REPORT

DURHAM YORK ENERGY CENTRE

DURHAM, ONTARIO

2022 ANNUAL AMBIENT AIR QUALITY MONITORING REPORT: CONTINUOUS & PERIODIC MONITORING PROGRAM

RWDI #2205149

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SUBMITTED TO

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1 INTRODUCTION

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

In 2022, the facility had two monitoring stations which collected continuous and discrete ambient measurements, known as the Courtice Station and Rundle Road Station. The station locations are shown in **Figure 1**. The Courtice and Rundle Road 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, both discretely monitor the following air quality parameters: Total Suspended Particulate (TSP), Metals, Dioxins and Furans (D&F) and Polycyclic Aromatic Hydrocarbons (PAHs).

Continuous meteorological data is collected at the Courtice and Rundle Road Stations. The Rundle Road Station collects the following meteorological parameters: wind speed, wind direction, ambient temperature, precipitation and relative humidity. The meteorological tower at the Rundle Road Station, is approximately 10 meters tall. The Courtice Station collects the following meteorological parameters: ambient temperature, ambient pressure, precipitation and relative humidity. For purposes of this report, wind speed and wind direction data presented for the Courtice Station have been obtained from the adjacent Courtice Water Pollution Control Plant (WPCP) meteorological tower, which is approximately 20 meters tall.

All 2022 quarterly reports were issued to the MECP by the Region of Durham. This report presents the annual results from January 1 to December 31, 2022.

Throughout 2022, there were six (6) exceedances of the AAQC for Benzo(a) Pyrene. At the Courtice Station, one (1) exceedance occurred on March 18. At the Rundle Road Station, five (5) exceedances occurred on the following dates: February 22, March 6, March 30, April 11, and November 1. There was one (1) exceedance for TSP which occurred at the Rundle Road station on July 22, 2022. Data recovery rates were acceptable and valid for all measured parameters at the Courtice and Rundle Road Monitoring Stations.

In years prior to 2020, the DYEC site had no recorded SO_2 exceedances. At the beginning of the 2020 year, the 1-hour AAQC limit was reduced from 250 ppb to 40 ppb and a 10-minute AAQC limit was introduced at 67 ppb. The ambient air monitoring program at the DYEC had ninety (90) rolling 1-hour average SO_2 concentrations above the AAQC and two-hundred and two (202) rolling 10-minute average SO_2 concentrations above the AAQC at the Courtice and Rundle Road Monitoring Stations throughout 2022.

2 BACKGROUND

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. The monitoring plan established the Courtice and Rundle Road monitoring stations to monitor ambient air quality and quantify the background ambient air quality levels and DYEC contributed emissions to ambient air quality levels. The monitoring plan also initially included the Fence Line Station, which commenced on February 6, 2016, and ceased on December 4, 2018. Since no exceedances had been reported for TSP or Metals, a request to remove the station was approved by the Ministry of the Environment, Conservation and Parks (MECP).

This 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 air 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 (Jacques Whitford, 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.

3 MONITORING LOCATIONS

The station sites were selected in consultation with a working group that included representatives from the MECP, the Region of Durham, York Region, and the Energy from Waste Advisory Committee (EFWAC), as required by Condition 11.3 of the Environmental Assessment Notice of Approval. The DYEC Site and Ambient Monitoring Station Locations are presented in **Figure 1**, in addition to an annual windrose for each Station. A windrose is a visual representation of the wind speed and wind direction over a specified time period.

The Courtice Station is predominantly upwind of the DYEC and is located on the Courtice WPCP property just southwest of the DYEC. The Rundle Road Station is predominantly downwind of the DYEC and is located just southeast of the intersection of Baseline Road and Rundle Road, northeast of the DYEC. Pictures of the two (2) Stations are presented as **Figure 2** and **3**.

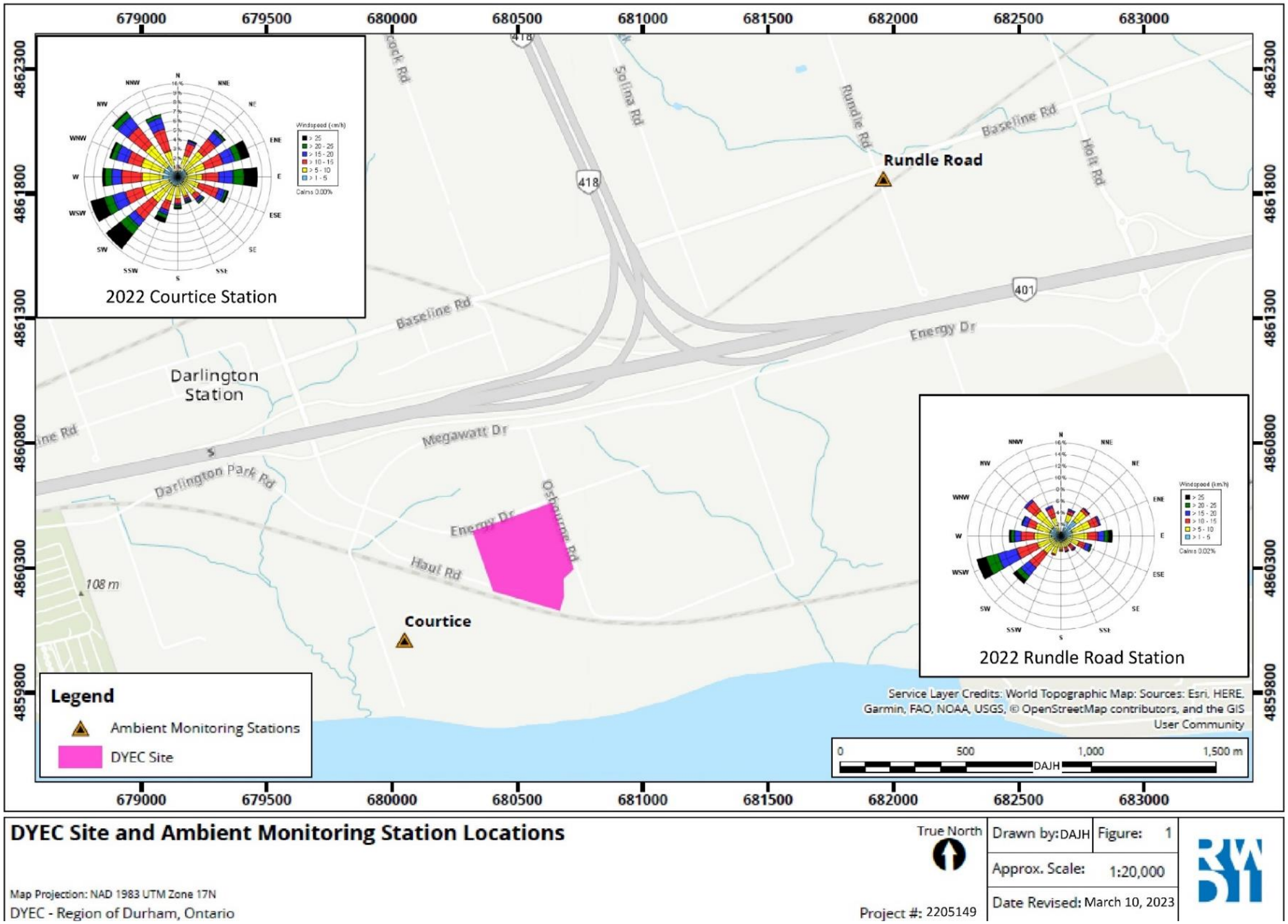


Figure 1: DYEC Site and Ambient Monitoring Station Locations

Figure 2: Courtice Station

Figure 3: Rundle Road Station

4 SAMPLING PROGRAM

4.1 Field Operations

RWDI representatives were responsible for completing the following:

- Day-to-day changing of the filters where applicable;
- Field notes and recording observations;
- Monthly calibrations;
- Attending quarterly audits;
- General and preventative maintenance of the units (e.g., flow calibrations, motor replacements etc.);
- Troubleshooting, maintenance and repairs when problems were encountered;
- Routine cleaning (e.g. PUF housing, SHARP $PM_{2.5}$ heads, sample lines etc.);
- Preparation and recovery of PUF media;
- Completion of chain of custody forms for submission to ALS Laboratories in Burlington, ON; and,
- Preparation of the media for shipment to ALS Laboratories using MECP accepted methods.

The samplers were operated according to the Operations Manual for Air Quality Monitoring in Ontario published by the MECP (January 2018) and the Ambient Air Quality Monitoring Plan. RWDI adhered to the manual for any operational changes conducted during the contract period.

4.2 Sample Schedules

All discrete sampling at the Courtice and Rundle Road Stations adhered to the National Air Pollution Surveillance (NAPS) sampling schedule, sampling for 24 hours (midnight to midnight). Sampling was as follows:

- TSP/Metals hi-vol samplers operated on the six-day schedule; and,
- PUF samplers operated on the twelve-day schedule. The samples were analyzed for PAH's every twelve days, and D&F's every twenty-four days.

4.3 Instrumentation

Courtice and Rundle Road Monitoring Stations are both equipped with the following continuous monitors: Teledyne T200 Nitrogen Oxide Analyzer Model (NO_X analyzer), Teledyne T100 Sulfur Dioxide Analyzer and Thermo Scientific Model 5030 SHARP Monitor (SHARP) with a $PM_{2.5}$ inlet head. Courtice and Rundle Road Stations also have the following periodic monitors: High Volume (Hi-Vol) Air Sampler outfitted with a total suspended particulate (TSP) inlet capable of collecting particulate of all aerodynamic diameters and a Tisch TE-1000 sampler used to collect D&F's and PAH's using a polyurethane foam plug.

The Courtice and Rundle Road Stations also collect continuous meteorological parameters. The Courtice Station is equipped with the following continuous monitors: Campbell Scientific Model HMP60 (temperature/relative humidity), Campbell Scientific Model CS106 (atmospheric pressure), Texas Electronic TE525M (precipitation). The Courtice Monitoring Station uses the Courtice WPCP wind speed and direction data. The wind speed and direction data are provided to RWDI by Courtice WPCP staff upon request. The Rundle Road Station is equipped with the following continuous monitors: Campbell Scientific Model HMP60 (temperature/relative humidity), Texas Electronic TE525M (precipitation) and RM Young Model 05103-10 wind head (wind speed and direction).

4.4 Analytical Methods

4.4.1 Synchronized Hybrid Ambient Real-time Particulate (SHARP) Monitor

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.

The instrument collects data using its own data acquisition system (DAS) on a 5-minute interval. Data is collected from the instrument directly which is attached to an Envidas computer. The computer can be accessed remotely, and all instrument parameters can be examined as well as the measurement data. This allows the tracking of instrument performance. Data was also collected at 1-minute intervals by an external datalogger using analog output connections as a back-up. The measurement data was averaged using Envista processing software over a 1-hour and 24-hour period to compare to the applicable ambient air quality criteria.

4.4.2 Nitrogen Oxide Analyzer

The Teledyne T200 NO_X analyzers use 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 EPA protocol span gases and a dilution system. Automatic IZS checks were performed on a daily basis commencing at approximately 1:45 and ending at 02:15 the same day. The checks consisted of a 10-minute zero check, a 10-minute span check and a 10-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.

The instrument collects data using its own data acquisition system (DAS) on a 5-minute interval. Data is collected from the instrument directly which is attached to an Envidas computer. The computer can be accessed remotely, and all instrument parameters can be examined as well as the measurement data. This allows the tracking of instrument performance. Data was also collected at 1-minute intervals by an external datalogger using analog output connections as a back-up. The measurement data was averaged using Envista processing software over a 1-hour and 24-hour period to compare to the applicable ambient air quality criteria.

4.4.3 Sulphur Dioxide Analyzer

The Teledyne T100 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 EPA protocol span gases and a dilution system. Automatic IZS checks were performed on a daily basis commencing at approximately 1:45 and ending at 02:15 the same day. The checks consisted of a 10-minute zero check, a 10-minute span check and a 10-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.

The instrument collects data using its own data acquisition system (DAS) on a 5-minute interval. Data is collected from the instrument directly which is attached to an Envidas computer. The computer can be accessed remotely, and all instrument parameters can be examined as well as the measurement data. This allows the tracking of instrument performance. Data was also collected at 1-minute intervals by an external datalogger using analog output connections as a back-up. The measurement data was averaged using Envista processing software over a 1-hour and 24-hour period to compare to the applicable ambient air quality criteria.

4.4.4 High Volume Air Sampler (Hi-Vol)

The Tisch TE-5170 Total Suspended Particulate (TSP) high volume (Hi-Vol) air samplers were outfitted with a TSP gabled inlet capable of collecting particulate of all aerodynamic diameters. Each 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. In the latter part of 2019, the pin-based wheel timer was modified with an automated relay system controlled by a datalogger to toggle the sampler on and off, and the chart recorder system was replaced by a digital pressure transducer to record the blower output pressure. Teflon coated glass fibre filters are outfitted at the top of the hi-vol samplers where air is drawn through the filter, thereby collecting TSP. Each Hi-Vol is calibrated quarterly (every three months) to ensure accuracy and validity of the volume of air drawn through the sampler.

The Teflon coated glass fibre filter media are pre and post weighed by ALS Laboratories in Burlington, Ontario. The filters are then analyzed for total particulate weight, metals analysis and mercury. The specific list of metals analyzed can be found in **Table 5** and the list and rationale is also provided in the Ambient Air Quality Monitoring Plan (Stantec, 2012).

4.4.5 Polyurethane Foam Samplers

The D&F, and PAH samples were collected using Tisch TE-1000 samplers, which are listed as reference devices for U.S. EPA Methods TO-9 and TO-13. The samplers use 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 CFM of flow over the sampling period, an elapsed timer and a wheel timer for starting and stopping each sample. In the latter part of 2019, the pin-based wheel timer was modified with an automated relay system controlled by a data logger to toggle the sampler on and off, and the chart recorder system was replaced by a digital pressure transducer to record the blower output pressure. Each PUF sampler is calibrated quarterly (every three months) to ensure accuracy and validity of the volume of air drawn through the sampler.

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. The specific list of PAHs and D&F analyzed can be found in **Tables 6** and **7**, the list and rationale for target compounds are also provided in the Ambient Air Quality Monitoring Plan (Stantec, 2012).

4.5 Equipment Replacement / Failures

4.5.1 Courtice Monitoring Station

4.5.1.1 Continuous Samplers

On March 6, 2022, there were some erroneous $PM_{2.5}$ 5-minute records, which resulted in one (1) hour of the data being invalidated at the Courtice station.

On March 8, 2022, a power failure occurred at the Courtice station, which resulted in one (1) hour of NO, NO_2, NO_X, $PM_{2.5}$ and SO_2 data being invalidated.

On July 19, 2022, erroneous spikes in the NO_X data occurred at the Courtice station, which resulted in four (4) hours of NO, NO2, and NOX data being invalidated. Similarly, erroneous spikes occurred on July 23, 2022, resulting in one (1) hour of NO, NO2, and NOX data being invalidated at the Courtice station.

On September 15, 2022, one (1) hour of SO_2 data at the Courtice station was invalidated due to verification checks on the recently installed perm tube.

During October of 2022, a maintenance project was undertaken at both monitoring stations which required the removal of all analyzers for the duration. The Courtice station analyzers were removed beginning at 12:00 on October 4 and were fully reinstalled and calibrated by 18:00 on October 12, 2022.

On October 17, 2022, a power failure caused the loss of one (1) hour of data at 11:00 for all analyzers at the Courtice station including the meteorological tower.

On October 18, 2022, a power failure caused the loss of two (2) hours of data from 13:00 to 15:00 for all analyzers at the Courtice station including the meteorological tower.

On October 27, 2022, two (2) hours of data were invalidated from 9:00 until 11:00 at the Courtice station due to an MECP audit being performed.

On November 17, 2022, the Courtice station suffered from a communications malfunction which invalidated twenty-six (26) hours of the NO_X data from 10:00 until 12:00 on November 18, 2022.

On November 29, 2022, nine (9) hours of the Courtice station NO_X data was invalidated from 2:00 until 11:00 due to failing the 'As Found' span calibrations. The overnight span check that morning had passed.

4.5.1.2 Discrete Samplers

The January 17, 2022 Courtice PAH sample was invalidated because of insufficient sample volume due to a tripped GFI outlet which stopped power to the sampler mid run.

The PAH and D&F samples for both stations on January 29 were invalid. The PUF sampling media was shipped late by the laboratory and did not arrive to the technician until the late afternoon of January 28 (the installation date).

Upon arrival, it was found that the PUF sample filter media was missing from the shipment. Upon discovering the missing media, the laboratory was closed, and the run date was the following day.

The February 22, 2022 Courtice PAH/ D&F sample was invalidated because of insufficient sample volume due to a tripped GFI outlet which stopped power to the sampler mid run.

The May 5, May 11, June 22, and June 28, 2022 Courtice TSP and metals sample was invalidated because of insufficient sample volumes due to a tripped breaker which stopped power to the sampler mid run. This breaker was replaced during the July calibration visit.

The August 21, 2022 PAH samples were invalid for both sites due to an error caused by the laboratory during analysis of the samples.

An error with the sample media changes for the September 2 sampling date caused the August 27 and September 2 TSP & metals samples to be invalid at both stations. Due to this error the September 2 PAH and D&F samples were also invalid at both stations.

The September 26, 2022, Courtice TSP & metals sample was invalidated because of an equipment malfunction.

The October 20, 2022, Courtice TSP & metals sample was invalidated because of insufficient sample volume due to a tripped breaker which stopped power to the sampler mid run.

The December 7, 2022, Courtice TSP & metals sample was invalidated due to an equipment malfunction.

The December 19, 2022, Courtice TSP & metals sample was invalidated because of a tripped breaker which interrupted the power to the sampler.

4.5.2 Rundle Road Monitoring Station

4.5.2.1 Continuous Samplers

On May 13, 2022, the pressure sensor board in the SO_2 analyzer at the Rundle Road station malfunctioned causing the loss of five (5) hours of data. This malfunction also occurred again on May 17 and May 20, resulting in the loss of two (2) and eleven (11) hours of data, respectively. On May 25, the analyzer was removed and sent out to be repaired. A replacement analyzer was installed and calibrated on this date, resulting in the loss of five (5) hours of data.

During October of 2022, a maintenance project was undertaken at both monitoring stations which required the removal of all analyzers for the duration. The Rundle Road station analyzers were removed beginning at 9:00 on October 4 and were fully reinstalled and calibrated by 14:00 on October 12, 2022.

On October 27, 2022, two (2) hours of data were invalidated from 11:00 to 13:00 at the Rundle Road station due to an MECP audit being performed.

On December 28, 2022, at 16:00 the wind direction instrument at the Rundle Road station malfunction and the data was invalid until 18:00 on December 31, 2022.

4.5.2.2 Discrete Samplers

The January 5, 2022 Rundle PAH/ D&F sample was invalidated because of insufficient sample volume due to a tripped GFI outlet which stopped power to the sampler mid run.

The PAH and D&F samples for both stations on January 29 were invalid. The PUF sampling media was shipped late by the laboratory and did not arrive to the technician until the late afternoon of January 28 (the installation date). Upon arrival, it was found that the PUF sample filter media was missing from the shipment. Upon discovering the missing media, the laboratory was closed, and the run date was the following day.

The May 5, May 11, June 22, and June 28, 2022 Courtice TSP and metals sample was invalidated because of insufficient sample volumes due to a tripped breaker which stopped power to the sampler mid run. This breaker was replaced during the July calibration visit.

The July 10, 2022, Rundle TSP & metals sample was invalidated because of insufficient sample volume due to a tripped breaker which stopped power to the sampler mid run. This breaker was replaced during the calibration visit on July 13, 2022.

The August 21, 2022 PAH samples were invalid for both sites due to an error caused by the laboratory during analysis of the samples.

An error with the sample media changes for the September 2 sampling date caused the August 27 and September 2 TSP & metals samples to be invalid at both stations. Due to this error the September 2 PAH and D&F samples were also invalid at both stations.

The December 31, 2022, D&F sample from the Rundle Road Station was invalid due to contamination which occurred at the laboratory while the sample was being processed for analysis.

4.6 Final Data Editing

No edits were made to the 2022 continuous or discrete monitoring dataset after a final review.

4.7 MECP Audits

An MECP audit took place on June 17, 2022. While all instruments met their respective audit criteria, three issues were identified. The first being that the sample flow rate for the Rundle SO_2 was noted as low but within acceptable limits. This was resolved on the same day by performing a pump rebuild. The second was that the multipoint gas audit of the Courtice NOx analyzer revealed inconsistencies in the gas response. This was partially rectified via recalibration; however additional maintenance may be required to achieve optimal performance. It should be noted that the instrument still responded within acceptable limits. The third issue was that the Rundle station TSP Hi-Vol sampler required a restart to meet ministry criteria. An additional visit was completed on June 20, 2022, where the motor was replaced, and the unit was recalibrated. The issue encountered during the audit has not reoccurred since.

A second MECP audit took place on October 27, 2022. While all instruments met their respective audit criteria, one issue was identified. The Rundle Road station TSP hi-vol sampler was noted to have an elevated flow rate but was still within acceptable limits.

5 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. New AAQC's for SO_2 were implemented in 2020, including a 10-minute rolling average AAQC of 67 ppb, a 1-hour rolling average AAQC of 40 ppb and an annual AAQC of 4 ppb. There is no longer a 24-hour rolling average AAQC for SO_2.

Environment Canada has established a Canadian Ambient Air Quality Standard (CAAQS) which are health-based air quality objectives for the outdoor air (Environment Canada, 2013). The current CAAQS' for $PM_{2.5}$ are 27 µg/m^3 for the 3-year average of annual 98th percentile 24-hour concentration, and 8.8 µg/m^3 for the 3-year average of annual average concentrations (in effect as of 2020). The new CAAQS' implemented in 2020 are listed in **Table 1**.

Table 1: $PM_{2.5}$, SO_2 and NO_2 CAAQS' by Implementation Year

Parameter	Averaging Time	Year Applied			Statistical Form
		2015	2020	2025	
Fine Particulate Matter ($PM_{2.5}$)	24-hour	28 µg/m^3	27 µg/m^3	-	The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations
	Annual	10 µg/m^3	8.8 µg/m^3	-	The 3-year average of the annual average of all 1-hour concentrations
Sulphur Dioxide (SO_2)	1-hour	-	70 ppb	65 ppb	The 3-year average of the annual 99th percentile of the daily maximum 1-hour average concentrations
	Annual	-	5 ppb	4 ppb	The average over a single calendar year of all 1-hour average concentrations
Nitrogen Dioxide (NO_2)	1-hour	-	60 ppb	42 ppb	The 3-year average of the annual 98th percentile of the daily maximum 1-hour average concentrations
	Annual	-	17 ppb	12 ppb	The average over a single calendar year of all 1-hour average concentrations

(https://www.ccme.ca/en/air-quality-report)

All applicable criteria and standards are presented in the following section of this report.

6 SUMMARY OF AMBIENT MEASUREMENTS

Ambient air quality monitoring results of all parameters sampled for the Courtice and Rundle Road Monitoring Stations are discussed herein. Detailed results of all continuous and discrete sampling throughout the year are included in **Appendix B** and **C**, respectively.

Table 2 below presents the number and percentage of valid samples collected at each sampling site for each parameter sampled. Data recovery above 75% is considered acceptable. Data recovery was 75.0% or higher at each station for all continuous and discrete parameters.

Table 2: 2022 Summary of Data Recovery by Sampling Site and Sampled Parameter

Station	Parameter	Total Possible # of Hours or Samples	# of Valid Hours or Samples Collected	Percentage of Valid Samples (%)	Overall Percentage of Valid Samples for the Station (%)
Courtice Monitoring Station	$PM_{2.5}$	8760	8541	97.5	**91.7**
	NO_X	8760	8473	96.7	
	NO	8760	8473	96.7	
	NO_2	8760	8473	96.7	
	SO_2	8760	8518	97.2	
	TSP & Metals	61	51	83.6	
	PAHs	31	26	83.9	
	D&F	16	13	81.3	
Rundle Road Monitoring Station	$PM_{2.5}$	8760	8542	97.5	**93.0**
	NO_X	8760	8526	97.3	
	NO	8760	8526	97.3	
	NO_2	8760	8526	97.3	
	SO_2	8760	8504	97.1	
	TSP & Metals	61	58	95.1	
	PAHs	31	27	87.1	
	D&F	16	12	75.0	

Table 3 presents a summary of the continuous sampling statistics at each station for 2022 compared to Ontario AAQC, Ontario Regulation 419/05 and HHRA values. **Table 4** presents a summary of the continuous sampling statistics at each station for 2022 compared to applicable CAAQS'. **Table 5** presents a summary of the 2022 TSP/metals discrete sampling statistics at Courtice and Rundle Road Stations. All results were compared to the applicable twenty-four (24) hour criteria/standards/HHRA. **Table 6** presents a summary of the 2022 PAH discrete sampling statistics at Courtice and Rundle Road Stations. All results were compared to the applicable twenty-four (24) hour criteria/standards/HHRA. **Table 7** presents a summary of the 2022 D&F discrete sampling statistics at Courtice and Rundle Road Stations. All results were compared to the applicable twenty-four (24) hour criteria/standards.

Table 3: 2022 Summary of Statistics for Continuous Sampling Parameter Levels at Courtice and Rundle Road Stations Compared to AAQC/HHRA's

Station	Parameter	Max 10-min Running Mean	10-min AAQC/ HHRA	Events > 10-min AAQC / HHRA	Max Running 1-hr Mean	1-hr AAQC/ HHRA	Events > 1-hr AAQC / HHRA	Max 24-hr Running Mean	24-hr AAQC / HHRA	Events > 24-hr AAQC / HHRA	Annual Arith. Mean	Annual AAQC / HHRA	Events > Annual AAQC / HRRA
Courtice Monitoring Station	$PM_{2.5}$ (µg/m³)	-	-	-	84.4	-	-	24.6	-	-	5.6	-	-
	NO_x (ppb)	-	-	-	87.9	-	-	35.9	-	-	5.9	-	-
	NO (ppb)	-	-	-	54.9	-	-	16.1	-	-	1.3	-	-
	NO_2 (ppb)	-	-	-	41.7	200	0	26.1	100	0	4.7	30	0
	SO_2 (ppb)	316.1	67	186	138.1	40	83	23.8	-	-	2.3	4	0
Rundle Road Monitoring Station	$PM_{2.5}$ (µg/m³)	-	-	-	56.6	-	-	26.6	-	-	5.5	-	-
	NO_x (ppb)	-	-	-	85.1	-	-	26.0	-	-	5.1	-	-
	NO (ppb)	-	-	-	62.5	-	-	8.8	-	-	1.3	-	-
	NO_2 (ppb)	-	-	-	38.6	200	0	18.1	100	0	3.8	30	0
	SO_2 (ppb)	221.0	67	16	112.6	40	7	9.9	-	-	0.5	4	0

Table 4: 2020-2022 Summary of Statistics for Continuous Sampling Parameter Levels at Courtice and Rundle Road Stations Compared to CAAQS'

Station	Parameter	2020-2022 1-Hour Mean	1-Hour CAAQS	Events > 1-Hour CAAQS	2020-2022 24-Hour Mean	24-Hour CAAQS	Events > 24-Hour CAAQS	2020-2022 Annual Mean	Annual CAAQS	Events > Annual CAAQS
Courtice Monitoring Station	$PM_{2.5}$ (µg/m³)	-	-	-	17.4 [3]	27	0	6.0 [4]	8.8	0
	Sulphur Dioxide (SO_2)	73.8 [1]	70	1	-	-	-	2.3 [5]	5	0
	Nitrogen Dioxide (NO_2)	34.1 [2]	60	0	-	-	-	4.7 [5]	17	0
Rundle Road Monitoring Station	$PM_{2.5}$ (µg/m³)	-	-	-	16.4 [3]	27	0	5.5 [4]	8.8	0
	Sulphur Dioxide (SO_2)	33.2 [1]	70	0	-	-	-	0.5 [5]	5	0
	Nitrogen Dioxide (NO_2)	25.1 [2]	60	0	-	-	-	3.8 [5]	17	0

Notes:
[1] The 3-year average of the annual 99th percentile of the daily maximum 1-hour average concentrations
[2] The 3-year average of the annual 98th percentile of the daily maximum 1-hour average concentrations
[3] The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations
[4] The 3-year average of the annual average of the daily 24-hour concentrations
[5] The average over a single calendar year of all 1-hour average concentrations

Table 5: 2022 Summary of Statistics for Discrete Sampling of TSP and Metal Parameter Levels at Courtice and Rundle Road Stations

Parameter	Units	AAQC	HHRA	Courtice Monitoring Station			Rundle Road Monitoring Station		
				Arithmetic Mean	Maximum 24-hour	No. of Elevated Readings	Arithmetic Mean	Maximum 24-hour	No. of Elevated Readings
Particulate (TSP)	µg/m³	120	120	21.5	53.9	0	30.6	120.9	1
Total Mercury (Hg)	µg/m³	2	2	8.20E-06	3.48E-05	0	7.92E-06	2.95E-05	0
Aluminum (Al)	µg/m³	4.8	-	1.77E-01	6.72E-01	0	2.83E-01	1.62E+00	0
Antimony (Sb)	µg/m³	25	25	9.43E-04	6.20E-03	0	6.17E-04	2.70E-03	0
Arsenic (As)	µg/m³	0.3	0.3	1.01E-03	3.83E-03	0	1.04E-03	4.92E-03	0
Barium (Ba)	µg/m³	10	10	6.84E-03	2.02E-02	0	8.09E-03	2.53E-02	0
Beryllium (Be)	µg/m³	0.01	0.001	1.57E-05	3.91E-05	0	1.81E-05	6.83E-05	0
Bismuth (Bi)	µg/m³	-	-	5.35E-04	5.77E-04	-	5.43E-04	5.71E-04	-
Boron (B)	µg/m³	120	-	4.54E-03	9.02E-03	0	5.01E-03	1.57E-02	0
Cadmium (Cd)	µg/m³	0.025	0.025	1.53E-04	1.10E-03	0	1.28E-04	6.57E-04	0
Chromium (Cr)	µg/m³	0.5	-	2.01E-03	6.16E-03	0	2.38E-03	1.25E-02	0
Cobalt (Co)	µg/m³	0.1	0.1	1.29E-04	3.88E-04	0	1.78E-04	8.27E-04	0
Copper (Cu)	µg/m³	50	-	2.92E-02	1.33E-01	0	2.18E-02	6.79E-02	0
Iron (Fe)	µg/m³	4	-	4.03E-01	1.05E+00	0	5.07E-01	2.41E+00	0
Lead (Pb)	µg/m³	0.5	0.5	2.20E-03	6.98E-03	0	2.86E-03	2.85E-02	0
Magnesium (Mg)	µg/m³	-	-	2.30E-01	5.79E-01	-	3.09E-01	1.19E+00	-

Parameter	Units	AAQC	HHRA	Courtice Monitoring Station			Rundle Road Monitoring Station		
				Arithmetic Mean	Maximum 24-hour	No. of Elevated Readings	Arithmetic Mean	Maximum 24-hour	No. of Elevated Readings
Manganese (Mn)	µg/m³	0.4	-	1.12E-02	2.74E-02	0	1.52E-02	6.52E-02	0
Molybdenum (Mo)	µg/m³	120	-	1.34E-03	4.07E-03	0	1.08E-03	3.37E-03	0
Nickel (Ni)	µg/m³	0.2	-	1.17E-03	3.79E-03	0	1.21E-03	3.57E-03	0
Phosphorus (P)	µg/m³	-	-	2.38E-01	5.13E-01	-	2.52E-01	6.91E-01	-
Selenium (Se)	µg/m³	10	10	4.61E-04	1.52E-03	0	4.84E-04	1.72E-03	0
Silver (Ag)	µg/m³	1	1	8.81E-05	6.70E-04	0	7.76E-05	5.66E-04	0
Strontium (Sr)	µg/m³	120	-	5.62E-03	2.88E-02	0	7.72E-03	4.48E-02	0
Thallium (Tl)	µg/m³	-	-	2.75E-05	6.59E-05	-	2.97E-05	1.27E-04	-
Tin (Sn)	µg/m³	10	10	7.78E-04	2.22E-03	0	8.03E-04	1.71E-03	0
Titanium (Ti)	µg/m³	120	-	7.95E-03	2.28E-02	0	1.22E-02	8.27E-02	0
Uranium (Ur)	µg/m³	0.3	-	1.76E-05	6.13E-05	0	2.46E-05	1.52E-04	0
Vanadium (V)	µg/m³	2	1	1.49E-03	1.60E-03	0	1.62E-03	3.95E-03	0
Zinc (Zn)	µg/m³	120	-	3.89E-02	1.49E-01	0	6.50E-02	6.24E-01	0
Zirconium (Zr)	µg/m³	20	-	5.94E-04	6.41E-04	0	6.13E-04	1.23E-03	0

Table 6: 2022 Summary of Statistics for Discrete Sampling of PAH Parameter Levels at Courtice and Rundle Road Stations

Parameter	Units	AAQC	HHRA	Courtice Monitoring Station			Rundle Road Monitoring Station		
				Arithmetic Mean	Maximum 24-hour	No. of Elevated Readings	Arithmetic Mean	Maximum 24-hour	No. of Elevated Readings
1-Methylnaphthalene	ng/m³	12000	-	5.78E+00	1.56E+01	0	4.27E+00	9.91E+00	0
2-Methylnaphthalene	ng/m³	10000	-	1.17E+01	3.23E+01	0	7.97E+00	2.03E+01	0
Acenaphthene	ng/m³	-	-	4.98E+00	1.86E+01	-	3.11E+00	1.53E+01	-
Acenaphthylene	ng/m³	3500	-	3.15E-01	1.06E+00	0	4.62E-01	5.27E+00	0
Anthracene	ng/m³	200	-	1.99E-01	6.13E-01	0	3.97E-01	2.45E+00	0
Benzo(a)Anthracene	ng/m³	-	-	2.23E-02	5.47E-02	-	4.83E-02	6.11E-01	-
Benzo(a)fluorene	ng/m³	-	-	5.32E-02	1.00E-01	-	9.74E-02	7.37E-01	-
Benzo(a)Pyrene	ng/m³	0.05 [1] 5 [2] 1.1 [3]	1	2.89E-02	6.84E-02	1	7.20E-02	1.16E+00	5
Benzo(b)Fluoranthene	ng/m³	-	-	7.45E-02	3.73E-01	-	1.23E-01	1.28E+00	-
Benzo(b)fluorene	ng/m³	-	-	2.89E-02	5.92E-02	-	6.48E-02	6.21E-01	-
Benzo(e)Pyrene	ng/m³	-	-	4.06E-02	1.25E-01	-	7.97E-02	9.69E-01	-
Benzo(g,h,i)Perylene	ng/m³	-	-	4.08E-02	1.24E-01	-	9.48E-02	1.29E+00	-
Benzo(k)Fluoranthene	ng/m³	-	-	5.89E-02	3.48E-01	-	1.04E-01	1.11E+00	-
Biphenyl	ng/m³	-	-	3.33E+00	8.58E+00	-	2.64E+00	8.06E+00	-
Chrysene	ng/m³	-	-	9.61E-02	2.40E-01	-	1.63E-01	1.40E+00	-
Dibenzo(a,h)Anthracene	ng/m³	-	-	7.96E-03	2.53E-02	-	1.38E-02	1.11E-01	-
Fluoranthene	ng/m³	-	-	1.05E+00	3.12E+00	-	1.58E+00	8.51E+00	-
Fluorene	ng/m³	-	-	3.92E+00	1.66E+01	-	3.23E+00	1.55E+01	-

Parameter	Units	AAQC	HHRA	Courtice Monitoring Station			Rundle Road Monitoring Station		
				Arithmetic Mean	Maximum 24-hour	No. of Elevated Readings	Arithmetic Mean	Maximum 24-hour	No. of Elevated Readings
Indeno(1,2,3-cd)Pyrene	ng/m³	-	-	4.07E-02	1.25E-01	-	8.79E-02	1.12E+00	-
Naphthalene	ng/m³	22500	22500	1.78E+01	4.73E+01	0	1.49E+01	4.95E+01	0
o-Terphenyl	ng/m³	-	-	1.31E-02	2.87E-02	-	1.21E-02	2.61E-02	-
Perylene	ng/m³	-	-	4.22E-03	4.92E-02	-	1.58E-02	2.00E-01	-
Phenanthrene	ng/m³	-	-	6.03E+00	2.42E+01	-	6.37E+00	3.67E+01	-
Pyrene	ng/m³	-	-	4.69E-01	1.07E+00	-	8.37E-01	4.33E+00	-
Tetralin	ng/m³	-	-	1.47E+00	6.20E+00	-	1.31E+00	5.36E+00	-
Total PAH [4]	ng/m³	-	-	5.75E+01	1.35E+02	-	4.80E+01	1.38E+02	-

Notes: [1] Ontario Ambient Air Quality Criteria. The Standard for benzo(a)Pyrene (B(a)P) is for B(a)P as a surrogate for PAHs,
[2] O.Reg. 419/05 Schedule 6 Upper Risk Thresholds,
[3] O.Reg. 419/05 24 Hour Guideline,
[4] The reported total PAH is the sum of all analysed PAH species

Table 7: 2022 Summary of Statistics for Discrete Sampling of D&F Parameter Levels at Courtice and Rundle Road Stations

Parameter	Units	AAQC	HHRA	Courtice Monitoring Station			Rundle Road Monitoring Station		
				Arithmetic Mean	Maximum 24-hour	Number of Elevated Readings	Arithmetic Mean	Maximum 24-hour	Number of Elevated Readings
2,3,7,8-TCDD	pg/m³	-	-	1.85E-03	7.12E-03	-	1.73E-03	8.97E-03	-
1,2,3,7,8-PeCDD	pg/m³	-	-	2.60E-03	1.00E-02	-	3.18E-03	1.17E-02	-
1,2,3,4,7,8-HxCDD	pg/m³	-	-	3.10E-04	9.45E-04	-	7.02E-04	5.39E-03	-
1,2,3,6,7,8-HxCDD	pg/m³	-	-	4.80E-04	1.69E-03	-	1.28E-03	1.08E-02	-
1,2,3,7,8,9-HxCDD	pg/m³	-	-	4.59E-04	1.57E-03	-	1.21E-03	1.06E-02	-
1,2,3,4,6,7,8-HpCDD	pg/m³	-	-	6.20E-04	2.20E-03	-	2.12E-03	1.92E-02	-
OCDD	pg/m³	-	-	6.33E-05	1.50E-04	-	1.28E-04	1.04E-03	-
2,3,7,8-TCDF	pg/m³	-	-	1.91E-04	5.52E-04	-	2.15E-04	7.21E-04	-
1,2,3,7,8-PeCDF	pg/m³	-	-	7.51E-05	2.72E-04	-	7.17E-05	2.79E-04	-
2,3,4,7,8-PeCDF	pg/m³	-	-	7.55E-04	2.46E-03	-	9.89E-04	2.53E-03	-
1,2,3,4,7,8-HxCDF	pg/m³	-	-	2.83E-04	8.04E-04	-	2.36E-04	5.64E-04	-
1,2,3,6,7,8-HxCDF	pg/m³	-	-	1.94E-04	4.80E-04	-	2.93E-04	1.17E-03	-
2,3,4,6,7,8-HxCDF	pg/m³	-	-	4.23E-04	2.13E-03	-	3.59E-04	1.01E-03	-
1,2,3,7,8,9-HxCDF	pg/m³	-	-	2.63E-04	8.70E-04	-	2.57E-04	8.92E-04	-
1,2,3,4,6,7,8-HpCDF	pg/m³	-	-	2.09E-04	1.48E-03	-	1.42E-04	6.25E-04	-
1,2,3,4,7,8,9-HpCDF	pg/m³	-	-	5.03E-05	1.86E-04	-	2.70E-05	8.10E-05	-
OCDF	pg/m³	-	-	9.22E-06	8.34E-05	-	4.10E-06	1.62E-05	-
Total Toxic Equivalency	pg/m³	0.1 [1] 1 [2]	-	8.83E-03	2.43E-02	0	1.29E-02	6.66E-02	0

Notes: [1] O.Reg. 419/05 Schedule 3 Standard phased in after July 1st, 2016
[2] O.Reg. 419/05 Schedule 6 Upper Risk Thresholds

6.1 Exceedances

6.1.1 Courtice Monitoring Station

The Courtice Monitoring Station observed no exceedances of TSP, metals, D&F's, $PM_{2.5}$ or NO_2 over their applicable AAQC, HHRA or CAAQS during 2022.

The Courtice Monitoring Station observed one (1) exceedance over the daily AAQC for Benzo(a)pyrene (0.05 ng/m^3) during 2022. The exceedance occurred on March 18, 2022, with 24-hour average concentrations of 0.068 ng/m^3. The exceedance details are provided in **Table 8**. The Courtice Monitoring Station had no other PAH exceedances (with the exception of Benzo(a)pyrene) during 2022.

Table 8: 2022 Courtice Monitoring Station BaP Exceedance Details

Date	Percentage of BaP Criteria	Wind Direction	Potential Source Contributions
March 18, 2022	136%	NE-ENE	The Courtice meteorological data suggests that the Courtice Station was downwind of the DYEC during part of the sampling period. Given the wind conditions during the sampling period, it is possible that the measured BaP exceedance is attributable to the Energy Centre operations; however, other sources may have also played a role.

The Courtice Monitoring Station observed eighty-three (83) exceedances over the maximum hourly mean AAQC for SO_2 (40 ppb) during 2022. The exceedance details are provided in **Table 9**. There were also one-hundred and eighty-six (186) exceedances of the rolling 10-minute average AAQC (67 ppb) at the Courtice Station in 2022. The exceedance details are provided in **Table 10**.

Table 9: 2022 Courtice Monitoring Station SO_2 1-Hour Exceedance Details

Date	Number of Exceedances	Maximum Percentage of Criteria
January 18, 2022	1	102%
January 21, 2022	1	104%
January 28, 2022	2	168%
March 5, 2022	3	175%
March 7, 2022	1	114%
March 14, 2022	2	268%
March 20, 2022	2	199%
March 23, 2022	2	112%
March 30, 2022	2	177%

Date	Number of Exceedances	Maximum Percentage of Criteria
March 31, 2022	1	106%
April 12, 2022	3	184%
April 13, 2022	2	121%
April 23, 2022	4	110%
May 5, 2022	2	140%
May 6, 2022	2	166%
May 20, 2022	3	147%
May 25, 2022	1	104%
June 15, 2022	2	128%
June 24, 2022	2	131%
June 29, 2022	1	111%
July 3, 2022	2	193%
July 4, 2022	2	197%
July 26, 2022	1	105%
July 30, 2022	1	108%
August 13, 2022	1	101%
August 15, 2022	1	112%
August 17, 2022	1	102%
September 6, 2022	1	101%
September 8, 2022	2	118%
September 15, 2022	2	106%
September 20, 2022	1	113%
October 16, 2022	1	105%
October 27, 2022	4	125%
October 28, 2022	2	113%
October 29, 2022	2	162%
October 30, 2022	2	118%
November 1, 2022	2	199%
November 2, 2022	1	104%
November 8, 2022	1	102%
November 9, 2022	3	174%

Date	Number of Exceedances	Maximum Percentage of Criteria
November 10, 2022	3	156%
November 11, 2022	1	102%
November 14, 2022	2	245%
November 23, 2022	2	106%
November 29, 2022	1	106%
December 13, 2022	1	102%
December 21, 2022	1	100%

Table 10: 2022 Courtice Monitoring Station SO_2 10-Minute Exceedance Details

Date	Number of Exceedances	Maximum Percentage of Criteria
January 13, 2022	1	104%
January 18, 2022	3	140%
January 20, 2022	1	153%
January 21, 2022	1	113%
January 25, 2022	1	105%
January 28, 2022	3	120%
March 5, 2022	5	297%
March 7, 2022	2	104%
March 14, 2022	9	335%
March 20, 2022	5	209%
March 18, 2022	1	126%
March 22, 2022	1	100%
March 26, 2022	1	136%
March 30, 2022	5	135%
April 11, 2022	1	162%
April 12, 2022	9	267%
April 13, 2022	3	130%
April 23, 2022	4	128%
May 5, 2022	5	299%
May 6, 2022	3	139%
May 7, 2022	1	136%

Date	Number of Exceedances	Maximum Percentage of Criteria
May 20, 2022	9	176%
May 25, 2022	1	119%
June 15, 2022	2	135%
June 24, 2022	4	374%
June 25, 2022	1	103%
June 29, 2022	4	142%
June 30, 2022	2	119%
July 3, 2022	10	280%
July 4, 2022	5	214%
July 25, 2022	1	152%
July 26, 2022	3	129%
July 30, 2022	2	113%
August 13, 2022	1	120%
August 15, 2022	2	183%
August 17, 2022	2	152%
September 6, 2022	2	114%
September 8, 2022	3	242%
September 15, 2022	2	151%
September 20, 2022	3	149%
October 1, 2022	1	143%
October 3, 2022	1	110%
October 16, 2022	3	109%
October 27, 2022	5	145%
October 28, 2022	3	233%
October 29, 2022	5	229%
October 30, 2022	3	125%
November 1, 2022	5	307%
November 2, 2022	1	101%
November 5, 2022	1	106%
November 8, 2022	4	165%
November 9, 2022	7	145%

Date	Number of Exceedances	Maximum Percentage of Criteria
November 10, 2022	6	178%
November 11, 2022	2	106%
November 14, 2022	6	298%
November 23, 2022	3	117%
November 27, 2022	2	118%
November 28, 2022	1	121%
November 29, 2022	1	112%
December 12, 2022	1	114%
December 21, 2022	1	106%

The elevated 1-hour running average SO_2 events at the Courtice Station typically originated from the North-northeast to the East-northeast directions. This indicates that the Station was downwind of the DYEC during some of the exceedance events which indicates that contributions from the DYEC are possible.

Durham Region staff have provided Technical Memorandums summarizing the DYEC SO_2 continuous emissions monitoring system (CEMS) data during the exceedance events recorded at the Courtice and Rundle Road Stations for each quarter. The Memorandums indicate that based on the in-stack concentration levels measured by the CEMS, that there were no unusual levels in SO_2 emissions during the Station exceedance events and that the facility's contribution to ambient air quality would be expected to be quite low.

6.1.2 Rundle Road Monitoring Station

The Rundle Road Monitoring Station observed no exceedances of metals, D&F's, $PM_{2.5}$ or NO_2 over their applicable AAQC, HHRA or CAAQS during 2022.

The Rundle Road Monitoring Station observed one (1) exceedance over the daily AAQC for TSP (120 $\mu g/m^3$) during 2022. The exceedance occurred on July 22, 2022, with 24-hour average concentrations of 120.9 $\mu g/m^3$. The exceedance details are provided in **Table 11**. The Rundle Road Monitoring Station had no metals exceedances during 2022.

Table 11: 2022 Rundle Road Monitoring Station TSP Exceedance Details

Date	Percentage of TSP Criteria	Wind Direction	Potential Source Contributions
July 22, 2022	101%	SSE-NW	The Rundle Road meteorological data suggests that the Rundle Road Station was partially downwind of the DYEC during the sampling period. Given the wind conditions during the sampling period, it is possible that the measured TSP exceedance is attributable to the Energy Centre operations although CEMS data indicates that particulate emissions were within the expected values as well as below the listed Limits. It is likely that other sources played a role in the measured exceedance including but not limited to local construction and agricultural activities.

The Rundle Road Monitoring Station observed five (5) exceedances over the daily AAQC for Benzo(a)pyrene (0.05 ng/m^3) during 2022. The exceedances occurred on February 22, March 6, March 30, April 11, and November 1, 2022, with 24-hour average concentrations of 0.058, 1.160, 0.056, 0.053 and 0.051 ng/m^3 respectively. The exceedance details are provided in **Table 12**. The Rundle Road Monitoring Station had no other PAH exceedances (with the exception of Benzo(a)pyrene) during 2022.

Table 12: 2022 Rundle Road Monitoring Station BaP Exceedance Details

Date	Percentage of BaP Criteria	Wind Direction	Potential Source Contributions
February 22, 2022	116%	ENE-E	The Rundle Road meteorological data suggests that the Rundle Road Station was upwind of the DYEC during the sampling period. Given the wind conditions, it is likely that the measured BaP exceedance is attributable to sources other than the Energy Centre operations.
March 6, 2022	2320%	W, WSW	The Rundle Road meteorological data suggests that the Rundle Road Station was downwind of the DYEC during part of the sampling period. Given the wind conditions during the sampling period, it is possible that the measured BaP exceedance is attributable to the Energy Centre operations; however, other sources may have also played a role.
March 30, 2022	112%	E, NE	The Rundle Road meteorological data suggests that the Rundle Road Station was upwind of the DYEC during the sampling period. Given the wind conditions, it is likely that the measured BaP exceedance is attributable to sources other than the Energy Centre operations.
April 11, 2022	106%	E, ESE	The Rundle Road meteorological data suggests that the Rundle Road Station was upwind of the DYEC during the sampling period. Given the wind conditions, it is likely that the measured BaP exceedance is attributable to sources other than the Energy Centre operations.

Date	Percentage of BaP Criteria	Wind Direction	Potential Source Contributions
November 1, 2022	102%	SW, NNW	The Rundle Road meteorological data suggests that the Rundle Road Station was primarily crosswind of the DYEC during the sampling period. Given the wind conditions, it is likely that the measured BaP exceedance is attributable to sources other than the Energy Centre operations.

The Rundle Road Station observed seven (7) exceedances over the maximum hourly mean AAQC for SO_2 (40 ppb) during 2022. The exceedance details are provided in **Table 13**. There were also sixteen (16) exceedances of the rolling 10-minute average AAQC (67 ppb) at the Rundle Station in 2022. The exceedance details are provided in **Table 14**.

Table 13: 2022 Rundle Road Monitoring Station SO_2 1-Hour Exceedance Details

Date	Number of Exceedances	Maximum Percentage of Criteria
May 11, 2022	2	209%
May 12, 2022	2	105%
May 24, 2022	2	132%
September 6, 2022	1	102%

Table 14: 2022 Rundle Road Monitoring Station SO_2 10-Minute Exceedance Details

Date	Number of Exceedances	Maximum Percentage of Criteria
May 11, 2022	8	258%
May 12, 2022	3	149%
May 24, 2022	5	249%

The 1-hour elevated running average SO_2 events at the Rundle Road Station occurred from the East-southeast and Southeast directions. This indicates that the Rundle Road Station was not downwind of the DYEC during these events and the DYEC did not contribute to these events. The events were possibly a result of emissions from industrial sources along the lake shore.

Durham Region staff have provided Technical Memorandums summarizing the DYEC SO_2 continuous emissions monitoring system (CEMS) data during the exceedance events recorded at the Courtice and Rundle Road Ambient Monitoring Stations for each quarter. The Memorandums indicate that based on the in-stack concentration levels measured by the CEMS, that there were no unusual levels in SO_2 emissions during the ambient Station exceedance events and that the facility's contribution to ambient air quality would be expected to be quite low.

7 AMBIENT AIR QUALITY TRENDS

Ambient air quality measurements from the Courtice and Rundle Road Monitoring Stations from 2013 to 2022 are compared in this section of the report. Stantec collected and reported the data from 2013 until the end of Quarter 2 of 2018. RWDI has been responsible for collecting and reporting data from Quarter 3 of 2018 to present. The data from 2013 to 2017 was obtained from Stantec's 2017 Annual Ambient Air Quality Monitoring Report for the Durham York Energy Centre (Stantec, 2018).

Beginning in 2020, there was the reduction of the SO_2 1-hour AAQC limit from 250 to 40 ppb. Prior to 2020, the DYEC had never recorded an SO_2 exceedance over any of the applicable AAQC's. Subsequently in 2022, there have been eighty-three (83) and seven (7) exceedances of the new 1-hour AAQC at the Courtice and Rundle Road Stations, respectively.

7.1 Criteria Air Contaminant Comparisons

A summary of the criteria air contaminant (CAC) concentration statistics for Courtice and Rundle Road Stations from 2013-2022 are presented in following sections, as well as plotted graphs and observations made from comparing the annual Nitrogen Dioxide (NO_2), Sulfur Dioxide (SO_2) and Particulate Matter less than 2.5 microns ($PM_{2.5}$) data statistics. Annual data statistics including a comparison to statistics from previous years can be found in **Tables 15 – 22**.

7.1.1 NO_2 Comparison

All continuously monitored NO_2 levels were below the applicable hourly, 24-hour and annual average criteria from 2013 to 2022 for both the Courtice and Rundle Road Monitoring Stations. A summary of annual NO_x, NO and NO_2 data for both stations is presented in **Table 15** for 2013-2022. It should be noted that NO_x and NO do not have any applicable AAQC's/CAAQS'. As of 2020 there were two new CAAQS' for NO_2 which define limits on the annual average concentration and on the 3-year average of the annual 98th percentile of the daily maximum 1-hour means concentrations.

Table 15: 2013-2022 Comparison of Measured NO_X, NO and NO_2 Statistics for Courtice and Rundle Road Monitoring Stations

Contaminant	Statistic	Courtice Station										Rundle Road Station									
		2013[1]	2014[1]	2015[1]	2016[1]	2017[1]	2018[1]	2019	2020	2021	2022	2013[1]	2014[1]	2015[1]	2016[1]	2017[1]	2018[1]	2019	2020	2021	2022
NO_X (ppb)	Annual Arithmetic Mean	9.6	10.8	9.1	8.8	9.0	8.0	7.1	5.6	6.2	5.9	8	7.8	8.2	7.1	7.2	6.7	5.1	4.6	4.4	5.1
	Maximum 1-hour Running Mean	151.3	122.2	148.5	97.1	146.9	86.8	98.7	95.1	92.5	87.9	68.5	70	102	71.3	89.3	73.6	275.7	66.3	107.4	85.1
	Maximum 24-hour Running Mean	49.6	52.1	42.6	44.7	45.0	35.6	38.6	38.3	46.3	35.9	34.9	38.6	31.9	28.3	35.5	32.3	27.9	22.1	23.1	26.0
NO (ppb)	Annual Arithmetic Mean	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	2.1	1.5	1.1	1.4	1.3	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	1.9	1	0.8	0.9	1.3
	Maximum 1-hour Running Mean	111.1	79.1	88.5	69.5	128.9	68.5	62.6	57.3	67.7	54.9	40.7	38.2	90.9	42.8	88.5	54.3	218.6	31.7	66.5	62.5
	Maximum 24-hour Running Mean	22.9	21.7	22.3	21.9	25.1	17.2	19.5	15.6	23.0	16.1	10.6	11.2	15.9	9.2	7.9	11.9	14.7	5	8.0	8.8
NO_2 (ppb)	Annual Arithmetic Mean	6.4	8	6.8	6.4	6.4	6.1	5.8	4.6	5.0	4.7	6.5	6.1	6.6	5.4	5.5	4.9	4.3	3.9	3.7	3.8
	Annual CAAQS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	17	17	17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	17	17	17
	Events > Annual CAAQS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0
	Maximum 1-hour Running Mean	48	52.7	62.3	62.4	42.8	70.6	41.3	39	37.6	41.7	39.3	62.2	42.6	36.2	42.9	38.3	57.2	35.2	41	38.6
	1-hour AAQC	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
	Events > 1-hour AAQC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	98th Percentile (Daily Maximum 1-hr Mean)	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	37.4	36.6	35.1	33.2	33.9	N/A[2]	N/A[2]	N/A[2]	N/A[2]	N/A[2]	30.2	26.9	23.5	25.7	26.0
	3-Year Average of the Annual 98th Percentile of the Daily Maximum 1-hour Mean Concentrations	N/A	N/A	N/A	N/A	N/A	N/A	N/A	36.4	35.0	34.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	26.9	25.4	25.1
	1-Hour CAAQS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	60	60	60	N/A	N/A	N/A	N/A	N/A	N/A	N/A	60	60	60
	Events > 1-Hour CAAQS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0
	Maximum Running 24-hour Mean	26.8	31.7	25.9	23.1	26.4	21.0	23.2	25.6	23.3	26.1	24.7	28	22.6	21.5	30.5	20.5	19.8	17.2	16.7	18.1
	24-hour AAQC	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	Events > 24-hour AAQC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes: [1] 2013-2018 Q2 data taken from Stantec's 2017 Annual Report (Stantec, 2018) and Stantec's 2018 Q1 (Stantec, 2018a) and Q2 Reports (Stantec, 2018b).
[2] These values were not presented in the 2013-2018 data taken from Stantec's Annual Reports (Stantec, 2018)

Annual variations in measured NO_2 data for maximum 1-hour, 24-hour and annual means and their applicable AAQC limits are presented in **Figures 4**, **5** and **6** respectively. The following observations were made from the data plots:

- The maximum measured hourly average NO_2 concentrations at the two stations have generally shown the Courtice Station has higher maximums than the Rundle Road Station apart from 2014 and 2019; 2017, 2020, 2021 and 2022 showed similar levels (as seen in **Figure 4**).
- Two new CAAQS standards for NO_2 were also introduced in 2020 which defined the 3-year average of the annual 98th percentile of the daily maximum 1-hour average concentration limit as 60 ppb and the average over a single calendar year of all 1-hour average concentration limit as 17 ppb.
- The maximum measured 24-hour average NO_2 concentrations at the two stations have remained relatively constant and have generally shown similar levels between both stations year to year (as seen in **Figure 5**).
- Measured annual average NO_2 concentrations at the Courtice Station have been slightly higher than the Rundle Road Station apart from 2013 and 2015 where they showed similar levels (as seen in **Figure 6**). Measured annual average NO_2 concentrations at both stations were relatively constant for all years presented.
- Measured maximum 1-hour and 24-hour average NO_2 concentrations have not come close to exceeding the applicable AAQC's over the timeseries.

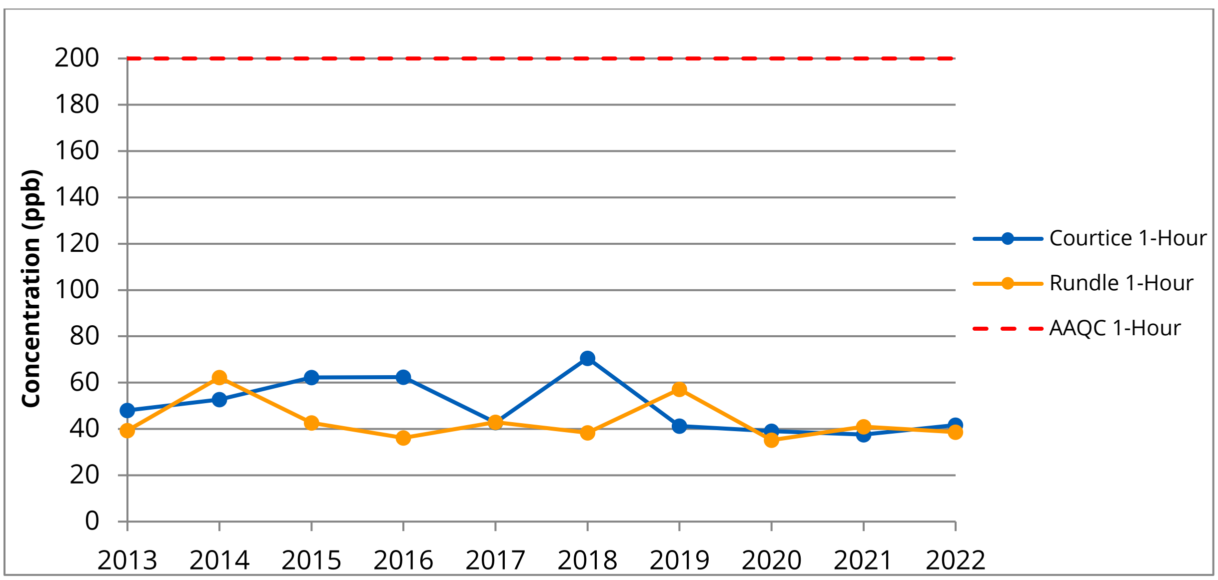


Figure 4: Maximum Measured 1-hour Mean NO_2 Concentrations by Year

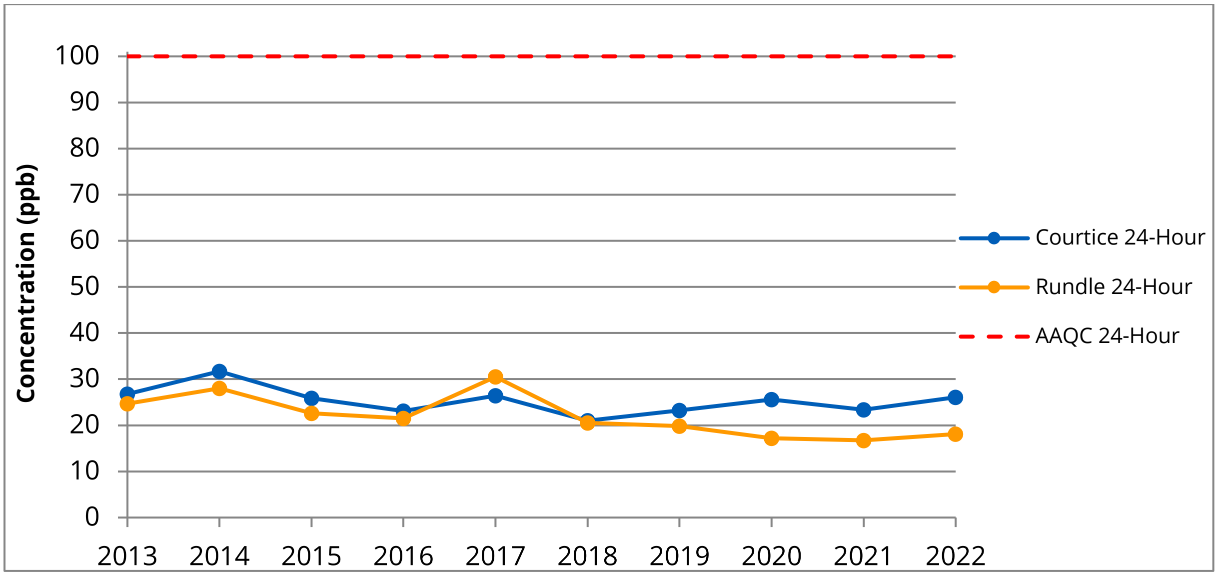


Figure 5: Maximum Measured 24-hour Running Mean NO_2 Concentrations by Year

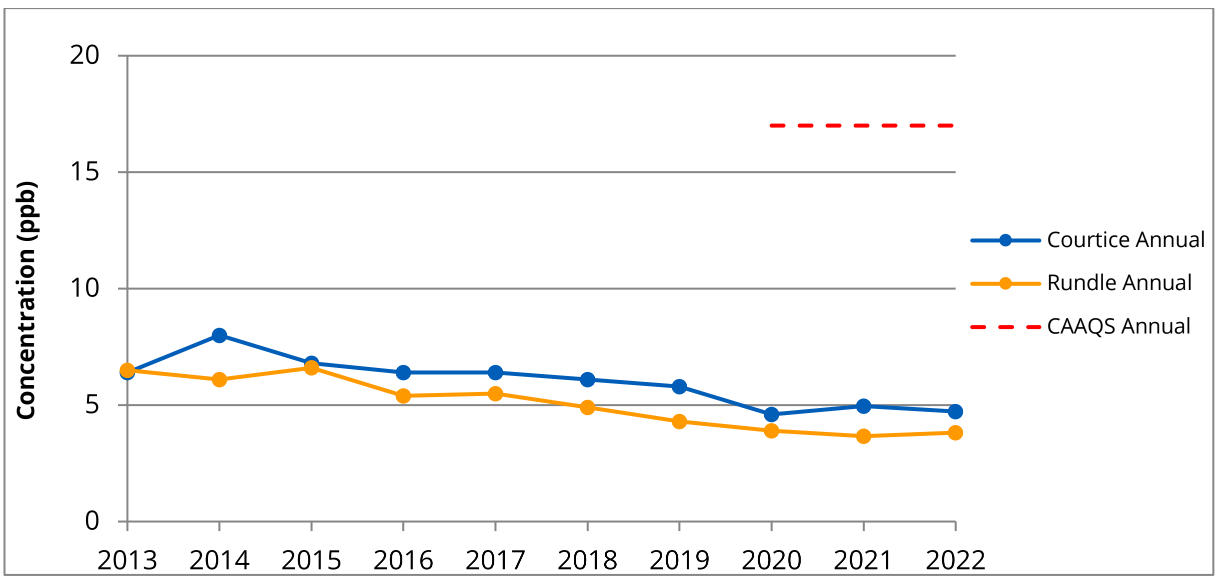


Figure 6: Maximum Measured Annual Mean NO_2 Concentrations by Year
Notes: Annual NO_2 CAAQS in effect as of 2020

7.1.2 SO_2 Comparison

In 2022, there have been more frequent SO_2 concentrations elevated above the AAQC's than in previous years due to the new limits imposed at the end of 2020. A summary of annual SO_2 data for both stations is presented in **Table 16** for 2013-2022.

Table 16: 2013-2022 Comparison of Measured SO_2 Statistics for Courtice and Rundle Road Monitoring Stations

Contaminant	Statistic	Courtice Station										Rundle Road Station									
		2013[1]	2014[1]	2015[1]	2016[1]	2017[1]	2018[1]	2019	2020	2021	2022	2013[1]	2014[1]	2015[1]	2016[1]	2017[1]	2018[1]	2019	2020	2021	2022
SO_2 (ppb)	Annual Arithmetic Mean	1.6	1.5	1	1.7	1.8	2.7	1.9	1.4	1.7	2.3	0	0.7	0.7	0.8	0.6	0.7	0.5	0.4	0.4	0.5
	Annual AAQC / CAAQS' [2]	20	20	20	20	20	20	5[3]	4 / 5	4 / 5	4 / 5	20	20	20	20	20	20	5[3]	4 / 5	4 / 5	4 / 5
	Events > Annual AAQC / CAAQS' [2]	N/A[4]	0	0	0	0	0	0	0 / 0	0 / 0	0 / 0	N/A[4]	0	0	0	0	0	0	0 / 0	0 / 0	0 / 0
	Maximum Running 10-min Mean	N/A	N/A	N/A	N/A	N/A	N/A	N/A	M	275.9	316.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	M	96.7	221.0
	10-min AAQC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	M	67	67	N/A	N/A	N/A	N/A	N/A	N/A	N/A	M	67	67
	Events > 10-min AAQC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	M	85	186	N/A	N/A	N/A	N/A	N/A	N/A	N/A	M	7	16
	Maximum 1-hour Running Mean	56.3	43.3	39	57.1	95.6	96.2	58.2	67.2	134.1	138.1	24.8	34.1	28.3	30.7	61.0	66.0	34.8	59.7	70.5	112.6
	1-hour AAQC	250	250	250	250	250	250	250	40	40	40	250	250	250	250	250	250	250	40	40	40
	Events > 1-hour AAQC	0	0	0	0	0	0	0	19	38	83	0	0	0	0	0	0	0	5	3	7
	99th Percentile (Daily Maximum 1-hr Mean)	N/A[5]	N/A[5]	N/A[5]	N/A[5]	N/A[5]	73.0	50.8	51.6	65.5	104.4	N/A[5]	N/A[5]	N/A[5]	N/A[5]	N/A[5]	33.4	25.7	35.8	16.2	47.6
	3-Year Average of the Annual 99th Percentile of the Daily Maximum 1-hour Mean Concentrations	N/A	N/A	N/A	N/A	N/A	N/A	N/A	58.5	56.0	73.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	31.6	25.9	33.2
	1-Hour CAAQS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	70	70	70	N/A	N/A	N/A	N/A	N/A	N/A	N/A	70	70	70
	Events > 1-Hour CAAQS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0
	Maximum Running 24-hour Mean	13.8	15.6	8.8	13	18.7	17.0	18.6	21.4	12.0	23.8	3.9	4.2	8.3	6.2	5.2	8.1	5.6	6.7	7.8	9.9

Notes: [1] 2013-2018 Q2 data taken from Stantec's 2017 Annual Report (Stantec, 2018) and Stantec's 2018 Q1 (Stantec, 2018a) and Q2 Reports (Stantec, 2018b).
[2] CAAQS' Annual SO_2 Standard came into effect as of 2020.
[3] MECP comments on the 2019 Q4 report called for comparison to the 2020 annual SO_2 AAQC of 4 ppb in the 2019 Annual Report.
[4] As per Stantec's 2017 Annual Report (Stantec, 2018), the measurement period in 2013 was less than 9 months therefore annual averages are not comparable to the AAQC.
[5] These values were not presented in the 2013-2017 data taken from Stantec's Annual Reports (Stantec, 2018)
M-Missing Values

Annual variations in measured SO_2 data for maximum 1-hour running, 24-hour running and annual means and their applicable AAQC limits are presented in **Figures 7**, **8** and **9** respectively. The following observations were made from the data plots:

- In previous years the measured maximum 1-hour, 24-hour average and annual average SO_2 concentrations did not come close to exceeding their applicable AAQC's.
- In 2020, the maximum 1-hour mean AAQC was changed from 250 to 40 ppb (an 84% reduction). In 2022 there were eighty-three (83) exceedances of the new criteria at the Courtice station and seven (7) exceedances at the Rundle Road station.
- In 2020, a new 10-minute AAQC was introduced (67 ppb). In 2022, there were one-hundred and eighty-six (186) and sixteen (16) exceedances of the rolling 10-minute running average AAQC at the Courtice and Rundle Road stations respectively.
- Two new CAAQS' were introduced for SO_2 in 2020 which defined the 3-year average of the annual 99th percentile of the daily maximum 1-hour average concentration limit as 70 ppb and the average over a single calendar year of all 1-hour average concentration limit as 5 ppb. In 2022, the Courtice Station exceeded the 1-hour CAAQS SO_2 limit.
- The maximum measured hourly average SO_2 concentrations at the two stations have generally shown the Courtice Station consistently having higher maximums than Rundle Road and both stations trending the same over the entire timeseries (as seen in **Figure 7**).
- The maximum measured 24-hour average SO_2 concentrations at the two stations have generally shown the Courtice Station consistently having higher maximums than Rundle Road with the exception of 2015 where maximums were generally the same (as seen in **Figure 8**). Measured 24-hour average SO_2 concentrations at both stations were relatively constant for all of the years presented.
- Measured annual average SO_2 concentrations at the Courtice Station have been slightly higher than the Rundle Road Station apart from 2015 where they showed similar levels (as seen in **Figure 9**). Measured annual average SO_2 concentrations at both stations were relatively constant for all of the years presented.

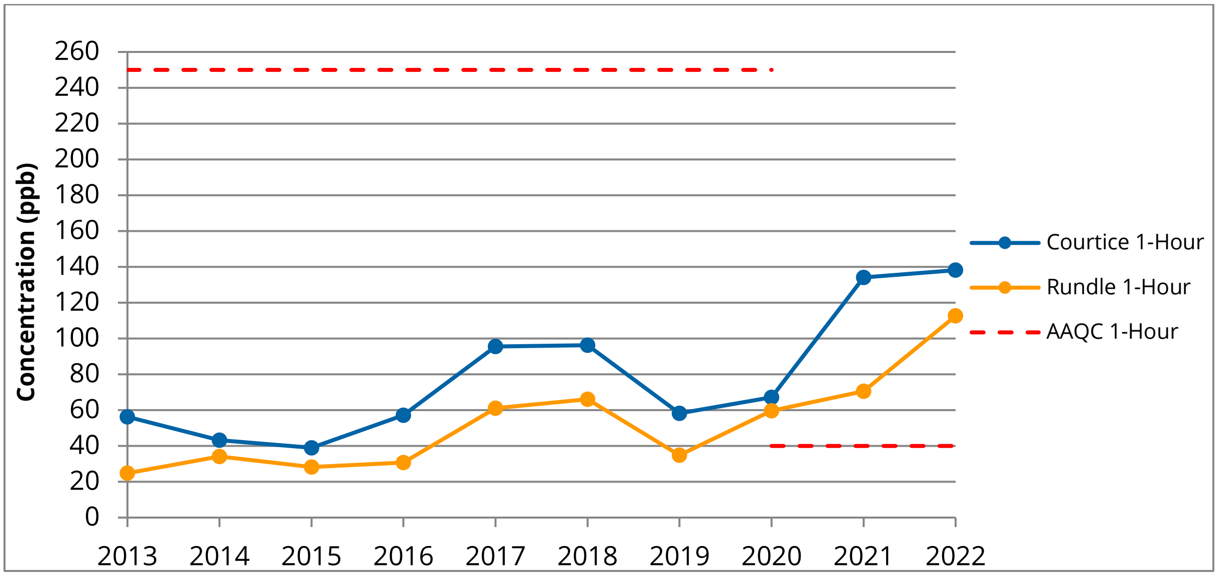
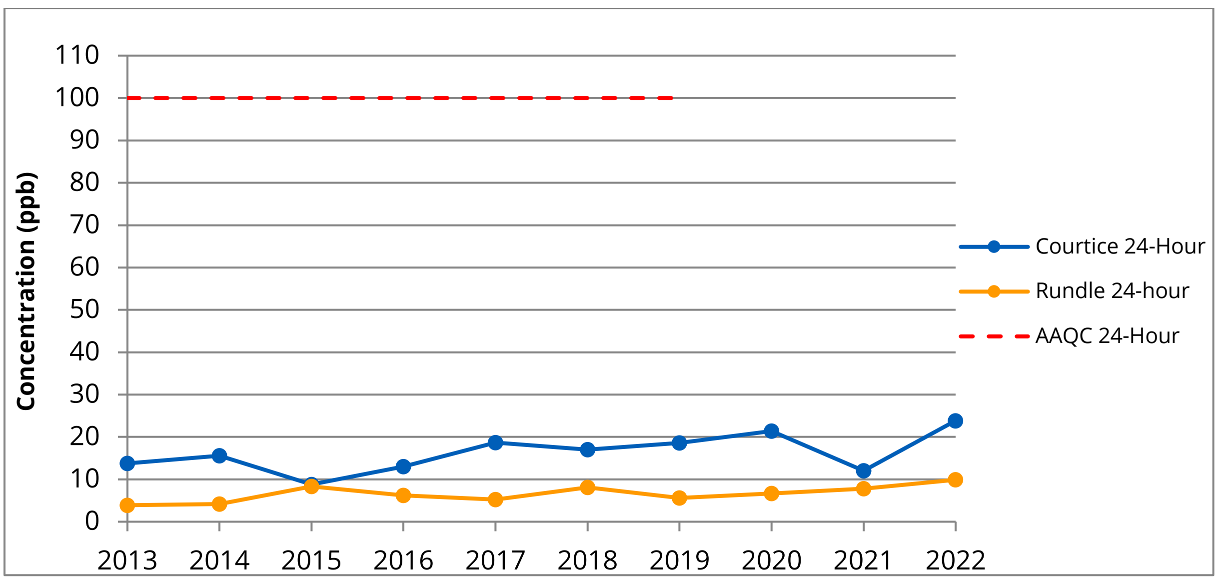


Figure 7: Maximum Measured 1-hour Mean SO_2 Concentrations by Year



Notes: 24-Hour SO_2 AAQC removed as of 2020

Figure 8: Maximum Measured 24-Hour Running Mean SO_2 Concentrations by Year

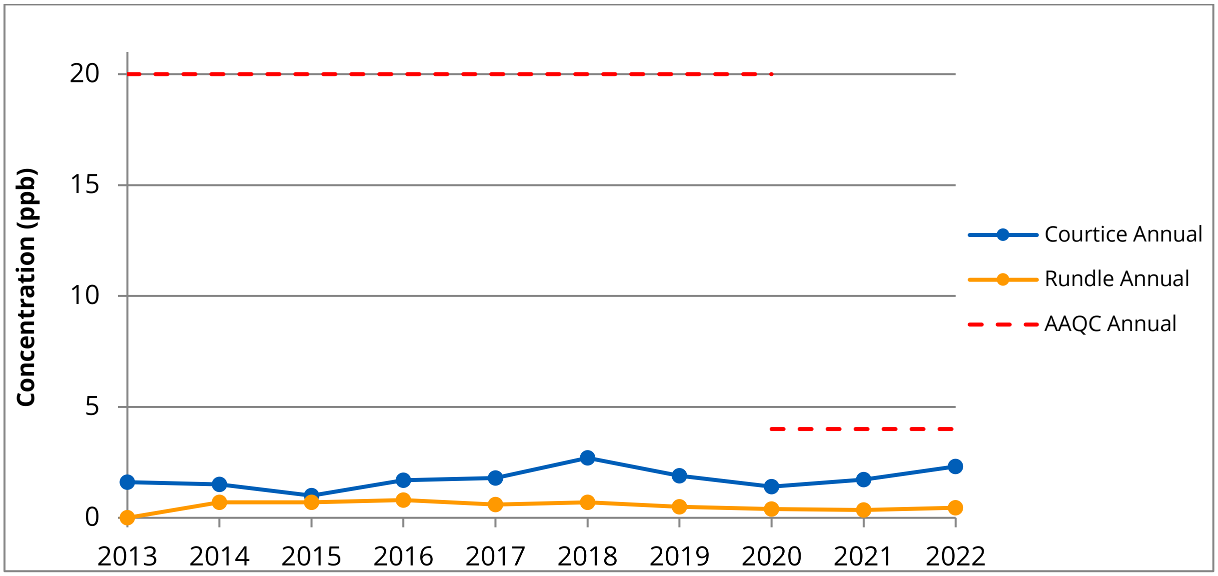


Figure 9: Maximum Measured Annual Mean SO_2 Concentrations by Year

7.1.3 $PM_{2.5}$ Comparison

All continuously monitored $PM_{2.5}$ levels were below the applicable CAAQS' from 2013 to 2022 for both the Courtice and Rundle Road Monitoring Stations. A summary of annual $PM_{2.5}$ data for both stations is presented in **Table 17** for 2013-2022. In 2020 CAAQS' were lowered for the 24-hour and annual limits as described in Section 5 Air Quality Criteria and Standards.

Table 17: 2013-2022 Comparison of Measured $PM_{2.5}$ Statistics for Courtice and Rundle Road Monitoring Stations

Contaminant	Statistic	Courtice Station										Rundle Road Station									
		2013[1]	2014[1]	2015[1]	2016[1]	2017[1]	2018[1]	2019	2020	2021	2022	2013[1]	2014[1]	2015[1]	2016[1]	2017[1]	2018[1]	2019	2020	2021	2022
$PM_{2.5}$ (µg/m^3)	Annual Arithmetic Mean	8.4	8.6	7.7	6.8	6.4	6.3	6.4	5.9	6.3	5.6	8.4	8.5	9.5	9.6	6.3	6.1	5.7	5.2	5.9	5.5
	3-Year Average of the Annual Arithmetic Mean of all 1-hour Concentrations	N/A[2]	N/A[2]	N/A[2]	7.7	7.0	6.5	6.4	6.2	6.2	6.0	N/A[2]	N/A[2]	N/A[2]	9.2	8.5	7.3	6.0	5.7	5.6	5.5
	Annual CAAQS	10	10	10	10	10	10	10	8.8	8.8	8.8	10	10	10	10	10	10	10	8.8	8.8	8.8
	Events > Annual CAAQS	N/A[3]	N/A[3]	N/A[3]	0	0	0	0	0	0	0	N/A[3]	N/A[3]	N/A[3]	0	0	0	0	0	0	0
	Maximum 1-hour Running Mean	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]	64.8	68.6	45.1	68.3	84.4	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]	68.3	49.0	45.2	62.1	56.6
	Maximum Running 24-hour Mean	27	43.2	59.6	34.7	70.6	34.6	35.7	28.6	43.3	24.6	50.6	41.3	64.7	43.1	35.8	31.4	33.6	23.1	39.6	26.6
	98th Percentile (24-hour Mean)	21.5	22.3	27.3	21.6	19.8	18.7	18.5	17	21.3	14.0	21.7	21.1	28.4	32.9	20.3	18.6	17.4	16.1	18.8	14.1
	3-Year Average of the Annual 98th Percentile of the Daily 24-hour Mean Concentrations	N/A[2]	N/A[2]	N/A[2]	23.7	22.9	20.0	19.0	18.1	18.9	17.4	N/A[2]	N/A[2]	N/A[2]	27.5	27.2	23.9	18.8	17.4	17.4	16.4
	24-hour CAAQS	30	30	28	28	28	28	28	27	27	27	30	30	28	28	28	28	28	27	27	27
	Events > 24-hour CAAQS	N/A[3]	N/A[3]	N/A[3]	0	0	0	0	0	0	0	N/A[3]	N/A[3]	N/A[3]	0	0	0	0	0	0	0

Notes: [1] 2013-2018 Q2 data taken from Stantec's 2017 Annual Report (Stantec, 2018) and Stantec's 2018 Q1 (Stantec, 2018a) and Q2 Reports (Stantec, 2018b).
[2] As per Stantec's 2017 Annual Report (Stantec, 2018), the measurement period in 2013 was less than 9 months, therefore the 3-year average for 2013-2015 is not applicable.
[3] As per Stantec's 2017 Annual Report (Stantec, 2018), the measurement period in 2013 was less than 9 months, therefore the 3-year averages for comparison to CAAQS' are not comparable.
[4] These values were not presented in the 2013-2017 data taken from Stantec's Annual Reports (Stantec, 2018)

One-hour mean $PM_{2.5}$ concentrations were averaged over 3-year consecutive periods and compared to the annual CAAQS, which is presented visually in **Figure 10**. The annual 98th percentiles of the daily 24-Hour mean $PM_{2.5}$ concentrations were averaged over 3-year consecutive periods and compared to the 24-Hour CAAQS, which is presented visually in **Figure 11**. It should be noted that the averaged period from 2013-2015 is not plotted in **Figure 10** or **11** as the measurement period in 2013 was less than 9 months (Stantec, 2018) and does not meet the validity requirements for averaging over the 3-year period. The following observations were made from the data plots:

- Two CAAQS standards for $PM_{2.5}$ were reduced in 2020. The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations was changed from 28 to 27 ppb and the 3-year average of the annual averages of all 1-hour concentrations was changed from 10 to 8.8 ppb.
- The 3-year averaged annual $PM_{2.5}$ concentrations measured at the two stations have generally shown a declining trend in overall averages from 2014-2018 and the Rundle Road Station had a slightly higher average as compared to the Courtice Station during this time period. From 2017-2022 both station averages stabilized and the Courtice Station surpassed Rundle Road averages (as seen in **Figure 10**).
- The 3-Year averages of annual 98th percentile 24-Hour $PM_{2.5}$ mean concentrations measured at the two stations have generally shown a declining trend in overall averages from 2017-2019. From 2017-2022 both station averages stabilized and Courtice surpassed the Rundle Road averages (as seen in **Figure 11**).
- Measured 3-year averaged 98th percentile 24-hour average values and 3-year averaged annual $PM_{2.5}$ concentrations measured at both the Courtice, and Rundle Road Stations were fairly close to the CAAQS limits in the 2014-2016 and 2015-2017 yearly averages with the highest being 92% of the CAAQS but have since declined to as high as 64% of the CAAQS in the 2020-2022 grouping as seen in **Figure 10** and **Figure 11**, respectively.

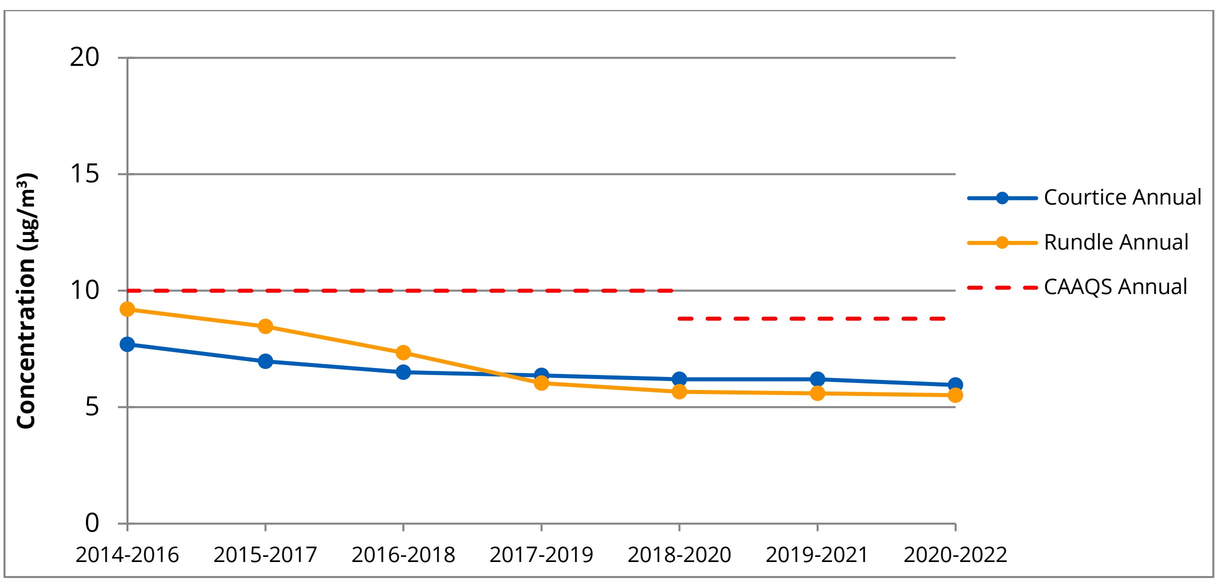


Figure 10: 3-Year Averages of Annual $PM_{2.5}$ Arithmetic Means (of 1-Hour Average Concentrations) by 3-Year Grouping

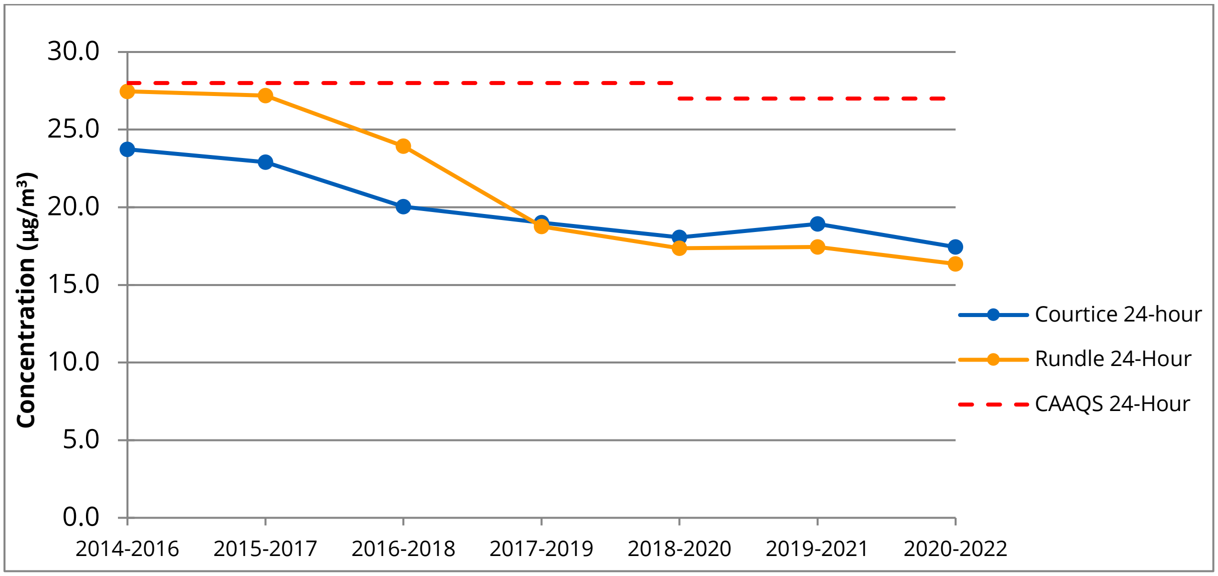


Figure 11: 3-Year Averages of Annual 98th Percentile 24-Hour $PM_{2.5}$ Mean Concentrations by 3-Year Grouping

7.2 TSP and Metals Comparisons

A summary of the maximum measured daily average Total Suspended Particulates (TSP) and Metal concentrations and percentage of the applicable AAQC's/HHRC's from 2013-2014, and 2016-2022 at the Courtice and Rundle Road Monitoring Stations is presented in **Table 18** and **19,** respectively. As per Stantec's comment in the 2017 Annual Report, the 2013, 2014 and 2016 data should be reviewed with caution "since the measurement period in 2013 was eight months (April-December), six months (January-June) in 2014, and 11 months (February-December) in 2016, due to the non-continuous monitoring being temporarily discontinued as per the ambient monitoring plan. Caution should be exercised in comparing the data, as the measurement period lengths were different and cover different periods of each year (with different meteorological conditions)" (Stantec, 2018).

There were two (2) TSP exceedances in 2017, four (4) exceedances in 2018, one (1) exceedance in 2019 and one (1) exceedance in 2022. No other exceedances of TSP or Metals have occurred at the Courtice or Rundle Road Monitoring Stations from 2013 to 2022.

Table 18: 2013-2022 Comparison of Measured TSP and Metals Concentrations at the Courtice Station

Contaminant	Units	AAQC	HHRA	Maximum Concentration										Percentage of Criteria									
				2013 [1]	2014 [1]	2015 [1]	2016 [1]	2017 [1]	2018[1]	2019	2020	2021	2022	2013 [1]	2014 [1]	2015 [1]	2016 [1]	2017 [1]	2018[1]	2019	2020	2021	2022
Particulate (TSP)	µg/m³	*120*	*120*	62.0	57.0	N/A	94.7	59.6	84.7	146.4	69.7	101.0	53.9	51.7%	47.5%	N/A	78.9%	49.7%	70.6%	122.0%	58.1%	84.2%	78.9%
Total Mercury (Hg)	µg/m³	*2*	*2*	3.12E-05	2.15E-05		3.62E-05	3.60E-05	4.19E-05	7.75E-05	4.00E-05	8.80E-05	3.48E-05	0.002%	0.001%		0.002%	0.002%	0.002%	0.004%	0.002%	0.004%	0.002%
Aluminum (Al)	µg/m³	*4.8*	*-*	3.34E-01	3.57E-01		6.78E-01	4.49E-01	8.95E-01	1.00E+00	5.00E-01	1.07E+00	6.72E-01	7.0%	7.4%		14.1%	9.4%	18.6%	20.8%	10.4%	22.3%	14.1%
Antimony (Sb)	µg/m³	*25*	*25*	2.69E-03	3.91E-03		3.67E-03	3.73E-03	7.14E-03	2.55E-03	4.06E-03	3.16E-03	6.20E-03	0.01%	0.02%		0.01%	0.01%	0.03%	0.01%	0.02%	0.01%	0.01%
Arsenic (As)	µg/m³	*0.3*	*0.3*	3.79E-03	2.35E-03		2.20E-03	4.14E-03	4.29E-03	2.76E-03	3.28E-03	1.35E-02	3.83E-03	1.3%	0.8%		0.7%	1.4%	1.4%	0.9%	1.1%	4.5%	0.7%
Barium (Ba)	µg/m³	*10*	*10*	1.58E-02	1.90E-02		3.39E-02	2.05E-02	1.89E-02	2.23E-02	1.55E-02	2.10E-02	2.02E-02	0.2%	0.2%		0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.3%
Beryllium (Be)	µg/m³	*0.01*	*0.01*	2.69E-04	3.91E-04		3.67E-04	3.73E-04	1.56E-03	7.19E-05	3.26E-05	4.55E-05	3.91E-05	2.7%	3.9%		3.7%	3.7%	15.6%	0.7%	0.3%	0.5%	3.7%
Bismuth (Bi)	µg/m³	*-*	*-*	1.66E-03	2.35E-03		2.20E-03	2.24E-03	4.29E-03	1.42E-03	5.86E-04	1.57E-03	5.77E-04	-	-		-	-	-	-	-	-	-
Boron (B)	µg/m³	*120*	*-*	1.13E-02	5.61E-03		8.50E-03	5.39E-03	1.31E-02	1.39E-02	1.30E-02	1.64E-02	9.02E-03	0.009%	0.005%		0.007%	0.004%	0.011%	0.012%	0.011%	0.014%	0.007%
Cadmium (Cd)	µg/m³	*0.025*	*0.025*	5.59E-04	1.18E-03		7.34E-04	7.45E-04	1.90E-03	6.95E-04	5.45E-03	5.96E-04	1.10E-03	2.2%	4.7%		2.9%	3.0%	7.6%	2.8%	21.8%	2.4%	2.9%
Chromium (Cr)	µg/m³	*0.5*	*-*	3.82E-03	6.29E-03		7.74E-03	1.03E-02	9.50E-03	2.25E-02	4.64E-03	5.69E-03	6.16E-03	0.8%	1.3%		1.5%	2.1%	1.9%	4.5%	0.9%	1.1%	1.5%
Cobalt (Co)	µg/m³	*0.1*	*0.1*	5.59E-04	7.83E-04		7.34E-04	7.45E-04	1.43E-03	6.95E-04	6.51E-04	9.77E-04	3.88E-04	0.6%	0.8%		0.7%	0.7%	1.4%	0.7%	0.7%	1.0%	0.7%
Copper (Cu)	µg/m³	*50*	*-*	7.68E-02	5.95E-02		1.27E-01	9.85E-02	4.55E-02	6.10E-02	4.70E-02	7.73E-02	1.33E-01	0.2%	0.1%		0.3%	0.2%	0.1%	0.1%	0.1%	0.2%	0.3%
Iron (Fe)	µg/m³	*4*	*-*	9.90E-01	9.26E-01		1.58E+00	1.01E+00	2.53E+00	3.31E+00	1.26E+00	1.68E+00	1.05E+00	24.8%	23.2%		39.5%	25.3%	63.3%	82.8%	31.6%	42.1%	39.5%
Lead (Pb)	µg/m³	*0.5*	*0.5*	6.47E-03	5.50E-03		7.52E-03	1.09E-02	1.43E-02	1.39E-02	7.81E-03	7.97E-03	6.98E-03	0.3%	0.3%		0.4%	0.5%	0.7%	0.7%	0.4%	0.4%	0.4%
Magnesium (Mg)	µg/m³	*-*	*-*	5.71E-01	4.13E-01		1.14E+00	5.61E-01	1.21E+00	1.25E+00	8.98E-01	9.57E-01	5.79E-01	-	-		-	-	-	-	-	-	-
Manganese (Mn)	µg/m³	*0.4*	*-*	3.31E-02	3.08E-02		4.86E-02	5.25E-02	7.25E-02	1.20E-01	3.69E-02	4.97E-02	2.74E-02	8.3%	7.7%		12.2%	13.1%	18.1%	30.1%	9.2%	12.4%	12.2%
Molybdenum (Mo)	µg/m³	*120*	*-*	1.65E-03	2.36E-03		3.15E-03	4.44E-03	7.69E-03	2.20E-03	3.01E-03	3.03E-03	4.07E-03	0.001%	0.002%		0.003%	0.004%	0.006%	0.002%	0.003%	0.003%	0.003%
Nickel (Ni)	µg/m³	*0.2*	*-*	4.35E-03	2.78E-03		2.40E-03	3.95E-03	3.85E-03	5.35E-03	2.95E-03	3.51E-03	3.79E-03	2.2%	1.4%		1.2%	2.0%	1.9%	2.7%	1.5%	1.8%	1.2%
Phosphorus (P)	µg/m³	*-*	*-*	1.45E-01	1.05E-01		4.60E-01	9.76E-02	1.08E+00	2.02E+00	1.36E+00	5.06E-01	5.13E-01	-	-		-	-	-	-	-	-	-
Selenium (Se)	µg/m³	*10*	*10*	2.69E-03	3.91E-03		3.67E-03	3.73E-03	7.14E-03	3.48E-03	3.26E-03	2.98E-03	1.52E-03	0.03%	0.04%		0.04%	0.04%	0.07%	0.03%	0.03%	0.03%	0.04%
Silver (Ag)	µg/m³	*1*	*1*	1.89E-03	1.96E-03		1.83E-03	1.86E-03	3.57E-03	3.48E-04	3.26E-04	4.71E-04	6.70E-04	0.2%	0.2%		0.2%	0.2%	0.4%	0.03%	0.03%	0.05%	0.2%
Strontium (Sr)	µg/m³	*120*	*-*	1.10E-02	1.34E-02		1.86E-02	1.38E-02	1.73E-02	4.35E-02	2.08E-02	2.34E-02	2.88E-02	0.01%	0.01%		0.02%	0.01%	0.01%	0.04%	0.02%	0.02%	0.02%
Thallium (Tl)	µg/m³	*-*	*-*	2.69E-03	3.91E-03		3.67E-03	3.73E-03	7.14E-03	9.81E-05	2.93E-05	1.08E-04	6.59E-05	-	-		-	-	-	-	-	-	-
Tin (Sn)	µg/m³	*10*	*10*	4.79E-03	3.91E-03		3.67E-03	3.73E-03	7.14E-03	2.52E-03	2.47E-03	3.46E-03	2.22E-03	0.05%	0.04%		0.04%	0.04%	0.07%	0.03%	0.02%	0.03%	0.04%
Titanium (Ti)	µg/m³	*120*	*-*	1.73E-02	2.26E-02		2.82E-02	2.08E-02	3.19E-02	4.31E-02	3.10E-02	4.25E-02	2.28E-02	0.01%	0.02%		0.02%	0.02%	0.03%	0.04%	0.03%	0.04%	0.02%
Uranium (Ur)	µg/m³	*0.3*	*-*	1.24E-04	1.76E-04		1.65E-04	1.68E-04	3.57E-03	1.11E-04	6.97E-05	9.63E-05	6.13E-05	0.04%	0.06%		0.06%	0.06%	1.19%	0.04%	0.02%	0.03%	0.06%
Vanadium (V)	µg/m³	*2*	*1*	6.50E-02	1.14E-01		9.54E-02	2.46E-01	3.57E-03	2.02E-02	1.63E-03	2.95E-03	1.60E-03	3.3%	5.7%		4.8%	12.3%	0.2%	1.0%	0.1%	0.1%	4.8%
Zinc (Zn)	µg/m³	*120*	*-*	1.39E-03	1.96E-03		1.83E-03	1.86E-03	1.86E-01	1.66E-01	9.38E-02	1.49E-01	1.49E-01	0.001%	0.002%		0.002%	0.002%	0.155%	0.1%	0.1%	0.1%	0.002%
Zirconium (Zr)	µg/m³	*20*	*-*	1.92E-03	1.96E-03		1.83E-03	1.86E-03	1.64E-03	2.35E-03	3.33E-03	6.17E-04	6.41E-04	0.010%	0.010%		0.009%	0.009%	0.008%	0.012%	0.017%	0.003%	0.009%

Notes: [1] 2013-2018 Q2 data taken from Stantec's 2017 Annual Report (Stantec, 2018) and Stantec's 2018 Q1 (Stantec, 2018a) and Q2 Reports (Stantec, 2018b).

Table 19: 2013-2022 Comparison of Measured TSP and Metals Concentrations at the Rundle Road Station

Contaminant	Units	AAQC	HHRA	Maximum Concentration										Percentage of Criteria									
				2013 [1]	2014 [1]	2015 [1]	2016 [1]	2017 [1]	2018[1]	2019	2020	2021	2022	2013 [1]	2014 [1]	2015 [1]	2016 [1]	2017 [1]	2018[1]	2019	2020	2021	2022
Particulate (TSP)	$\mu g/m^3$	*120*	*120*	78.0	59.0	N/A	97.1	232	203.6	81.7	102.3	75.6	120.9	65.0%	49.2%	N/A	80.9%	193.3%	169.7%	68.1%	85.2%	63.0%	100.8%
Total Mercury (Hg)	$\mu g/m^3$	*2*	*2*	5.14E-05	2.94E-05		2.50E-05	4.80E-05	9.83E-05	6.10E-05	4.40E-05	1.87E-04	2.95E-05	0.003%	0.001%		0.001%	0.002%	0.005%	0.003%	0.002%	0.009%	0.001%
Aluminum (Al)	$\mu g/m^3$	*4.8*	-	4.54E-01	2.90E-01		7.86E-01	1.08E+00	1.42E+00	6.64E-01	1.19E+00	9.25E-01	1.62E+00	9.5%	6.0%		16.4%	22.5%	29.6%	13.8%	24.8%	19.3%	33.8%
Antimony (Sb)	$\mu g/m^3$	*25*	*25*	2.86E-03	3.41E-03		3.57E-03	3.69E-03	2.64E-02	4.81E-03	1.53E-03	3.06E-03	2.70E-03	0.01%	0.01%		0.01%	0.01%	0.11%	0.019%	0.006%	0.012%	0.011%
Arsenic (As)	$\mu g/m^3$	*0.3*	*0.3*	1.76E-03	2.05E-03		4.72E-03	2.21E-03	2.06E-02	4.79E-03	1.11E-02	1.29E-01	4.92E-03	0.6%	0.7%		1.6%	0.7%	6.9%	1.6%	3.7%	43.1%	1.6%
Barium (Ba)	$\mu g/m^3$	*10*	*10*	1.61E-02	1.18E-02		2.37E-02	3.20E-02	2.58E-02	2.67E-02	1.97E-02	2.14E-02	2.53E-02	0.2%	0.1%		0.2%	0.3%	0.3%	0.3%	0.2%	0.2%	0.3%
Beryllium (Be)	$\mu g/m^3$	*0.01*	*0.01*	2.86E-04	3.41E-04		3.57E-04	3.69E-04	1.81E-03	3.27E-05	3.37E-05	4.15E-05	6.83E-05	2.9%	3.4%		3.6%	3.7%	18.1%	0.3%	0.3%	0.4%	0.7%
Bismuth (Bi)	$\mu g/m^3$	-	-	1.76E-03	2.05E-03		2.14E-03	2.21E-03	2.63E-03	1.46E-03	6.07E-04	1.65E-03	5.71E-04	-	-		-	-	-	-	-	-	-
Boron (B)	$\mu g/m^3$	*120*	-	1.45E-02	4.43E-03		7.45E-03	6.12E-03	1.33E-02	1.31E-02	1.35E-02	1.87E-02	1.57E-02	0.012%	0.004%		0.006%	0.005%	0.011%	0.01%	0.01%	0.02%	0.01%
Cadmium (Cd)	$\mu g/m^3$	*0.025*	*0.025*	8.99E-04	6.83E-04		7.13E-04	7.38E-04	4.73E-03	6.54E-04	3.55E-03	6.10E-04	6.57E-04	3.6%	2.7%		2.9%	3.0%	18.9%	2.6%	14.2%	2.4%	2.6%
Chromium (Cr)	$\mu g/m^3$	*0.5*	-	1.78E-02	4.75E-03		7.93E-03	1.75E-02	8.20E-03	8.54E-03	5.08E-03	4.87E-03	1.25E-02	3.6%	1.0%		1.6%	3.5%	1.6%	1.7%	1.0%	1.0%	2.5%
Cobalt (Co)	$\mu g/m^3$	*0.1*	*0.1*	5.95E-04	6.83E-04		2.78E-03	7.38E-04	8.77E-04	6.54E-04	1.27E-03	7.16E-04	8.27E-04	0.6%	0.7%		2.8%	0.7%	0.9%	0.7%	1.3%	0.7%	0.8%
Copper (Cu)	$\mu g/m^3$	*50*	-	2.36E-01	1.93E-01		1.16E-01	2.29E-01	6.15E-02	8.54E-02	7.30E-02	2.55E-01	6.79E-02	0.5%	0.4%		0.2%	0.5%	0.1%	0.2%	0.1%	0.5%	0.1%
Iron (Fe)	$\mu g/m^3$	*4*	-	1.31E+00	9.30E-01		1.83E+00	2.26E+00	2.97E+00	1.25E+00	2.00E+00	1.73E+00	2.41E+00	32.8%	23.3%		45.8%	56.5%	74.1%	31.2%	50.1%	43.2%	60.2%
Lead (Pb)	$\mu g/m^3$	*0.5*	*0.5*	6.80E-03	7.34E-03		7.25E-03	1.30E-02	3.96E-01	5.81E-03	5.93E-03	7.56E-03	2.85E-02	0.3%	0.4%		0.4%	0.7%	19.8%	0.3%	0.3%	0.4%	1.4%
Magnesium (Mg)	$\mu g/m^3$	-	-	6.76E-01	2.97E-01		1.10E+00	1.76E+00	2.10E+00	9.90E-01	9.86E-01	9.01E-01	1.19E+00	-	-		-	-	-	-	-	-	-
Manganese (Mn)	$\mu g/m^3$	*0.4*	-	1.02E-01	2.60E-02		6.56E-02	7.74E-02	1.13E-01	5.56E-02	3.68E-02	4.35E-02	6.52E-02	25.5%	6.5%		16.4%	19.4%	28.1%	13.9%	9.2%	10.9%	16.3%
Molybdenum (Mo)	$\mu g/m^3$	*120*	-	3.79E-03	2.76E-03		6.24E-03	3.13E-02	6.26E-03	2.20E-03	2.90E-03	2.65E-02	3.37E-03	0.003%	0.002%		0.005%	0.026%	0.005%	0.002%	0.002%	0.022%	0.003%
Nickel (Ni)	$\mu g/m^3$	*0.2*	-	4.67E-03	4.58E-03		1.94E-02	3.62E-03	3.26E-03	2.42E-03	3.02E-03	2.84E-03	3.57E-03	2.3%	2.3%		9.7%	1.8%	1.6%	1.2%	1.5%	1.4%	1.8%
Phosphorus (P)	$\mu g/m^3$	-	-	1.59E-01	1.85E-01		1.03E-01	1.45E-01	1.75E+00	2.15E+00	6.77E-01	2.33E-01	6.91E-01	-	-		-	-	-	-	-	-	-
Selenium (Se)	$\mu g/m^3$	*10*	*10*	2.86E-03	3.41E-03		3.57E-03	3.69E-03	4.39E-03	3.27E-03	3.37E-03	3.05E-03	1.72E-03	0.03%	0.03%		0.04%	0.04%	0.04%	0.03%	0.03%	0.03%	0.02%
Silver (Ag)	$\mu g/m^3$	*1*	*1*	2.33E-03	1.71E-03		1.78E-03	1.85E-03	1.06E-02	3.27E-04	3.37E-04	5.29E-04	5.66E-04	0.2%	0.2%		0.2%	0.2%	1.1%	0.03%	0.03%	0.05%	0.06%
Strontium (Sr)	$\mu g/m^3$	*120*	-	1.95E-02	1.09E-02		2.11E-02	7.54E-02	5.82E-02	3.13E-02	4.07E-02	1.87E-02	4.48E-02	0.02%	0.01%		0.02%	0.06%	0.05%	0.03%	0.03%	0.02%	0.04%
Thallium (Tl)	$\mu g/m^3$	-	-	2.86E-03	3.41E-03		3.57E-03	3.69E-03	4.39E-03	6.36E-05	3.03E-05	7.40E-05	1.27E-04	-	-		-	-	-	-	-	-	-
Tin (Sn)	$\mu g/m^3$	*10*	*10*	2.86E-03	3.41E-03		4.12E-02	3.69E-03	3.09E-02	4.30E-03	2.97E-03	1.11E-02	1.71E-03	0.03%	0.03%		0.41%	0.04%	0.31%	0.04%	0.03%	0.11%	0.02%
Titanium (Ti)	$\mu g/m^3$	*120*	-	2.40E-02	1.71E-02		3.50E-02	6.46E-02	5.57E-02	2.52E-02	7.13E-02	3.51E-02	8.27E-02	0.02%	0.01%		0.03%	0.05%	0.05%	0.02%	0.06%	0.03%	0.07%
Uranium (Ur)	$\mu g/m^3$	*0.3*	-	1.32E-04	1.54E-04		1.60E-04	1.66E-04	1.97E-04	3.27E-05	1.43E-04	7.80E-05	1.52E-04	0.04%	0.05%		0.05%	0.06%	0.07%	0.01%	0.05%	0.03%	0.05%
Vanadium (V)	$\mu g/m^3$	*2*	*1*	7.43E-02	1.24E-01		6.66E-02	2.95E-01	1.88E-02	3.46E-02	1.69E-03	1.55E-03	3.95E-03	3.7%	6.2%		3.3%	14.8%	0.9%	1.7%	0.1%	0.1%	0.2%
Zinc (Zn)	$\mu g/m^3$	*120*	-	1.48E-03	1.71E-03		1.78E-03	1.85E-03	1.12E-01	5.87E-02	1.05E-01	1.27E-01	6.24E-01	0.001%	0.001%		0.001%	0.002%	0.093%	0.049%	0.087%	0.105%	0.520%
Zirconium (Zr)	$\mu g/m^3$	*20*	-	3.22E-03	1.71E-03		3.14E-03	3.43E-03	2.19E-03	6.54E-04	1.43E-03	6.21E-04	1.23E-03	0.016%	0.009%		0.016%	0.017%	0.011%	0.003%	0.01%	0.00%	0.006%

Notes: [1] 2013-2018 Q2 data taken from Stantec's 2017 Annual Report (Stantec, 2018) and Stantec's 2018 Q1 (Stantec, 2018a) and Q2 Reports (Stantec, 2018b)

7.3 PAH Comparisons

A summary of the maximum measured daily average Polycyclic Aromatic Hydrocarbons (PAH) concentrations and percentage of the applicable AAQC's from 2013-2014, and 2016-2022 for both Courtice and Rundle Road Monitoring Stations is presented in **Table 20** and **21,** respectively. As per Stantec's comment in the 2017 Annual Report, the 2013, 2014 and 2016 data should be reviewed with caution "since the measurement periods are not the same in each year, the data are not directly comparable" (Stantec, 2018).

The maximum measured PAH concentrations, with the exception of Benzo(a)Pyrene, were all well below applicable AAQC's from 2013-2022. There have been twenty-eight (28) exceedances of Benzo(a)Pyrene above the applicable AAQC from 2013-2022 at the Courtice Monitoring Station and forty-nine (49) exceedances of Benzo(a)Pyrene above the applicable AAQC from 2013-2022 at the Rundle Road Monitoring Station.

Table 20: 2013-2022 Comparison of Measured PAH Concentrations at the Courtice Station

Contaminant	Units	*MECP Criteria*	*HHRA*	Maximum Concentration										Percentage of Criteria									
				2013 [1]	2014 [1]	2015 [1]	2016 [1]	2017 [1]	2018[1]	2019	2020	2021	2022	2013 [1]	2014 [1]	2015 [1]	2016 [1]	2017 [1]	2018[1]	2019	2020	2021	2022
1-Methylnaphthalene	ng/m³	*12000*	-	27.2	8.2		24.0	19.7	21.8	14.6	16.9	34.1	15.6	0.2%	0.1%		0.2%	0.2%	0.2%	0.1%	0.1%	0.3%	0.1%
2-Methylnaphthalene	ng/m³	*10000*	-	54.3	13.9		50.4	33.5	39.9	23.5	28.8	77.0	32.3	0.5%	0.1%		0.5%	0.3%	0.4%	0.2%	0.3%	0.8%	0.3%
Acenaphthene	ng/m³	-	-	38.7	11.8		29.6	17.0	20.2	10.1	14.3	37.9	18.6	-	-		-	-	-	-	-	-	-
Acenaphthylene	ng/m³	*3500*	-	1.1	0.4		0.3	0.8	0.6	0.5	1.6	1.3	1.1	0.03%	0.01%		0.01%	0.02%	0.02%	0.01%	0.05%	0.04%	0.03%
Anthracene	ng/m³	*200*	-	13.1	1.1		0.5	0.6	0.8	0.4	0.5	1.4	0.6	6.6%	0.6%		0.3%	0.3%	0.4%	0.2%	0.3%	0.7%	0.3%
Benzo(a)Anthracene	ng/m³	-	-	0.2	0.2		0.1	0.1	0.1	0.1	0.1	0.1	0.1	-	-		-	-	-	-	-	-	-
Benzo(a)fluorene	ng/m³	-	-	0.3	0.3		0.2	0.2	0.2	0.1	0.1	0.1	0.1	-	-		-	-	-	-	-	-	-
Benzo(a)Pyrene	ng/m³	*0.05[2]* *5[3]* *1.1[4]*	*1*	0.1	0.1		0.1	0.1	0.2	0.1	0.1	0.2	0.1	129.6%	264%		207%	176%	361%	197%	185%	397%	137%
Benzo(b)Fluoranthene	ng/m³	-	-	0.4	0.6		2.5	0.1	0.3	0.1	0.3	0.2	0.4	-	-		-	-	-	-	-	-	-
Benzo(b)fluorene	ng/m³	-	-	0.3	0.3		0.2	0.2	0.2	0.1	0.1	0.1	0.1	-	-		-	-	-	-	-	-	-
Benzo(e)Pyrene	ng/m³	-	-	0.3	0.3		0.2	0.2	0.2	0.1	0.2	0.2	0.1	-	-		-	-	-	-	-	-	-
Benzo(g,h,i)Perylene	ng/m³	-	-	0.4	0.3		2.5	0.1	0.1	0.1	0.2	0.2	0.1	-	-		-	-	-	-	-	-	-
Benzo(k)Fluoranthene	ng/m³	-	-	0.4	0.3	N/A	2.5	0.1	0.1	0.1	0.2	0.2	0.3	-	-	N/A	-	-	-	-	-	-	-
Biphenyl	ng/m³	-	-	14.9	4.5		11.1	9.7	10.1	5.0	8.6	19.7	8.6	-	-		-	-	-	-	-	-	-
Chrysene	ng/m³	-	-	0.2	0.5		0.2	0.1	0.3	0.2	0.4	0.3	0.2	-	-		-	-	-	-	-	-	-
Dibenzo(a,h)Anthracene	ng/m³	-	-	0.3	0.5		2.8	0.1	0.1	0.03	0.0	0.0	0.03	-	-		-	-	-	-	-	-	-
Fluoranthene	ng/m³	-	-	4.5	4.0		3.2	2.6	3.3	1.2	2.1	2.3	3.1	-	-		-	-	-	-	-	-	-
Fluorene	ng/m³	-	-	-	-		-	-	-	2.9	9.8	21.3	16.6	-	-		-	-	-	-	-	-	-
Indeno(1,2,3-cd)Pyrene	ng/m³	-	-	0.4	0.5		2.8	0.1	0.1	0.1	0.2	0.2	0.1	-	-		-	-	-	-	-	-	-
Naphthalene	ng/m³	*22500*	*22500*	143.0	38.7		60.9	92.2	77.8	48.1	67.1	119.2	47.3	0.6%	0.2%		0.3%	0.4%	0.3%	0.2%	0.3%	0.5%	0.2%
o-Terphenyl	ng/m³	-	-	0.3	0.3		0.2	0.2	0.2	0.02	0.0	0.0	0.03	-	-		-	-	-	-	-	-	-
Perylene	ng/m³	-	-	0.3	0.3		0.2	0.2	0.2	0.02	0.0	0.0	0.05	-	-		-	-	-	-	-	-	-
Phenanthrene	ng/m³	-	-	33.9	14.2		23.1	16.4	21.6	8.7	15.8	22.0	24.2	-	-		-	-	-	-	-	-	-
Pyrene	ng/m³	-	-	1.7	2.5		1.3	1.2	1.4	0.6	1.0	1.0	1.1	-	-		-	-	-	-	-	-	-
Tetralin	ng/m³	-	-	5.8	25.3		3.8	4.9	4.6	7.8	12.7	80.0	6.2	-	-		-	-	-	-	-	-	-
Total PAH[5]	ng/m³	-	-	327.0	95.0		208.7	200.0	203.6	117.9	170.2	333.0	135.4	-	-		-	-	-	-	-	-	-

Notes:
[1] 2013-2018 Q2 data taken from Stantec's 2017 Annual Report (Stantec, 2018) and Stantec's 2018 Q1 (Stantec, 2018a) and Q2 Reports (Stantec, 2018b)
[2] Ontario AAQC. The Standard for benzo(a)Pyrene (B(a)P) is for B(a)P as a surrogate for PAHs.
[3] O.Reg. 419/05 Schedule 6 Upper Risk Thresholds
[4] O.Reg. 419/05 24 Hour Guideline
[5] The reported total PAH is the sum of all analysed PAH species.

Table 21: 2013-2022 Comparison of Measured PAH Concentrations at the Rundle Road Station

Contaminant	Units	*MECP Criteria*	*HHRA*	Maximum Concentration										Percentage of Criteria									
				2013 [1]	2014 [1]	2015 [1]	2016 [1]	2017 [1]	2018[1]	2019	2020	2021	2022	2013 [1]	2014 [1]	2015 [1]	2016 [1]	2017 [1]	2018[1]	2019	2020	2021	2022
1-Methylnaphthalene	ng/m^3	*12000*	-	26.6	10.8		238.2	29.4	26.6	16.1	27.0	22.1	9.9	0.2%	0.1%		2.0%	0.2%	0.2%	0.1%	0.2%	0.2%	0.1%
2-Methylnaphthalene	ng/m^3	*10000*	-	45.4	18.7		502.5	69.2	54.1	29.4	48.5	43.0	20.3	0.5%	0.2%		5.0%	0.7%	0.5%	0.3%	0.5%	0.4%	0.2%
Acenaphthene	ng/m^3	-	-	18.9	8.1		303.2	44.1	40.4	18.0	26.9	17.5	15.3	-	-		-	-	-	-	-	-	-
Acenaphthylene	ng/m^3	*3500*	-	1.6	2.0		3.3	1.2	0.6	0.6	0.9	0.7	5.3	0.1%	0.1%		0.1%	-	0.02%	0.02%	0.02%	0.02%	0.15%
Anthracene	ng/m^3	*200*	-	1.5	0.7		7.5	3.1	2.6	1.9	2.1	1.2	2.4	0.8%	0.4%		3.8%	-	1.3%	0.9%	1.1%	0.6%	1.2%
Benzo(a)Anthracene	ng/m^3	-	-	0.5	0.2		0.2	0.1	0.1	0.1	0.2	0.1	0.6	-	-		-	-	-	-	-	-	-
Benzo(a)fluorene	ng/m^3	-	-	0.6	0.3		0.4	0.4	0.3	0.1	0.2	0.1	0.7	-	-		-	-	-	-	-	-	-
Benzo(a)Pyrene	ng/m^3	*0.05[2]* *5[3]* *1.1[4]*	*1*	0.4	0.3		0.2	0.2	0.1	0.1	0.2	0.3	1.2	826%	576%		415%	316%	278%	221%	364%	653.7%	2320%
Benzo(b)Fluoranthene	ng/m^3	-	-	1.0	0.7		0.5	0.4	0.1	0.2	0.2	0.2	1.3	-	-		-	-	-	-	-	-	-
Benzo(b)fluorene	ng/m^3	-	-	0.5	0.3		0.2	0.3	0.3	0.1	0.1	0.1	0.6	-	-		-	-	-	-	-	-	-
Benzo(e)Pyrene	ng/m^3	-	-	0.5	0.3		0.2	0.3	0.3	0.1	0.2	0.2	1.0	-	-		-	-	-	-	-	-	-
Benzo(g,h,i)Perylene	ng/m^3	-	-	0.6	0.3		0.1	0.1	0.1	0.1	0.2	0.2	1.3	-	-		-	-	-	-	-	-	-
Benzo(k)Fluoranthene	ng/m^3	-	-	0.3	0.2	N/A	0.1	0.1	0.1	0.1	0.2	0.2	1.1	-	-	N/A	-	-	-	-	-	-	-
Biphenyl	ng/m^3	-	-	7.4	5.8		125.9	14.2	13.2	5.5	19.3	9.9	8.1	-	-		-	-	-	-	-	-	-
Chrysene	ng/m^3	-	-	0.9	0.7		0.4	0.1	0.2	0.2	0.3	0.3	1.4	-	-		-	-	-	-	-	-	-
Dibenzo(a,h)Anthracene	ng/m^3	-	-	0.2	0.2		0.1	0.1	0.1	0.03	0.1	0.0	0.1	-	-		-	-	-	-	-	-	-
Fluoranthene	ng/m^3	-	-	7.7	3.5		14.7	13.9	13.5	4.7	6.2	3.3	8.5	-	-		-	-	-	-	-	-	-
Fluorene	ng/m^3	-	-	-	-		-	-	-	6.9	16.5	12.2	15.5	-	-		-	-	-	-	-	-	-
Indeno(1,2,3-cd)Pyrene	ng/m^3	-	-	0.5	0.3		0.2	0.1	0.1	0.1	0.2	0.2	1.1	-	-		-	-	-	-	-	-	-
Naphthalene	ng/m^3	*22500*	*22500*	94.1	92.6		294.6	85.4	74.2	53.7	104.7	81.1	49.5	0.4%	0.4%		1.3%	0.4%	0.3%	0.2%	0.5%	0.4%	0.2%
o-Terphenyl	ng/m^3	-	-	0.5	0.3		0.2	0.3	0.3	0.02	0.0	0.0	0.0	-	-		-	-	-	-	-	-	-
Perylene	ng/m^3	-	-	0.5	0.3		0.2	0.3	0.3	0.02	0.0	0.0	0.2	-	-		-	-	-	-	-	-	-
Phenanthrene	ng/m^3	-	-	29.4	13.0		209.7	69.8	58.1	24.0	30.6	16.2	36.7	-	-		-	-	-	-	-	-	-
Pyrene	ng/m^3	-	-	3.2	1.9		6.6	5.6	5.4	2.0	3.6	1.4	4.3	-	-		-	-	-	-	-	-	-
Tetralin	ng/m^3	-	-	5.1	4.0		4.4	3.8	7.7	36.0	16.8	94.5	5.4	-	-		-	-	-	-	-	-	-
Total PAH[5]	ng/m^3	-	-	165.0	153.9		1710.2	309.0	292.1	160.3	274.2	216.3	138.1	-	-		-	-	-	-	-	-	-

Notes:
[1] 2013-2018 Q2 data taken from Stantec's 2017 Annual Report (Stantec, 2018) and Stantec's 2018 Q1 (Stantec, 2018a) and Q2 Reports (Stantec, 2018b)
[2] Ontario AAQC. The Standard for benzo(a)Pyrene (B(a)P) is for B(a)P as a surrogate for PAHs.
[3] O.Reg. 419/05 Schedule 6 Upper Risk Thresholds
[4] O.Reg. 419/05 24 Hour Guideline
[5] The reported total PAH is the sum of all analysed PAH species

7.4 Dioxins and Furans Comparisons

The maximum measured ambient toxic equivalent Dioxins and Furans (D&F) concentrations from 2013 – 2022 and their specific measurement period for both Courtice and Rundle Road Monitoring Stations is presented in **Table 22**. As per Stantec's comment in the 2017 Annual Report, the 2013-2016 data should be reviewed with caution "as the measurement periods were different and cover different periods of each year (with different meteorological conditions). Only the 2017 measurements encompassed a full year as previous years sampling were dependent on the start-up date of the DYEC" (Stantec, 2018).

There was one (1) exceedance of the maximum measured toxic equivalent D&F concentration AAQC at the Courtice Monitoring Station in 2018, but none in 2013-2017 or 2019-2022. The maximum measured toxic equivalent D&F concentrations at the Rundle Road Station were all below the applicable AAQC from 2013-2022.

Table 22: 2013-2022 Comparison of Maximum Measured D&F Concentrations at the Courtice and Rundle Road Stations

Year	Sampling Period Throughout Year	Courtice Station		Rundle Road Station	
		Maximum Concentration (pg TEQ/m³)	No. of Exceedances	Maximum Concentration (pg TEQ/m³)	No. of Exceedances
2013 [1]	May - December	0.036	0	0.029	0
2014 [1]	January - June	0.038	0	0.065	0
2015 [1]	October - December	0.017	0	0.021	0
2016 [1]	February - December	0.044	0	0.026	0
2017 [1]	January – December	0.052	0	0.065	0
2018 [1]	January - December	0.109	1	0.091	0
2019	January - December	0.012	0	0.025	0
2020	January - December	0.025	0	0.030	0
2021	January - December	0.015	0	0.046	0
2022	January - December	0.024	0	0.067	0

Notes: [1] 2013-2018 Q2 data taken from Stantec's 2017 Annual Report (Stantec, 2018) and Stantec's 2018 Q1 (Stantec, 2018a) and Q2 Reports (Stantec, 2018b)

8 CONCLUSIONS

The ambient air monitoring program at the DYEC for 2022 had six (6) Benzo(a)pyrene daily average concentrations above the applicable AAQC at the Courtice and Rundle Road Monitoring Stations. There was one (1) TSP daily average concentration above the applicable AAQC at the Rundle Road Monitoring Station.

At the beginning of 2020, the SO_2 1-hour AAQC limit was reduced from 250 to 40 ppb. The ambient air monitoring program at the DYEC for 2022 had ninety (90) SO_2 1-hour average concentrations above the AAQC at the Courtice and Rundle Road Monitoring Stations. There were also two-hundred and two (202) exceedances of the rolling 10-minute average AAQC for SO_2 throughout 2022.

Throughout the 2022 year, there were a few minor issues with equipment failures and malfunctions. These were addressed as soon as they were identified, and preventive actions were put in place to prevent reoccurrences.

Data recovery was 93% or higher at each station for all contaminants, which exceeds the MECP's requirement of 75% of collected readings to be considered valid. The overall data recovery was 98.1% for the Courtice Monitoring Station and was 97.3% for the Rundle Road Monitoring Station.

9 REFERENCES

1. Jacques Whitford, (2009). Final Environmental Assessment, December 4, 2009.
2. Stantec Consulting Ltd., (2012). Ambient Air Quality Monitoring Plan, Durham York Residual Waste Study, May 8, 2012.
3. Stantec Consulting Ltd., (2018). 2017 Annual Ambient Air Quality Monitoring Report for the Durham York Energy Centre.
4. Stantec Consulting Ltd., (2018a). Quarterly Ambient Air Quality Monitoring Report for the Durham York Energy Centre – January to March 2018.
5. Stantec Consulting Ltd., (2018b). Quarterly Ambient Air Quality Monitoring Report for the Durham York Energy Centre – April to June 2018.

10 GENERAL STATEMENT OF LIMITATIONS

This report entitled "2022 Annual Ambient Air Quality Monitoring Report: Continuous & Periodic Monitoring Program", dated April 27, 2023, was prepared by RWDI AIR Inc. ("RWDI") for The Regional Municipality of Durham ("Client"). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein ("Project"). This report was prepared using scientific principles, published methodologies and professional judgment in assessing available information and data. The findings presented within this document are based on available data within the limits of the existing information, budgeted scope of work, and schedule. The conclusions contained in this report are based on the information available to RWDI when this report was prepared; subsequent changes made by the Client after the date of this report have not been reflected in the conclusions.

This report was prepared for the exclusive use of The Regional Municipality of Durham and the MECP. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. RWDI accepts no responsibility for damages, if any, suffered by any third party as result of decisions made or actions based on this report.

APPENDIX A

National Air Pollution Surveillance (NAPS) Program // Programme de surveillance national de la pollution atmosphérique (SNPA)

2022 Sampling Schedule // Horaire Échantillonnage **2022**

Notes // Notes:

3-Day schedule in orange, pink and purple // Échantillonneurs 3-jours en orange, rose et violet

6-Day schedule in pink and purple // Échantillonneurs 6-jours en rose et violet

12-Day schedule in purple // Échantillonneurs 12-jours en violet

January // janvier

SUN DIM	MON LUN	TUE MAR	WED MER	THU JEU	FRI VEN	SAT SAM
						1
2	3	4	5	6	7	
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

February // février

SUN DIM	MON LUN	TUE MAR	WED MER	THU JEU	FRI VEN	SAT SAM
		1	2	3	4	5
6		8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28					

March // mars

SUN DIM	MON LUN	TUE MAR	WED MER	THU JEU	FRI VEN	SAT SAM
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

April // avril

SUN DIM	MON LUN	TUE MAR	WED MER	THU JEU	FRI VEN	SAT SAM
					1	2
3	4		6	7		9
10	11	12	13	14	15	16
	18	19		21	22	23
24	25	26	27	28	29	30

May // mai

SUN DIM	MON LUN	TUE MAR	WED MER	THU JEU	FRI VEN	SAT SAM
1	2	3	4	5	6	7
	9	10		12	13	
15	16	17	18	19		21
22	23	24	25	26	27	28
29	30	31				

June // juin

SUN DIM	MON LUN	TUE MAR	WED MER	THU JEU	FRI VEN	SAT SAM
				2	3	
5	6		8	9	10	11
12		14	15		17	18
19	20	21	22	23	24	25
26	27	28	29	30		

July // juillet

SUN DIM	MON LUN	TUE MAR	WED MER	THU JEU	FRI VEN	SAT SAM
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

August // août

SUN DIM	MON LUN	TUE MAR	WED MER	THU JEU	FRI VEN	SAT SAM
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

September // septembre

SUN DIM	MON LUN	TUE MAR	WED MER	THU JEU	FRI VEN	SAT SAM
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

October // octobre

SUN DIM	MON LUN	TUE MAR	WED MER	THU JEU	FRI VEN	SAT SAM
						1
	3	4		6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25		27	28	29
30	31					

November // novembre

SUN DIM	MON LUN	TUE MAR	WED MER	THU JEU	FRI VEN	SAT SAM
		1	2	3		5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

December // decembre

SUN DIM	MON LUN	TUE MAR	WED MER	THU JEU	FRI VEN	SAT SAM
					2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Contact the NAPS inquiry centre for additional information // Contactez le centre d'information SNPA pour plus d'informations

ec.info-donnees-rnspa-naps-data-info.ec@canada.ca

APPENDIX B

Table B1: 2022 Monitoring Summary Results for $PM_{2.5}$ at Courtice Station

Data Statistics	Annual Arithmetic Mean	Maximum Running 1 hr Mean	Maximum Running 24 hr Mean	98th Percentile (24 hr Mean) [1]	Number of valid Hours	% valid data
Compound	$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$
	(ug/m^3)	(ug/m^3)	(ug/m^3)	(ug/m^3)	No.	%
2022	5.6	84.4	24.6	14.0	8541	97.5

[1] - This value is the 98th percentile of daily average levels for the 2022 year.

Table B2: 2022 Monitoring Summary Results for $PM_{2.5}$ at Rundle Station

Data Statistics	Annual Arithmetic Mean	Maximum Running 1 hr Mean	Maximum Running 24 hr Mean	98th Percentile (24 hr Mean) [1]	Number of valid Hours	% valid data
Compound	$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$
	(ug/m^3)	(ug/m^3)	(ug/m^3)	(ug/m^3)	No.	%
2022	5.5	56.6	26.6	14.1	8542	97.5

[1] - This value is the 98th percentile of daily average levels for the 2022 year.

Table B3: 2022 Monitoring Summary Results for NOx at Courtice Station

Data Statistics	Events > 1 hr AAQC	Events > 24 hr AAQC	Annual Arithmetic Mean	Maximum Running 1 hr Mean	Maximum Running 24 hr Mean	Number of valid Hours	% valid data
Compound	NO_x	NO_x	NO_x	NO_x	NO_x	NO_x	NO_x
	No.	No.	(ppb)	(ppb)	(ppb)	No.	%
2022	N/A	N/A	5.9	87.9	35.9	8473	96.7

Table B4: 2022 Monitoring Summary Results for NOx at Rundle Station

Data Statistics	Events > 1 hr AAQC	Events > 24 hr AAQC	Annual Arithmetic Mean	Maximum Running 1 hr Mean	Maximum Running 24 hr Mean	Number of Valid Hours	% Valid Data
Compound	NO_x	NO_x	NO_x	NO_x	NO_x	NO_x	NO_x
	No.	No.	(ppb)	(ppb)	(ppb)	No.	%
2022	N/A	N/A	5.1	85.1	26.0	8526	97.3

Table B5: 2022 Monitoring Summary Results for NO at Courtice Station

Data Statistics	Events > 1 hr AAQC	Events > 24 hr AAQC	Annual Arithmetic Mean	Maximum Running 1 hr Mean	Maximum Running 24 hr Mean	Number of valid Hours	% valid data
Compound	NO	NO	NO	NO	NO	NO	NO
	No.	No.	(ppb)	(ppb)	(ppb)	No.	%
2022	N/A	N/A	1.3	54.9	16.1	8473	96.7

Table B6: 2022 Monitoring Summary Results for NO at Rundle Station

Data Statistics	Events > 1 hr AAQC	Events > 24 hr AAQC	Annual Arithmetic Mean	Maximum Running 1 hr Mean	Maximum Running 24 hr Mean	Number of valid Hours	% valid data
Compound	NO	NO	NO	NO	NO	NO	NO
	No.	No.	(ppb)	(ppb)	(ppb)	No.	%
2022	N/A	N/A	1.3	62.5	8.8	8526	97.3

Table B7: 2022 Monitoring Summary Results for NO_2 at Courtice Station

Data Statistics	Events > 1 hr AAQC	Events > 24 hr AAQC	Events > Annual AAQC	Annual Arithmetic Mean	Maximum Running 1 hr Mean	98th Percentile (Daily Max 1 hr Mean) [1]	Maximum Running 24 hr Mean	Number of valid Hours	% valid data
Compound	NO_2	NO_2	NO_2	NO_2	NO_2	NO_2	NO_2	NO_2	NO_2
	No.	No.	No.	(ppb)	(ppb)	(ppb)	(ppb)	No.	%
2022	0	0	0	4.7	41.7	33.9	26.1	8473	96.7

[1] - This value is the 98th percentile of daily maximum 1-hour average concentrations for the 2022 year.

Table B8: 2022 Monitoring Summary Results for NO_2 at Rundle Station

Data Statistics	Events > 1 hr AAQC	Events > 24 hr AAQC	Events > Annual AAQC	Annual Arithmetic Mean	Maximum Running 1 hr Mean	98th Percentile (Daily Max 1 hr Mean) [1]	Maximum Running 24 hr Mean	Number of valid Hours	% valid data
Compound	NO_2	NO_2	NO_2	NO_2	NO_2	NO_2	NO_2	NO_2	NO_2
	No.	No.	No.	(ppb)	(ppb)	(ppb)	(ppb)	No.	%
2022	0	0	0	3.8	38.6	26.0	18.1	8526	97.3

[1] - This value is the 98th percentile of daily maximum 1-hour average concentrations for the 2022 year.

Table B9: 2022 Monitoring Summary Results for SO_2 at Courtice Station

Data Statistics	Events > 10 min AAQC	Events > 1 hr AAQC	Events > Annual AAQC	Annual Arithmetic Mean	Maximum Running 10 min Mean	Maximum Running 1 hr Mean	99th Percentile (Daily Max 1 hr Mean) [1]	Maximum Running 24 hr Mean	Number of valid Hours	% valid data
Compound	SO_2	SO_2	SO_2	SO_2	SO_2	SO_2	SO_2	SO_2	SO_2	SO_2
	No.	No.	No.	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	No.	%
2022	186	83	0	2.3	316.1	138.1	104.4	23.8	8518	97.2

[1] - This value is the 99th percentile of daily maximum 1-hour average concentrations for the 2022 year.

Table B10: 2022 Monitoring Summary Results for SO_2 at Rundle Station

Data Statistics	Events > 10 min AAQC	Events > 1 hr AAQC	Events > Annual AAQC	Events > Annual CAAQS	Annual Arithmetic Mean	Maximum Running 10 min Mean	Maximum Running 1 hr Mean	99th Percentile (Daily Max 1 hr Mean) [1]	Maximum Running 24 hr Mean	Number of valid Hours	% valid data
Compound	SO_2	SO_2	SO_2	SO_2	SO_2	SO_2	SO_2	SO_2	SO_2	SO_2	SO_2
	No.	No.	No.	No.	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	No.	%
2022	16	7	0	0	0.5	221.0	112.6	47.6	9.9	8504	97.1

[1] - This value is the 99th percentile of daily maximum 1-hour average concentrations for the 2022 year.

APPENDIX C

Table C5: 2022 Courtice Station Monitoring Results for Dioxins & Furans

DYEC AAQM										
Courtice Station Monitoring Results for Dioxins & Furans										
Contaminant	**Units**	**AAQC**	**HHRA Health Based Criteria**	**No. > AAQC**	**Geometric Mean**	**Arithmetic Mean**	**Maximum Concentration**	**Minimum Concentration**	**Number of Valid Samples**	**% Valid data**
2,3,7,8-TCDD	pg TEQ/m^3	-	-	-	1.22E-03	1.85E-03	7.12E-03	3.57E-04	13	81.3
1,2,3,7,8-PeCDD	pg TEQ/m^3	-	-	-	1.51E-03	2.60E-03	1.00E-02	2.95E-04	13	81.3
1,2,3,4,7,8-HxCDD	pg TEQ/m^3	-	-	-	2.00E-04	3.10E-04	9.45E-04	5.00E-05	13	81.3
1,2,3,6,7,8-HxCDD	pg TEQ/m^3	-	-	-	2.81E-04	4.80E-04	1.69E-03	6.46E-05	13	81.3
1,2,3,7,8,9-HxCDD	pg TEQ/m^3	-	-	-	2.87E-04	4.59E-04	1.57E-03	6.31E-05	13	81.3
1,2,3,4,6,7,8-HpCDD	pg TEQ/m^3	-	-	-	3.75E-04	6.20E-04	2.20E-03	5.71E-05	13	81.3
OCDD	pg TEQ/m^3	-	-	-	4.89E-05	6.33E-05	1.50E-04	1.67E-05	13	81.3
2,3,7,8-TCDF	pg TEQ/m^3	-	-	-	1.57E-04	1.91E-04	5.52E-04	5.59E-05	13	81.3
1,2,3,7,8-PeCDF	pg TEQ/m^3	-	-	-	5.43E-05	7.51E-05	2.72E-04	1.73E-05	13	81.3
2,3,4,7,8-PeCDF	pg TEQ/m^3	-	-	-	5.36E-04	7.55E-04	2.46E-03	1.45E-04	13	81.3
1,2,3,4,7,8-HxCDF	pg TEQ/m^3	-	-	-	1.91E-04	2.83E-04	8.04E-04	3.74E-05	13	81.3
1,2,3,6,7,8-HxCDF	pg TEQ/m^3	-	-	-	1.41E-04	1.94E-04	4.80E-04	2.69E-05	13	81.3
2,3,4,6,7,8-HxCDF	pg TEQ/m^3	-	-	-	2.27E-04	4.23E-04	2.13E-03	2.54E-05	13	81.3
1,2,3,7,8,9-HxCDF	pg TEQ/m^3	-	-	-	1.77E-04	2.63E-04	8.70E-04	3.00E-05	13	81.3
1,2,3,4,6,7,8-HpCDF	pg TEQ/m^3	-	-	-	8.57E-05	2.09E-04	1.48E-03	1.80E-05	13	81.3
1,2,3,4,7,8,9-HpCDF	pg TEQ/m^3	-	-	-	1.77E-05	5.03E-05	1.86E-04	3.45E-06	13	81.3
OCDF	pg TEQ/m^3	-	-	-	2.65E-06	9.22E-06	8.34E-05	3.41E-07	13	81.3
Total Toxic Equivalency	pg TEQ/m^3	0.1 1[1]	-	0	6.45E-03	8.83E-03	2.43E-02	2.02E-03	13	81.3

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

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

Table C6: 2022 Rundle Station Monitoring Results for Dioxins & Furans

DYEC AAQM										
Rundle Station Monitoring Results for Dioxins & Furans										
Contaminant	**Units**	***AAQC***	***HHRA Health Based Criteria***	**No. > AAQC**	**Geometric Mean**	**Arithmetic Mean**	**Maximum Concentration**	**Minimum Concentration**	**Number of Valid Samples**	**% Valid data**
2,3,7,8-TCDD	pg TEQ/m^3	-	-	-	1.11E-03	1.73E-03	8.97E-03	3.45E-04	12	75.0
1,2,3,7,8-PeCDD	pg TEQ/m^3	-	-	-	1.90E-03	3.18E-03	1.17E-02	4.29E-04	12	75.0
1,2,3,4,7,8-HxCDD	pg TEQ/m^3	-	-	-	2.78E-04	7.02E-04	5.39E-03	4.78E-05	12	75.0
1,2,3,6,7,8-HxCDD	pg TEQ/m^3	-	-	-	3.56E-04	1.28E-03	1.08E-02	6.07E-05	12	75.0
1,2,3,7,8,9-HxCDD	pg TEQ/m^3	-	-	-	3.55E-04	1.21E-03	1.06E-02	6.07E-05	12	75.0
1,2,3,4,6,7,8-HpCDD	pg TEQ/m^3	-	-	-	5.12E-04	2.12E-03	1.92E-02	4.14E-05	12	75.0
OCDD	pg TEQ/m^3	-	-	-	4.78E-05	1.28E-04	1.04E-03	1.00E-05	12	75.0
2,3,7,8-TCDF	pg TEQ/m^3	-	-	-	1.62E-04	2.15E-04	7.21E-04	4.31E-05	12	75.0
1,2,3,7,8-PeCDF	pg TEQ/m^3	-	-	-	4.69E-05	7.17E-05	2.79E-04	1.62E-05	12	75.0
2,3,4,7,8-PeCDF	pg TEQ/m^3	-	-	-	7.33E-04	9.89E-04	2.53E-03	2.09E-04	12	75.0
1,2,3,4,7,8-HxCDF	pg TEQ/m^3	-	-	-	1.88E-04	2.36E-04	5.64E-04	4.44E-05	12	75.0
1,2,3,6,7,8-HxCDF	pg TEQ/m^3	-	-	-	1.83E-04	2.93E-04	1.17E-03	3.99E-05	12	75.0
2,3,4,6,7,8-HxCDF	pg TEQ/m^3	-	-	-	2.23E-04	3.59E-04	1.01E-03	3.11E-05	12	75.0
1,2,3,7,8,9-HxCDF	pg TEQ/m^3	-	-	-	1.77E-04	2.57E-04	8.92E-04	3.54E-05	12	75.0
1,2,3,4,6,7,8-HpCDF	pg TEQ/m^3	-	-	-	8.18E-05	1.42E-04	6.25E-04	1.63E-05	12	75.0
1,2,3,4,7,8,9-HpCDF	pg TEQ/m^3	-	-	-	1.60E-05	2.70E-05	8.10E-05	3.70E-06	12	75.0
OCDF	pg TEQ/m^3	-	-	-	2.49E-06	4.10E-06	1.62E-05	3.82E-07	12	75.0
Total Toxic Equivalency	pg TEQ/m^3	*0.1* *1* [1]	-	0	7.86E-03	1.29E-02	6.66E-02	2.61E-03	12	75.0

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

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

Table C3: 2022 Courtice Station Monitoring Results for PAHs

DYEC AAQM Courtice Station Monitoring Results for Polycyclic Aromatic Hydrocarbons										
Contaminant	Units	*AAQC*	*HHRA Health Based Criteria*	No. > AAQC	Geometric Mean	Arithmetic Mean	Maximum Concentration	Minimum Concentration	Number of Valid Samples	% Valid data
1-Methylnaphthalene	ng/m^3	*12000*	-	0	4.34E+00	5.78E+00	1.56E+01	8.97E-01	26	83.9
2-Methylnaphthalene	ng/m^3	*10000*	-	0	8.37E+00	1.17E+01	3.23E+01	1.56E+00	26	83.9
Acenaphthene	ng/m^3	-	-	-	2.50E+00	4.98E+00	1.86E+01	1.86E-01	26	83.9
Acenaphthylene	ng/m^3	*3500*	-	0	2.35E-01	3.15E-01	1.06E+00	4.53E-02	26	83.9
Anthracene	ng/m^3	*200*	-	0	1.24E-01	1.99E-01	6.13E-01	2.28E-02	26	83.9
Benzo(a)Anthracene	ng/m^3	-	-	-	1.76E-02	2.23E-02	5.47E-02	1.23E-03	26	83.9
Benzo(a)fluorene	ng/m^3	-	-	-	4.82E-02	5.32E-02	1.00E-01	2.28E-02	26	83.9
Benzo(a)Pyrene	ng/m^3	*0.05 [1]* *5 [2]* *1.1 [3]*	*1*	1	2.24E-02	2.89E-02	6.84E-02	2.93E-04	26	83.9
Benzo(b)Fluoranthene	ng/m^3	-	-	-	5.09E-02	7.45E-02	3.73E-01	1.14E-03	26	83.9
Benzo(b)fluorene	ng/m^3	-	-	-	2.43E-02	2.89E-02	5.92E-02	8.44E-03	26	83.9
Benzo(e)Pyrene	ng/m^3	-	-	-	2.92E-02	4.06E-02	1.25E-01	2.93E-04	26	83.9
Benzo(g,h,i)Perylene	ng/m^3	-	-	-	3.05E-02	4.08E-02	1.24E-01	2.93E-04	26	83.9
Benzo(k)Fluoranthene	ng/m^3	-	-	-	3.78E-02	5.89E-02	3.48E-01	2.67E-03	26	83.9
Biphenyl	ng/m^3	-	-	-	2.76E+00	3.33E+00	8.58E+00	6.00E-01	26	83.9
Chrysene	ng/m^3	-	-	-	8.17E-02	9.61E-02	2.40E-01	1.41E-02	26	83.9
Dibenzo(a,h)Anthracene	ng/m^3	-	-	-	5.66E-03	7.96E-03	2.53E-02	2.93E-04	26	83.9
Fluoranthene	ng/m^3	-	-	-	8.52E-01	1.05E+00	3.12E+00	2.49E-01	26	83.9
Fluorene	ng/m^3	-	-	-	2.52E+00	3.92E+00	1.66E+01	4.57E-01	26	83.9
Indeno(1,2,3-cd)Pyrene	ng/m^3	-	-	-	2.99E-02	4.07E-02	1.25E-01	2.93E-04	26	83.9
Naphthalene	ng/m^3	*22500*	*22500*	0	1.48E+01	1.78E+01	4.73E+01	2.73E+00	26	83.9
o-Terphenyl	ng/m^3	-	-	-	1.14E-02	1.31E-02	2.87E-02	3.72E-03	26	83.9
Perylene	ng/m^3	-	-	-	1.50E-03	4.22E-03	4.92E-02	2.93E-04	26	83.9
Phenanthrene	ng/m^3	-	-	-	4.21E+00	6.03E+00	2.42E+01	9.61E-01	26	83.9
Pyrene	ng/m^3	-	-	-	4.01E-01	4.69E-01	1.07E+00	1.72E-01	26	83.9
Tetralin	ng/m^3	-	-	-	1.22E+00	1.47E+00	6.20E+00	4.91E-01	26	83.9
Total PAH[4]	ng/m^3	-	-	-	4.63E+01	5.75E+01	1.35E+02	9.62E+00	26	83.9

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

Table C4: 2022 Rundle Station Monitoring Results for PAHs

DYEC AAQM Rundle Station Monitoring Results for Polycyclic Aromatic Hydrocarbons										
Contaminant	Units	AAQC	HHRA Health Based Criteria	No. > AAQC	Geometric Mean	Arithmetic Mean	Maximum Concentration	Minimum Concentration	Number of Valid Samples	% Valid data
1-Methylnaphthalene	ng/m^3	*12000*	-	0	3.37E+00	4.27E+00	9.91E+00	4.91E-01	27	87.1
2-Methylnaphthalene	ng/m^3	*10000*	-	0	6.11E+00	7.97E+00	2.03E+01	8.98E-01	27	87.1
Acenaphthene	ng/m^3	-	-	-	1.74E+00	3.11E+00	1.53E+01	1.32E-01	27	87.1
Acenaphthylene	ng/m^3	*3500*	-	0	2.57E-01	4.62E-01	5.27E+00	6.72E-02	27	87.1
Anthracene	ng/m^3	*200*	-	0	1.86E-01	3.97E-01	2.45E+00	4.33E-02	27	87.1
Benzo(a)Anthracene	ng/m^3	-	-	-	2.56E-02	4.83E-02	6.11E-01	6.73E-03	27	87.1
Benzo(a)fluorene	ng/m^3	-	-	-	6.98E-02	9.74E-02	7.37E-01	2.49E-02	27	87.1
Benzo(a)Pyrene	ng/m^3	*0.05* [1] *5* [2] *1.1* [3]	*1*	5	3.08E-02	7.20E-02	1.16E+00	8.05E-03	27	87.1
Benzo(b)Fluoranthene	ng/m^3	-	-	-	7.36E-02	1.23E-01	1.28E+00	1.84E-02	27	87.1
Benzo(b)fluorene	ng/m^3	-	-	-	3.75E-02	6.48E-02	6.21E-01	8.69E-03	27	87.1
Benzo(e)Pyrene	ng/m^3	-	-	-	4.32E-02	7.97E-02	9.69E-01	1.04E-02	27	87.1
Benzo(g,h,i)Perylene	ng/m^3	-	-	-	4.79E-02	9.48E-02	1.29E+00	1.35E-02	27	87.1
Benzo(k)Fluoranthene	ng/m^3	-	-	-	5.69E-02	1.04E-01	1.11E+00	1.26E-02	27	87.1
Biphenyl	ng/m^3	-	-	-	2.09E+00	2.64E+00	8.06E+00	5.06E-01	27	87.1
Chrysene	ng/m^3	-	-	-	1.12E-01	1.63E-01	1.40E+00	3.83E-02	27	87.1
Dibenzo(a,h)Anthracene	ng/m^3	-	-	-	8.47E-03	1.38E-02	1.11E-01	1.56E-03	27	87.1
Fluoranthene	ng/m^3	-	-	-	9.97E-01	1.58E+00	8.51E+00	1.97E-01	27	87.1
Fluorene	ng/m^3	-	-	-	2.09E+00	3.23E+00	1.55E+01	2.76E-01	27	87.1
Indeno(1,2,3-cd)Pyrene	ng/m^3	-	-	-	4.61E-02	8.79E-02	1.12E+00	1.63E-02	27	87.1
Naphthalene	ng/m^3	*22500*	*22500*	0	1.16E+01	1.49E+01	4.95E+01	8.87E-01	27	87.1
o-Terphenyl	ng/m^3	-	-	-	1.03E-02	1.21E-02	2.61E-02	3.11E-03	27	87.1
Perylene	ng/m^3	-	-	-	3.42E-03	1.58E-02	2.00E-01	2.96E-04	27	87.1
Phenanthrene	ng/m^3	-	-	-	3.98E+00	6.37E+00	3.67E+01	6.13E-01	27	87.1
Pyrene	ng/m^3	-	-	-	5.53E-01	8.37E-01	4.33E+00	1.01E-01	27	87.1
Tetralin	ng/m3	-	-	-	9.81E-01	1.31E+00	5.36E+00	9.48E-02	27	87.1
Total PAH[4]	ng/m^3	-	-	-	3.80E+01	4.80E+01	1.38E+02	4.69E+00	27	87.1

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

[1] AAQC

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

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

[4] Total PAH sums all PAH contaminants

Table C1: 2022 Courtice Station Monitoring Results for TSP and Metals

DYEC AAQM Courtice Station Monitoring Results for Total Suspended Particulate and Metals									
Contaminant	Units	AAQC	No. > AAQC	Geometric Mean	Arithmetic Mean	Maximum Concentration	Minimum Concentration	Number of Valid Samples	% Valid data
Particulate (TSP)	µg/m^3	*120*	0	17.5	21.5	53.9	0.03	51	83.6
Total Mercury (Hg)	µg/m^3	*2*	0	6.74E-06	8.20E-06	3.48E-05	2.80E-06	51	83.6
Aluminum (Al)	µg/m^3	*4.8*	0	1.39E-01	1.77E-01	6.72E-01	3.12E-02	51	83.6
Antimony (Sb)	µg/m^3	*25*	0	7.17E-04	9.43E-04	6.20E-03	2.32E-04	51	83.6
Arsenic (As)	µg/m^3	*0.3*	0	9.53E-04	1.01E-03	3.83E-03	8.41E-04	51	83.6
Barium (Ba)	µg/m^3	*10*	0	5.85E-03	6.84E-03	2.02E-02	1.27E-03	51	83.6
Beryllium (Be)	µg/m^3	*0.01*	0	1.54E-05	1.57E-05	3.91E-05	1.40E-05	51	83.6
Bismuth (Bi)	µg/m^3	-	-	5.34E-04	5.35E-04	5.77E-04	5.04E-04	51	83.6
Boron (B)	µg/m^3	*120*	0	4.51E-03	4.54E-03	9.02E-03	4.20E-03	51	83.6
Cadmium (Cd)	µg/m^3	*0.025*	0	1.16E-04	1.53E-04	1.10E-03	3.14E-05	51	83.6
Chromium (Cr)	µg/m^3	*0.5*	0	1.75E-03	2.01E-03	6.16E-03	9.53E-04	51	83.6
Cobalt (Co)	µg/m^3	*0.1*	0	1.17E-04	1.29E-04	3.88E-04	5.16E-05	51	83.6
Copper (Cu)	µg/m^3	*50*	0	2.23E-02	2.92E-02	1.33E-01	3.99E-03	51	83.6
Iron (Fe)	µg/m^3	*4*	0	3.41E-01	4.03E-01	1.05E+00	6.88E-02	51	83.6
Lead (Pb)	µg/m^3	*0.5*	0	1.92E-03	2.20E-03	6.98E-03	6.56E-04	51	83.6
Magnesium (Mg)	µg/m^3	-	-	2.00E-01	2.30E-01	5.79E-01	7.16E-02	51	83.6
Manganese (Mn)	µg/m^3	*0.4*	0	9.48E-03	1.12E-02	2.74E-02	1.97E-03	51	83.6
Molybdenum (Mo)	µg/m^3	*120*	0	1.16E-03	1.34E-03	4.07E-03	3.99E-04	51	83.6
Nickel (Ni)	µg/m^3	*0.2*	0	1.05E-03	1.17E-03	3.79E-03	4.65E-04	51	83.6
Phosphorus (P)	µg/m^3	-	-	2.33E-01	2.38E-01	5.13E-01	2.10E-01	51	83.6
Selenium (Se)	µg/m^3	*10*	0	4.28E-04	4.61E-04	1.52E-03	3.64E-04	51	83.6
Silver (Ag)	µg/m^3	*1*	0	5.11E-05	8.81E-05	6.70E-04	2.55E-05	51	83.6
Strontium (Sr)	µg/m^3	*120*	0	4.38E-03	5.62E-03	2.88E-02	8.53E-04	51	83.6
Thallium (Tl)	µg/m^3	-	-	2.72E-05	2.75E-05	6.59E-05	2.52E-05	51	83.6
Tin (Sn)	µg/m^3	*10*	0	6.76E-04	7.78E-04	2.22E-03	1.71E-04	51	83.6
Titanium (Ti)	µg/m^3	*120*	0	6.44E-03	7.95E-03	2.28E-02	3.08E-03	51	83.6
Uranium (Ur)	µg/m^3	*0.3*	0	1.42E-05	1.76E-05	6.13E-05	4.04E-06	51	83.6
Vanadium (V)	µg/m^3	*2*	0	1.48E-03	1.49E-03	1.60E-03	1.40E-03	51	83.6
Zinc (Zn)	µg/m^3	*120*	0	3.44E-02	3.89E-02	1.49E-01	1.01E-02	51	83.6
Zirconium (Zr)	µg/m^3	*20*	0	5.94E-04	5.94E-04	6.41E-04	5.61E-04	51	83.6

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

Table C2: 2022 Rundle Road Station Monitoring Results for TSP and Metals

DYEC AAQM Rundle Road Station Monitoring Results for Total Suspended Particulate and Metals									
Contaminant	Units	AAQC	No. > AAQC	Geometric Mean	Arithmetic Mean	Maximum Concentration	Minimum Concentration	Number of Valid Samples	% Valid data
Particulate (TSP)	µg/m³	*120*	1	25.5	30.6	120.9	4.4	58	95.1
Total Mercury (Hg)	µg/m³	*2*	0	6.50E-06	7.92E-06	2.95E-05	2.82E-06	58	95.1
Aluminum (Al)	µg/m³	*4.8*	0	1.93E-01	2.83E-01	1.62E+00	3.44E-02	58	95.1
Antimony (Sb)	µg/m³	*25*	0	4.94E-04	6.17E-04	2.70E-03	7.35E-05	58	95.1
Arsenic (As)	µg/m³	*0.3*	0	9.73E-04	1.04E-03	4.92E-03	8.47E-04	58	95.1
Barium (Ba)	µg/m³	*10*	0	6.69E-03	8.09E-03	2.53E-02	1.56E-03	58	95.1
Beryllium (Be)	µg/m³	*0.01*	0	1.68E-05	1.81E-05	6.83E-05	1.41E-05	58	95.1
Bismuth (Bi)	µg/m³	-	-	5.42E-04	5.43E-04	5.71E-04	5.08E-04	58	95.1
Boron (B)	µg/m³	*120*	0	4.81E-03	5.01E-03	1.57E-02	4.23E-03	58	95.1
Cadmium (Cd)	µg/m³	*0.025*	0	9.95E-05	1.28E-04	6.57E-04	1.95E-05	58	95.1
Chromium (Cr)	µg/m³	*0.5*	0	1.91E-03	2.38E-03	1.25E-02	9.59E-04	58	95.1
Cobalt (Co)	µg/m³	*0.1*	0	1.42E-04	1.78E-04	8.27E-04	4.58E-05	58	95.1
Copper (Cu)	µg/m³	*50*	0	1.68E-02	2.18E-02	6.79E-02	2.88E-03	58	95.1
Iron (Fe)	µg/m³	*4*	0	3.85E-01	5.07E-01	2.41E+00	6.44E-02	58	95.1
Lead (Pb)	µg/m³	*0.5*	0	2.22E-03	2.86E-03	2.85E-02	6.83E-04	58	95.1
Magnesium (Mg)	µg/m³	-	-	2.50E-01	3.09E-01	1.19E+00	6.70E-02	58	95.1
Manganese (Mn)	µg/m³	*0.4*	0	1.16E-02	1.52E-02	6.52E-02	2.12E-03	58	95.1
Molybdenum (Mo)	µg/m³	*120*	0	8.65E-04	1.08E-03	3.37E-03	1.08E-04	58	95.1
Nickel (Ni)	µg/m³	*0.2*	0	1.08E-03	1.21E-03	3.57E-03	4.58E-04	58	95.1
Phosphorus (P)	µg/m³	-	-	2.43E-01	2.52E-01	6.91E-01	2.12E-01	58	95.1
Selenium (Se)	µg/m³	*10*	0	4.41E-04	4.84E-04	1.72E-03	3.67E-04	58	95.1
Silver (Ag)	µg/m³	*1*	0	4.53E-05	7.76E-05	5.66E-04	2.54E-05	58	95.1
Strontium (Sr)	µg/m³	*120*	0	5.91E-03	7.72E-03	4.48E-02	8.82E-04	58	95.1
Thallium (Tl)	µg/m³	-	-	2.83E-05	2.97E-05	1.27E-04	2.54E-05	58	95.1
Tin (Sn)	µg/m³	*10*	0	7.12E-04	8.03E-04	1.71E-03	1.75E-04	58	95.1
Titanium (Ti)	µg/m³	*120*	0	8.30E-03	1.22E-02	8.27E-02	3.11E-03	58	95.1
Uranium (Ur)	µg/m³	*0.3*	0	1.74E-05	2.46E-05	1.52E-04	3.84E-06	58	95.1
Vanadium (V)	µg/m³	*2*	0	1.57E-03	1.62E-03	3.95E-03	1.41E-03	58	95.1
Zinc (Zn)	µg/m³	*120*	0	4.54E-02	6.50E-02	6.24E-01	1.22E-02	58	95.1
Zirconium (Zr)	µg/m³	*20*	0	6.10E-04	6.13E-04	1.23E-03	5.64E-04	58	95.1

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