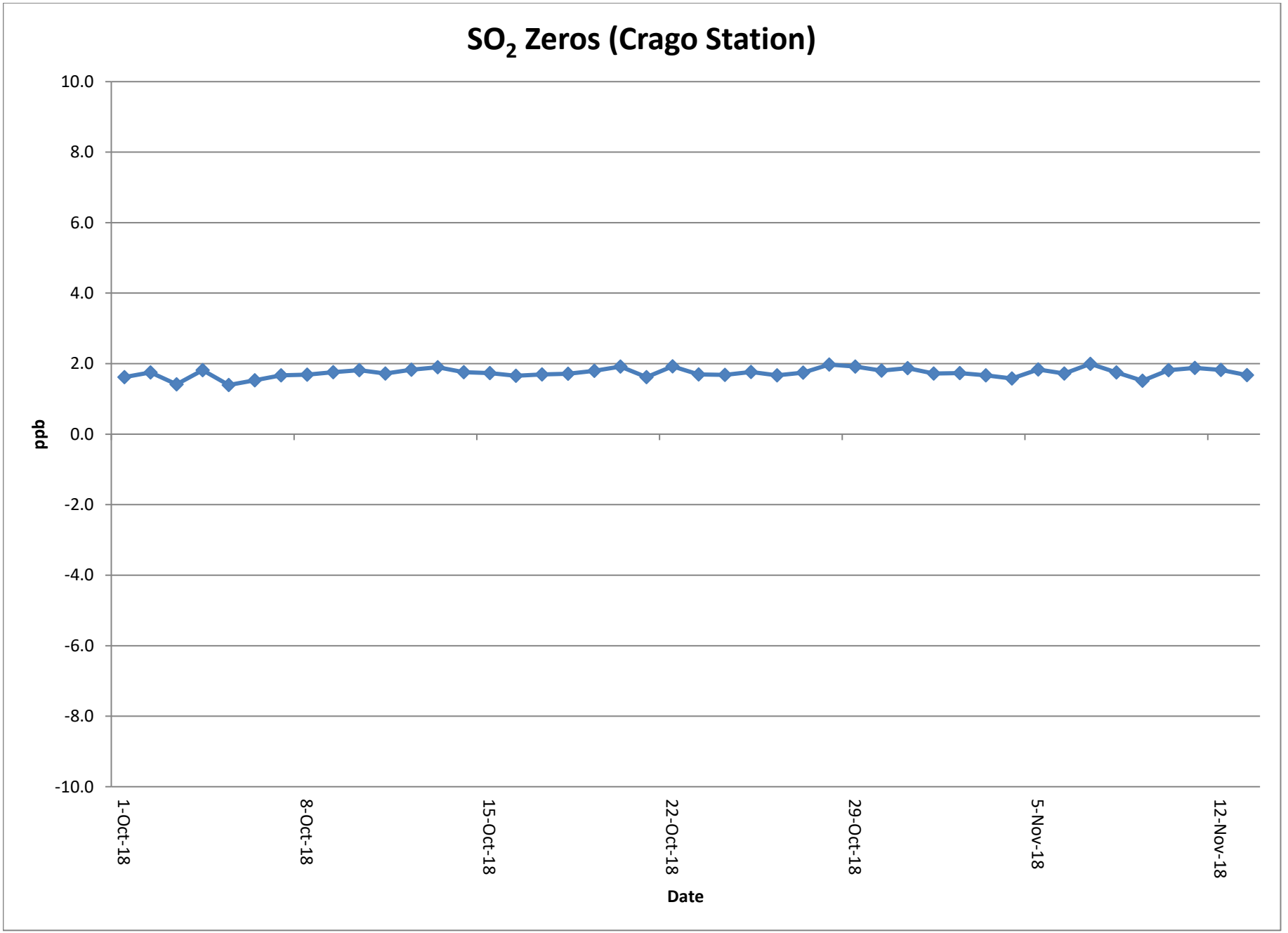
NOTE: All non-detectable results were reported as 1/2 of the detection limit

APPENDIX C


NOx Zeros (Crago Station)
10.0
8.0
6.0
4.0
2.0
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
ppb
1-Oct-18
8-Oct-18
15-Oct-18
22-Oct-18
29-Oct-18
5-Nov-18
12-Nov-18
Date


NO Zeros (Crago Station)
10.0
8.0
6.0
4.0
2.0
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
ppb
1-Oct-18
8-Oct-18
15-Oct-18
22-Oct-18
29-Oct-18
5-Nov-18
12-Nov-18
Date


NO2 Zeros (Crago Station)
10.0
8.0
6.0
4.0
2.0
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
ppb
1-Oct-18
8-Oct-18
15-Oct-18
22-Oct-18
29-Oct-18
5-Nov-18
12-Nov-18
Date


SO2 Zeros (Crago Station)
10.0
8.0
6.0
4.0
2.0
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
ppb
1-Oct-18
8-Oct-18
15-Oct-18
22-Oct-18
29-Oct-18
5-Nov-18
12-Nov-18
Date

APPENDIX D

Table D1: 4th Quarter Edit Log for $PM_{2.5}$ at Crago Station

Emitter's Name: Durham York Energy Centre								
Contact Name: Ms. Lyndsay Waller		**Phone:** (905) 404-0888 ext 4107		**Email:** Lyndsay.Waller@Durham.ca				
Station Number: N/A			**Station Name:** Crago Station					
Station Address: Crago and Osborne Road			**Emitter Address:** The Region of Durham, 605 Rossland Road, Whitby, ON					
Pollutants or Parameter: $PM_{2.5}$		**Instrument Make & Model:** Thermo Scientific Model 5030 SHARP Monitor				**s/n:** CM-0269		
Data Edit Period	Start Date: October 1, 2018		End Date: December 31, 2018			All testing done in EST		
Edit #	**Edit date (dd/mm/yyyy)**	**Editor's Name**	**Edit Action**	**Starting**		**Ending**		**Reason**
				Date (dd/mm/yyyy)	**Hour (xx:xx)**	**Date (dd/mm/yyyy)**	**Hour (xx:xx)**	
1	01/11/18	NJM	Deleted Hours	29/10/2018	12:00	29/10/2018	14:00	Monthly Calibration

Table D2: 4th Quarter Edit Log for NOx at Crago Station

Emitter's Name: Durham York Energy Centre								
Contact Name: Ms. Lyndsay Waller		**Phone:** (905) 404-0888 ext 4107		**Email:** Lyndsay.Waller@Durham.ca				
Station Number: N/A			**Station Name:** Crago Station					
Station Address: Crago and Osborne Road			**Emitter Address:** The Region of Durham, 605 Rossland Road, Whitby, ON					
Pollutants or Parameter: NOx		**Instrument Make & Model:** Teledyne Nitrogen Oxide Analyzer Model T200				**s/n:** 1424		
Data Edit Period	Start Date: October 1, 2018		End Date: December 31, 2018			All testing done in EST		
Edit #	**Edit date (dd/mm/yyyy)**	**Editor's Name**	**Edit Action**	**Starting**		**Ending**		**Reason**
				Date (dd/mm/yyyy)	**Hour (xx:xx)**	**Date (dd/mm/yyyy)**	**Hour (xx:xx)**	
2	01/11/18	NJM	Deleted Hours	01/10/2018	00:00	29/10/2018	01:00	Due to time based drift between the NOx unit time prompting overnight z/s response and the datalogger time recording the response, the z/s response spanned over 15 min of the 00:00-01:00 hour. Since 75% valid data was not captured, there was <Sample size required for the hour to be valid.
1	01/11/18	NJM	Deleted Hours	29/10/2018	12:00	29/10/2018	14:00	Monthly Calibration
3	01/11/18	NJM	Deleted Hours	7/11/2018	01:00	7/11/2018	02:00	Due to time based drift between the NOx unit time prompting overnight z/s response and the datalogger time recording the response, the z/s response spanned over 15 min of the 01:00-02:00 hour. Since 75% valid data was not captured, there was <Sample size required for the hour to be valid.

Table D3: 4th Quarter Edit Log for SO2 at Crago Station

Emitter's Name: Durham York Energy Centre								
Contact Name: Ms. Lyndsay Waller		**Phone:** (905) 404-0888 ext 4107		**Email:** Lyndsay.Waller@Durham.ca				
Station Number: N/A			**Station Name:** Crago Station					
Station Address: Crago and Osborne Road			**Emitter Address:** The Region of Durham, 605 Rossland Road, Whitby, ON					
Pollutants or Parameter: SO_2		**Instrument Make & Model:** Teledyne Sulfur Dioxide Analyzer Model T100				**s/n:** 1228		
Data Edit Period	Start Date: October 1, 2018		End Date: December 31, 2018			All testing done in EST		
Edit #	**Edit Date (dd/mm/yyyy)**	**Editor's Name**	**Edit Action**	**Starting**		**Ending**		**Reason**
				Date (dd/mm/yyyy)	**Hour (xx:xx)**	**Date (dd/mm/yyyy)**	**Hour (xx:xx)**	
2	01/11/18	NJM	Deleted Hours	01/10/2018	00:00	29/10/2018	01:00	Due to time based drift between the SO_2 unit time prompting overnight z/s response and the datalogger time recording the response, the z/s response spanned over 15 min of the 00:00-01:00 hour. Since 75% valid data was not captured, there was <Sample size required for the hour to be valid.
1	01/11/18	NJM	Deleted Hours	29/10/2018	12:00	29/10/2018	14:00	Monthly Calibration
3	01/11/18	NJM	Deleted Hours	7/11/2018	01:00	7/11/2018	02:00	Due to time based drift between the SO_2 unit time prompting overnight z/s response and the datalogger time recording the response, the z/s response spanned over 15 min of the 01:00-02:00 hour. Since 75% valid data was not captured, there was <Sample size required for the hour to be valid.

Table D4: 4th Quarter Edit Log for Meterological Parameters at Crago Station

Emitter's Name: Durham York Energy Centre								
Contact Name: Ms. Lyndsay Waller			**Phone:** (905) 404-0888 ext 4107		**Email:** Lyndsay.Waller@Durham.ca			
Station Number: N/A				**Station Name:** Crago Station				
Station Address: Crago and Osborne Road				**Emitter Address:** The Region of Durham, 605 Rossland Road, Whitby, ON				
Pollutants or Parameter: Ambient T, P, RH and Rain			**Instrument Make & Model:** Miscellaneous Meteorological Instrumentation			**s/n:** N/A		
Data Edit Period		Start Date: October 1, 2018		End Date: December 31, 2018		All testing done in EST		
Edit #	**Edit date (dd/mm/yyyy)**	**Editor's Name**	**Edit Action**	**Starting**		**Ending**		**Reason**
				Date (dd/mm/yyyy)	**Hour (xx:xx)**	**Date (dd/mm/yyyy)**	**Hour (xx:xx)**	
No Edits								