REPORT

DURHAM YORK ENERGY CENTRE

DURHAM, ONTARIO

2021 ANNUAL AMBIENT AIR QUALITY MONITORING REPORT: CONTINUOUS & PERIODIC MONITORING PROGRAM

RWDI #1803743

May 11, 2022

SUBMITTED TO

The Director, Legislative Services-Regional Clerk or Designate,

The Regional Municipality of Durham
605 Rossland Road East, 1st Floor
Corporate Services-Legislative Services Division
Whitby, ON L1N 6A3

CC:

Gioseph Anello
Gioseph.anello@durham.ca

Lyndsay Waller
Lyndsay.Waller@durham.ca

Andrew Evans
Andrew.Evans@durham.ca

SUBMITTED BY

Khalid Hussein, P.Eng.
Project Manager
Khalid.Hussein@rwdi.com

RWDI AIR Inc.
Consulting Engineers & Scientists
600 Southgate Drive
Guelph, ON N1G 4P6

T: 519.823.1311 | ext. 2428
F: 519.823.1316

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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 2021, 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 2021 quarterly reports were issued to the MECP by the Region of Durham. This report presents the annual results from January 1st to December 31st, 2021.

Throughout 2021, there were eleven (11) exceedances of the AAQC for Benzo(a) Pyrene. At the Courtice Station, three (3) exceedances occurred on the following dates: March 23rd, July 21st, and October 13th. At the Rundle Road Station, eight (8) exceedances occurred on the following dates: March 11th, March 23rd, July 21st, August 2nd, October 1st, October 13th, November 6th, and November 30th. 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 forty-one (41) rolling 1-hour average SO_2 concentrations above the AAQC and ninety-two (92) rolling 10-minute average SO_2 concentrations above the AAQC at the Courtice and Rundle Road Monitoring Stations throughout 2021.

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).

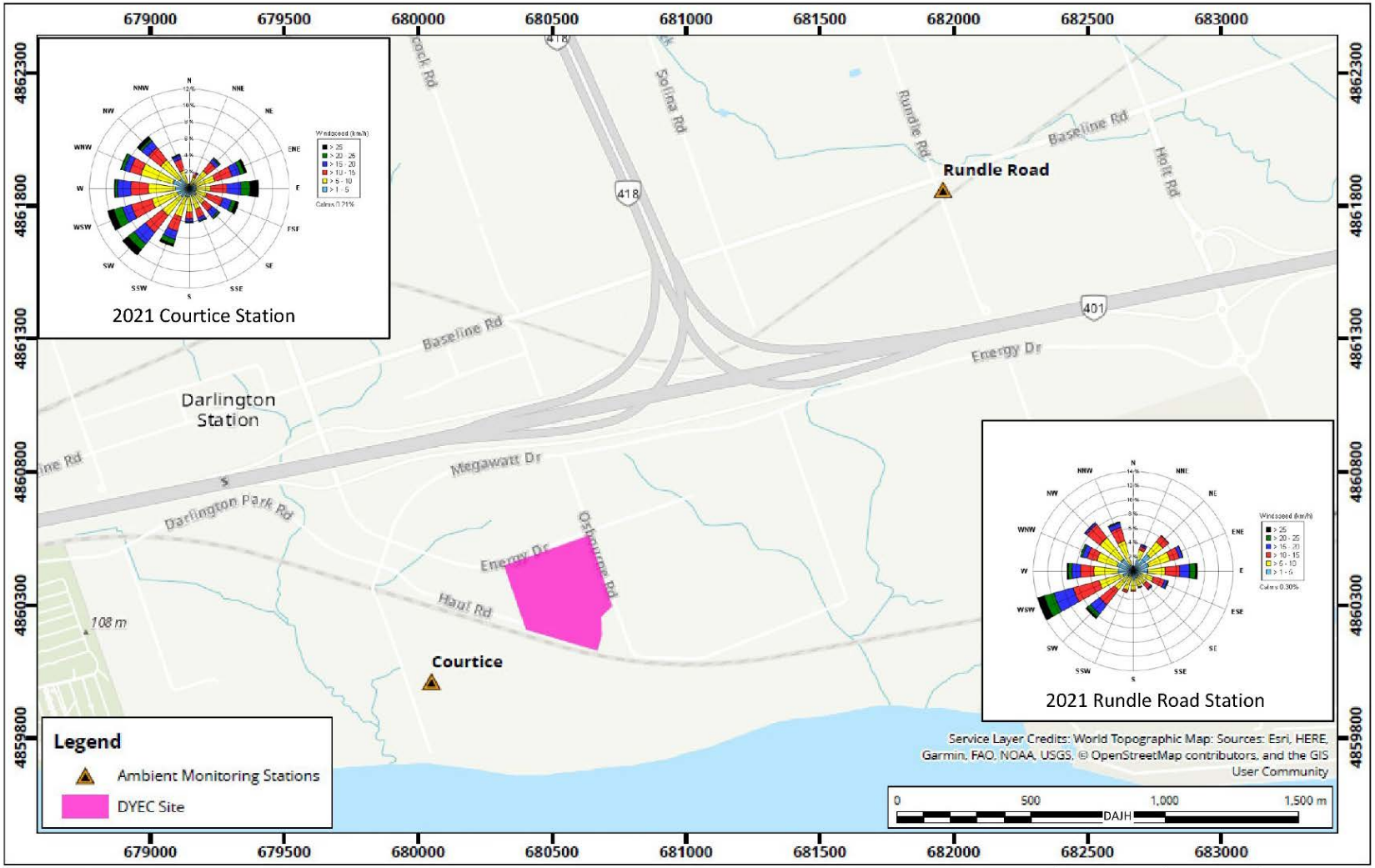
This monitoring plan was developed based on the Regional Council mandate to provide ambient monitoring in the area of the DYEC. The purpose of the ambient air monitoring program is to:

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**.



DYEC Site and Ambient Monitoring Station Locations

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

True North

Project #: 1803743

Drawn by: DJH	Figure: 1
Approx. Scale:	1:20,000
Date Revised:	April 14, 2022

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 3** 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 4 & 5 and the list and rationale is 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

Beginning May 20th, 2021 at 11:00 am, a power outage affected the Courtice wind monitor and resulted in no data being collected until midnight of May 24th, 2021.

On July 31st, 2021 a power failure invalidated an hour of continuous data at the Courtice station from 12:00 to 13:00. On August 20th, 2021 a power failure invalidated an hour of NO_x data at the Courtice station from 14:00 to 15:00. On August 25th, 2021 a power failure invalidated an hour of NO_x and SO_2 data at the Courtice station from 8:00 to 9:00. On September 24th, 2021 the MECP audited both DYEC ambient monitoring stations resulting in one to two hours of data invalidated for each analyzer at varying times throughout the day.

On October 20th, 2021 thirteen hours of the $PM_{2.5}$ continuous data at the Courtice station from 00:00 to 13:00 was invalidated due to a decrease in the analyzer flow rate.

4.5.1.2 Discrete Samplers

The September 19th, 2021 samples at both stations for PAH's, Dioxins and Furans were invalidated due to an error during sample preparation at the laboratory.

4.5.2 Rundle Road Monitoring Station

4.5.2.1 Continuous Samplers

On April 30th, 2021 it was noted that the SO_2 analyzer at the Rundle Road Station failed the overnight internal span check. All diagnostic data from the analyzer was within acceptable ranges and so it was suspected that the internal permeation tube was depleted and expected that the data is still valid. An RWDI technician visited the station on May 13th, 2021 and confirmed that the data was still valid by completing a calibration which confirmed that the failed span checks were due to a depleted permeation tube. A new permeation tube was also installed at this time.

4.5.2.2 Discrete Samplers

The May 10th and June 21st, 2021 TSP samples from the Rundle Road station did not run in full due to power failures.

The August 26th, 2021 TSP sample from the Rundle Road station did not run in full due to a power failure.

The September 19th, 2021 samples at both stations for PAH's, Dioxins and Furans were invalidated due to an error during sample preparation at the laboratory.

4.6 Final Data Editing

There was one omission that was made in the Q4 report. There was an SO_2 1-hour running average that was missed in the reporting which occurred on November 8, 2021 at 08:25 with a value of 51.7 ppb. In the report, it is indicated that there are 32 1-hour SO_2 running average exceedances at the Courtice Station when there are actually 33 in Q4.

No edits were made to the 2021 continuous or discrete monitoring dataset after a final review.

4.7 MECP Audits

One MECP audit was completed during 2021, which occurred on September 24th, 2021. All analyzers passed the audit criteria.

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). In 2020, there are new CAAQS' being implemented which 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 93.3% or higher at each station for all continuous and discrete parameters.

Table 2: 2021 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	8718	99.5	**98.1**
	NO_X	8760	8701	99.3	
	NO	8760	8701	99.3	
	NO_2	8760	8701	99.3	
	SO_2	8760	8724	99.6	
	TSP & Metals	61	61	100	
	PAHs	30	29	96.7	
	D&F	15	14	93.3	
Rundle Road Monitoring Station	$PM_{2.5}$	8760	8740	99.8	**97.3**
	NO_X	8760	8705	99.4	
	NO	8760	8705	99.4	
	NO_2	8760	8705	99.4	
	SO_2	8760	8704	99.4	
	TSP & Metals	61	58	95.1	
	PAHs	30	29	96.7	
	D&F	15	14	93.3	

Table 3 presents a summary of the continuous sampling statistics at each station for 2021 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 2021 compared to applicable CAAQS'. **Table 5** presents a summary of the 2021 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 2021 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 2021 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: 2021 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	$PM_{2.5}$ ($\mu g/m^3$)				68.3			43.3			6.3		
	NO_X (ppb)				92.5			46.3			6.2		
	NO (ppb)				67.7			23.0			1.4		
	NO_2 (ppb)				37.6	200	0	23.3	100	0	5.0	30	0
	SO_2 (ppb)	275.9	67	85	134.1	40	38	12.0			1.7	4	0
Rundle Road Monitoring Station	$PM_{2.5}$ ($\mu g/m^3$)				62.1			39.6			5.9		
	NO_X (ppb)				107.4			23.1			4.4		
	NO (ppb)				66.5			8.0			0.9		
	NO_2 (ppb)				41.0	200	0	16.7	100	0	3.7	30	0
	SO_2 (ppb)	96.7	67	7	70.5	40	3	7.8			0.4	4	0

Notes: The 2021 reporting year was the first annual report to include 10-minute and 1-hour running means

Table 4: 2019-2021 Summary of Statistics for Continuous Sampling Parameter Levels at Courtice and Rundle Road Stations Compared to CAAQS'

Station	Parameter	2019-2021 1-Hour Mean	1-Hour CAAQS	Events > 1-Hour CAAQS	2019-2021 24-Hour Mean	24-Hour CAAQS	Events > 24-Hour CAAQS	2019-2021 Annual Mean	Annual CAAQS	Events > Annual CAAQS
Courtice Monitoring Station	$PM_{2.5}$ (µg/m^3)				18.9 [3]	27	0	6.2 [4]	8.8	0
	Sulphur Dioxide (SO_2)	56.0 [1]	70	0				1.7 [5]	4	0
	Nitrogen Dioxide (NO_2)	35.0 [2]	60	0				5.0 [5]	17	0
Rundle Road Monitoring Station	$PM_{2.5}$ (µg/m^3)				17.4 [3]	27	0	5.6 [4]	8.8	0
	Sulphur Dioxide (SO_2)	25.9 [1]	70	0				0.4 [5]	4	0
	Nitrogen Dioxide (NO_2)	25.4 [2]	60	0				3.7 [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: 2021 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	22.5	101.0	0	22.6	75.6	0
Total Mercury (Hg)	µg/m³	2	2	1.13E-05	8.80E-05	0	1.42E-05	1.87E-04	0
Aluminum (Al)	µg/m³	4.8	-	1.54E-01	1.07E+00	0	1.53E-01	9.25E-01	0
Antimony (Sb)	µg/m³	25	25	8.14E-04	3.16E-03	0	6.32E-04	3.06E-03	0
Arsenic (As)	µg/m³	0.3	0.3	1.14E-03	1.35E-02	0	3.64E-03	1.29E-01	0
Barium (Ba)	µg/m³	10	10	7.19E-03	2.10E-02	0	6.59E-03	2.14E-02	0
Beryllium (Be)	µg/m³	0.01	0.001	1.80E-05	4.55E-05	0	1.68E-05	4.15E-05	0
Bismuth (Bi)	µg/m³	-	-	5.53E-04	1.57E-03	-	5.55E-04	1.65E-03	-
Boron (B)	µg/m³	120	-	5.33E-03	1.64E-02	0	5.41E-03	1.87E-02	0
Cadmium (Cd)	µg/m³	0.025	0.025	1.56E-04	5.96E-04	0	1.64E-04	6.10E-04	0
Chromium (Cr)	µg/m³	0.5	-	2.06E-03	5.69E-03	0	2.00E-03	4.87E-03	0
Cobalt (Co)	µg/m³	0.1	0.1	1.81E-04	9.77E-04	0	1.73E-04	7.16E-04	0
Copper (Cu)	µg/m³	50	-	2.04E-02	7.73E-02	0	2.43E-02	2.55E-01	0
Iron (Fe)	µg/m³	4	-	3.79E-01	1.68E+00	0	3.55E-01	1.73E+00	0
Lead (Pb)	µg/m³	0.5	0.5	2.41E-03	7.97E-03	0	2.45E-03	7.56E-03	0
Magnesium (Mg)	µg/m³	-	-	2.01E-01	9.57E-01	-	2.00E-01	9.01E-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
Manganese (Mn)	µg/m³	0.4	-	1.03E-02	4.97E-02	0	9.55E-03	4.35E-02	0
Molybdenum (Mo)	µg/m³	120	-	1.04E-03	3.03E-03	0	1.32E-03	2.65E-02	0
Nickel (Ni)	µg/m³	0.2	-	1.15E-03	3.51E-03	0	1.07E-03	2.84E-03	0
Phosphorus (P)	µg/m³	-	-	2.28E-01	5.06E-01	-	2.23E-01	2.33E-01	-
Selenium (Se)	µg/m³	10	10	7.30E-04	2.98E-03	0	6.83E-04	3.05E-03	0
Silver (Ag)	µg/m³	1	1	5.83E-05	4.71E-04	0	6.12E-05	5.29E-04	0
Strontium (Sr)	µg/m³	120	-	4.93E-03	2.34E-02	0	5.31E-03	1.87E-02	0
Thallium (Tl)	µg/m³	-	-	2.93E-05	1.08E-04	-	2.76E-05	7.40E-05	-
Tin (Sn)	µg/m³	10	10	8.74E-04	3.46E-03	0	9.77E-04	1.11E-02	0
Titanium (Ti)	µg/m³	120	-	7.70E-03	4.25E-02	0	6.99E-03	3.51E-02	0
Uranium (Ur)	µg/m³	0.3	-	2.07E-05	9.63E-05	0	1.83E-05	7.80E-05	0
Vanadium (V)	µg/m³	2	1	1.51E-03	2.95E-03	0	1.49E-03	1.55E-03	0
Zinc (Zn)	µg/m³	120	-	3.42E-02	1.49E-01	0	3.84E-02	1.27E-01	0
Zirconium (Zr)	µg/m³	20	-	5.96E-04	6.17E-04	0	5.95E-04	6.21E-04	0

Table 6: 2021 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	-	8.73E+00	3.41E+01	0	5.76E+00	2.21E+01	0
2-Methylnaphthalene	ng/m³	10000	-	1.64E+01	7.70E+01	0	9.68E+00	4.30E+01	0
Acenaphthene	ng/m³	-	-	5.85E+00	3.79E+01	-	3.42E+00	1.75E+01	-
Acenaphthylene	ng/m³	3500	-	2.58E-01	1.29E+00	0	1.95E-01	7.21E-01	0
Anthracene	ng/m³	200	-	3.55E-01	1.36E+00	0	3.02E-01	1.24E+00	0
Benzo(a)Anthracene	ng/m³	-	-	2.14E-02	1.20E-01	-	2.63E-02	1.03E-01	-
Benzo(a)fluorene	ng/m³	-	-	4.22E-02	9.34E-02	-	5.21E-02	1.43E-01	-
Benzo(a)Pyrene	ng/m³	0.05 [1] 5 [2] 1.1 [3]	1	3.10E-02	1.99E-01	3	4.47E-02	3.27E-01	8
Benzo(b)Fluoranthene	ng/m³	-	-	4.88E-02	1.57E-01	-	6.37E-02	2.11E-01	-
Benzo(b)fluorene	ng/m³	-	-	2.81E-02	8.71E-02	-	3.55E-02	1.10E-01	-
Benzo(e)Pyrene	ng/m³	-	-	3.67E-02	1.55E-01	-	4.57E-02	1.59E-01	-
Benzo(g,h,i)Perylene	ng/m³	-	-	3.46E-02	2.22E-01	-	4.26E-02	2.26E-01	-
Benzo(k)Fluoranthene	ng/m³	-	-	4.46E-02	2.48E-01	-	5.65E-02	2.10E-01	-
Biphenyl	ng/m³	-	-	4.59E+00	1.97E+01	-	3.00E+00	9.94E+00	-
Chrysene	ng/m³	-	-	7.78E-02	2.97E-01	-	9.15E-02	2.81E-01	-
Dibenzo(a,h)Anthracene	ng/m³	-	-	6.43E-03	2.73E-02	-	8.00E-03	2.53E-02	-
Fluoranthene	ng/m³	-	-	8.10E-01	2.25E+00	-	8.96E-01	3.31E+00	-
Fluorene	ng/m³	-	-	3.72E+00	2.13E+01	-	2.62E+00	1.22E+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/m^3	-	-	3.37E-02	1.84E-01	-	4.13E-02	1.87E-01	-
Naphthalene	ng/m^3	22500	22500	3.71E+01	1.19E+02	0	2.51E+01	8.11E+01	0
o-Terphenyl	ng/m^3	-	-	1.23E-02	3.28E-02	-	1.10E-02	3.53E-02	-
Perylene	ng/m^3	-	-	4.73E-03	3.52E-02	-	6.02E-03	3.14E-02	-
Phenanthrene	ng/m^3	-	-	5.60E+00	2.20E+01	-	4.56E+00	1.62E+01	-
Pyrene	ng/m^3	-	-	3.99E-01	1.05E+00	-	4.35E-01	1.42E+00	-
Tetralin	ng/m^3	-	-	8.14E+00	8.00E+01	-	7.94E+00	9.45E+01	-
Total PAH [4]	ng/m^3	-	-	9.23E+01	3.33E+02	-	6.44E+01	2.16E+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: 2021 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/m^3	-	-	1.49E-03	4.83E-03	-	1.61E-03	8.86E-03	-
1,2,3,7,8-PeCDD	pg/m^3	-	-	1.71E-03	7.57E-03	-	3.09E-03	1.25E-02	-
1,2,3,4,7,8-HxCDD	pg/m^3	-	-	2.39E-04	7.61E-04	-	5.99E-04	3.60E-03	-
1,2,3,6,7,8-HxCDD	pg/m^3	-	-	3.64E-04	1.07E-03	-	8.18E-04	5.53E-03	-
1,2,3,7,8,9-HxCDD	pg/m^3	-	-	3.93E-04	1.06E-03	-	8.00E-04	4.40E-03	-
1,2,3,4,6,7,8-HpCDD	pg/m^3	-	-	5.09E-04	1.15E-03	-	8.67E-04	4.20E-03	-
OCDD	pg/m^3	-	-	6.69E-05	1.75E-04	-	7.29E-05	3.19E-04	-
2,3,7,8-TCDF	pg/m^3	-	-	2.03E-04	5.68E-04	-	1.83E-04	6.33E-04	-
1,2,3,7,8-PeCDF	pg/m^3	-	-	5.41E-05	1.37E-04	-	6.41E-05	2.59E-04	-
2,3,4,7,8-PeCDF	pg/m^3	-	-	8.82E-04	3.40E-03	-	1.23E-03	1.04E-02	-
1,2,3,4,7,8-HxCDF	pg/m^3	-	-	2.84E-04	7.01E-04	-	4.71E-04	3.56E-03	-
1,2,3,6,7,8-HxCDF	pg/m^3	-	-	2.51E-04	8.39E-04	-	4.15E-04	3.14E-03	-
2,3,4,6,7,8-HxCDF	pg/m^3	-	-	2.80E-04	1.12E-03	-	4.00E-04	2.42E-03	-
1,2,3,7,8,9-HxCDF	pg/m^3	-	-	2.41E-04	6.44E-04	-	3.32E-04	1.61E-03	-
1,2,3,4,6,7,8-HpCDF	pg/m^3	-	-	1.22E-04	3.24E-04	-	1.91E-04	1.28E-03	-
1,2,3,4,7,8,9-HpCDF	pg/m^3	-	-	3.02E-05	6.70E-05	-	3.81E-05	2.04E-04	-
OCDF	pg/m^3	-	-	5.78E-06	1.77E-05	-	6.20E-06	1.93E-05	-
Total Toxic Equivalency	pg/m^3	0.1 [1] 1 [2]	-	7.13E-03	1.53E-02	0	1.12E-02	4.57E-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 2021.

The Courtice Monitoring Station observed three (3) exceedances over the daily AAQC for Benzo(a)pyrene (0.05 ng/m^3) during 2021. The exceedances occurred on March 23rd, July 21st, and October 13th, 2021 with 24-hour average concentrations of 0.162, 0.199 and 0.062 ng/m^{3,} respectively. 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 2021.

Table 8: 2021 Courtice Monitoring Station BaP Exceedance Details

Date	Percentage of BaP Criteria	Wind Direction	Potential Source Contributions
March 23, 2021	324%	ENE-S	According to the Courtice meteorological data, the Courtice Station was upwind of the DYEC during the sampling period. Since the winds were coming from the East-northeast and South, it is more likely that the exceedance was due to other sources in the area, as the Rundle Road Station experienced a BaP exceedance on March 23rd as well.
July 21, 2021	398%	NNW-WNW	According to the Courtice meteorological data, the Courtice Station was upwind of the DYEC during the sampling period. Since the winds were coming from the Northwest, it is likely that the exceedance was due to other sources in the surrounding area.
October 13, 2021	124%	WSW	According to the Courtice meteorological data, the Courtice Station was upwind of the DYEC during the sampling period. Since the winds were coming from the West-southwest, it is more likely that the exceedance was due to other sources in the area, as the Rundle Road Station experienced a BaP exceedance on October 13th as well.

The Courtice Monitoring Station observed thirty-eight (38) exceedances over the maximum hourly mean AAQC for SO_2 (40 ppb) during 2021. The exceedance details are provided in **Table 9**. There were also eighty-five (85) exceedances of the rolling 10-minute average AAQC (67 ppb) at the Courtice Station in 2021. The exceedance details are provided in **Table 10**.

Table 9: 2021 Courtice Monitoring Station SO_2 1-Hour Exceedance Details

Date	Number of Exceedances	Maximum Percentage of Criteria
June 11, 2021	1	106%
September 19, 2021	2	103%
September 24, 2021	1	101%
September 26, 2021	1	109%
October 1, 2021	2	108%
October 8, 2021	2	103%
November 3, 2021	2	113%
November 4, 2021	2	116%
November 5, 2021	1	112%
November 7, 2021	1	102%
November 8, 2021	3	250%
November 11, 2021	2	162%
November 14, 2021	2	131%
November 16, 2021	1	101%
November 23, 2021	2	115%
November 29, 2021	2	118%
November 30, 2021	1	103%
December 5, 2021	3	238%
December 7, 2021	2	102%
December 10, 2021	1	113%
December 11, 2021	2	109%
December 19, 2021	2	120%

Table 10: 2021 Courtice Monitoring Station SO_2 10-Minute Exceedance Details

Date	Number of Exceedances	Maximum Percentage of Criteria
June 10, 2021	1	109%
September 10, 2021	2	108%
September 19, 2021	3	143%
September 24, 2021	1	227%
September 26, 2021	5	166%
September 28, 2021	1	158%
October 1, 2021	2	107%
October 4, 2021	1	104%
October 23, 2021	1	136%
November 3, 2021	5	162%
November 4, 2021	5	269%
November 5, 2021	4	252%
November 7, 2021	2	216%
November 8, 2021	8	339%
November 11, 2021	6	149%
November 14, 2021	2	155%
November 16, 2021	3	223%
November 21, 2021	1	126%
November 23, 2021	4	181%
November 29, 2021	2	171%
November 30, 2021	1	108%
December 5, 2021	9	233%
December 7, 2021	2	107%
December 8, 2021	1	104%
December 9, 2021	1	163%
December 10, 2021	3	164%
December 11, 2021	3	109%
December 14, 2021	1	106%
December 19, 2021	4	242%
December 29, 2021	1	154%

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 (roughly 35%) which indicates that contributions from the DYEC are possible, however the majority of exceedance events were from other directions indicating that other sources surrounding the Station contributed.

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 TSP, metals, D&F's, $PM_{2.5}$ or NO_2 over their applicable AAQC, HHRA or CAAQS during 2021.

The Rundle Road Monitoring Station observed eight (8) exceedances over the daily AAQC for Benzo(a)pyrene (0.05 ng/m^3) during 2021. The exceedances occurred on March 11th, March 23rd, July 21st, August 2nd, October 1st, October 13th, November 6th, and November 30th, 2021 with 24-hour average concentrations of 0.076, 0.171, 0.327, 0.108, 0.057, 0.073, 0.065 and 0.075 ng/m^{3,} respectively. The exceedance details are provided in **Table 11**. The Rundle Road Monitoring Station had no other PAH exceedances (with the exception of Benzo(a)pyrene) during 2021.

Table 11: 2021 Rundle Road Monitoring Station BaP Exceedance Details

Date	Percentage of BaP Criteria	Wind Direction	Potential Source Contributions
March 11, 2021	152%	WSW-SW	According to the Rundle meteorological data, the Rundle Road Station was downwind of the DYEC during part of the sampling period. Since the winds were predominantly coming from the West-southwest and Southwest, it is possible that the measured BaP exceedances were partly attributed to the Energy Centre operations, however it should be noted that the Courtice station was upwind of the DYEC, and the BaP concentration was 90% of the AAQC. It is likely that the BaP background concentrations were elevated on March 11th.
March 23, 2021	342%	NE-E	According to the Rundle Road meteorological data, the Rundle Road Station was predominantly upwind of the Energy Centre during the sampling period, therefore it is unlikely that the DYEC contributed to the exceedance. It is likely that the exceedance was due to other sources in the area, as the Courtice Station experienced a BaP exceedance on March 23rd as well.

Date	Percentage of BaP Criteria	Wind Direction	Potential Source Contributions
July 21, 2021	654%	NNW-WNW	According to the Rundle Road meteorological data, the Rundle Road Station was predominantly upwind of the Energy Centre during the sampling period, therefore it is unlikely that the DYEC contributed to the exceedance.
August 2, 2021	216%	NNW-SW	According to the Rundle meteorological data, the Rundle Road Station was downwind of the DYEC during part of the sampling period. Since the winds were predominantly from the North-northwest and Southwest, it is possible that the measured BaP exceedances may be partly attributed to the Energy Centre operations.
October 1, 2021	114%	SW, WNW, NNW	According to the Rundle meteorological data, the Rundle Road Station was downwind of the DYEC during part of the sampling period. Although the winds were predominantly coming from the Southwest, West-northwest and North-northwest, this date is within the fall outage period at DYEC, when the facility was not operational. Therefore, the measured BaP exceedance is likely not attributable to the regular Energy Centre operations.
October 13, 2021	146%	WSW	According to the Rundle meteorological data, the Rundle Road Station was downwind of the DYEC during part of the sampling period. Since the winds were predominantly coming from the West-southwest, it is possible that the measured BaP exceedances may be partially attributed to the Energy Centre operations. However, it is likely that the exceedance was due to other sources in the area, as the Courtice Station experienced a BaP exceedance on October 13th as well.
November 6, 2021	130%	SSW, SSE, ENE	According to the Rundle meteorological data, the Rundle Road Station was downwind of the DYEC during part of the sampling period. Since the winds were predominantly coming from the South-southwest, it is possible that the measured BaP exceedances may be partly attributed to the Energy Centre operations.
November 30, 2021	150%	W, WSW, NE-ESE	According to the Rundle meteorological data, the Rundle Road Station was downwind of the DYEC during part of the sampling period. Since the winds were predominantly coming from the West, West-southwest and Northeast, it is possible that the measured BaP exceedances may be partly attributed to the Energy Centre operations.

The Rundle Road Station observed three (3) exceedances over the maximum hourly mean AAQC for SO_2 (40 ppb) during 2021. The exceedance details are provided in **Table 12**. There were also seven (7) exceedances of the rolling 10-minute average AAQC (67 ppb) at the Rundle Station in 2021. The exceedance details are provided in **Table 13**.

Table 12: 2021 Rundle Road Monitoring Station SO_2 1-Hour Exceedance Details

Date	Number of Exceedances	Maximum Percentage of Criteria
June 10, 2021	2	168%
June 11, 2021	1	101%

Table 13: 2021 Rundle Road Monitoring Station SO_2 10-Minute Exceedance Details

Date	Number of Exceedances	Maximum Percentage of Criteria
June 10, 2021	5	138%
June 11, 2021	2	144%

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 indicates 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 2021 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).

It should be noted that due to the global Covid-19 pandemic there was far less vehicular traffic in the Courtice area during 2021. Since vehicular traffic is a key component of air quality in the area, this had a noticeable impact on the concentration statistics for the year and led to a general reduction in the measured parameters. This change is noticeable when viewing the annual averages comparison and helps to support the theory that vehicular traffic from nearby highways directly impacts the monitoring station results at DYEC.

Another observable change which occurred in 2020 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 2021, there have been thirty-eight (38) and three (3) 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 2013-2021 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 14 – 21**.

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 2021 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 14** for 2013-2021. 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 mean concentrations.

Table 14: 2013-2021 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	2013 [1]	2014 [1]	2015 [1]	2016 [1]	2017 [1]	2018 [1]	2019	2020	2021
NO_X (ppb)	Annual Arithmetic Mean	9.6	10.8	9.1	8.8	9.0	8.0	7.1	5.6	6.2	8	7.8	8.2	7.1	7.2	6.7	5.1	4.6	4.4
	Maximum 1-hour Running Mean	151.3	122.2	148.5	97.1	146.9	86.8	98.7	95.1	92.5	68.5	70	102	71.3	89.3	73.6	275.7	66.3	107.4
	Maximum 24-hour Running Mean	49.6	52.1	42.6	44.7	45.0	35.6	38.6	38.3	46.3	34.9	38.6	31.9	28.3	35.5	32.3	27.9	22.1	23.1
NO (ppb)	Annual Arithmetic Mean						2.1	1.5	1.1	1.4						1.9	1	0.8	0.9
	Maximum 1-hour Running Mean	111.1	79.1	88.5	69.5	128.9	68.5	62.6	57.3	67.7	40.7	38.2	90.9	42.8	88.5	54.3	218.6	31.7	66.5
	Maximum 24-hour Running Mean	22.9	21.7	22.3	21.9	25.1	17.2	19.5	15.6	23.0	10.6	11.2	15.9	9.2	7.9	11.9	14.7	5	8.0
NO_2 (ppb)	Annual Arithmetic Mean	6.4	8	6.8	6.4	6.4	6.1	5.8	4.6	5.0	6.5	6.1	6.6	5.4	5.5	4.9	4.3	3.9	3.7
	Annual CAAQS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	17	17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	17	17
	Events > Annual CAAQS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0
	Maximum 1-hour Running Mean	48	52.7	62.3	62.4	42.8	70.6	41.3	39	37.6	39.3	62.2	42.6	36.2	42.9	38.3	57.2	35.2	41
	1-hour AAQC	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
	98th Percentile (Daily Maximum 1-hr Mean) [2]						37.4	36.6	35.1	33.2						30.2	26.9	23.5	25.7
	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	N/A	N/A	N/A	N/A	N/A	N/A	N/A	26.9	25.4
	1-Hour CAAQS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	60	60	N/A	N/A	N/A	N/A	N/A	N/A	N/A	60	60
	Events > 1-Hour CAAQS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	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	24.7	28	22.6	21.5	30.5	20.5	19.8	17.2	16.7
	24-hour AAQC	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

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).
The 2021 reporting year was the first annual report to include 1-hour running means

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 and 2021 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 of the 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.

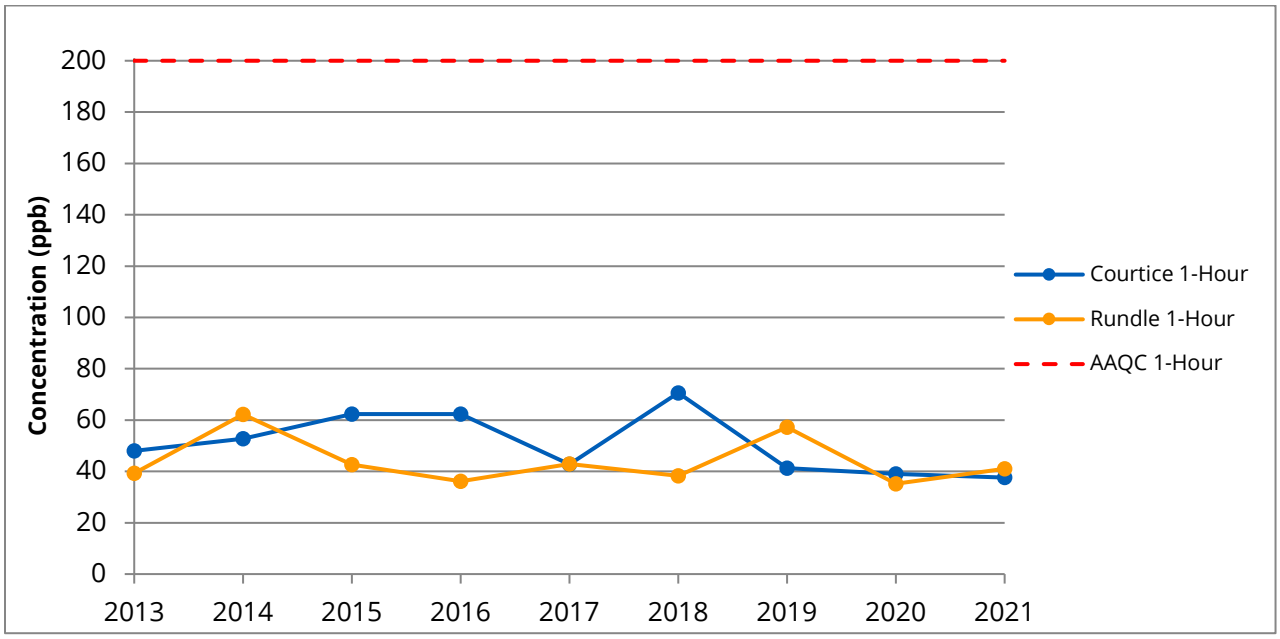


Figure 4: Maximum Measured 1-hour Mean NO_2 Concentrations by Year (Running Mean 2021)

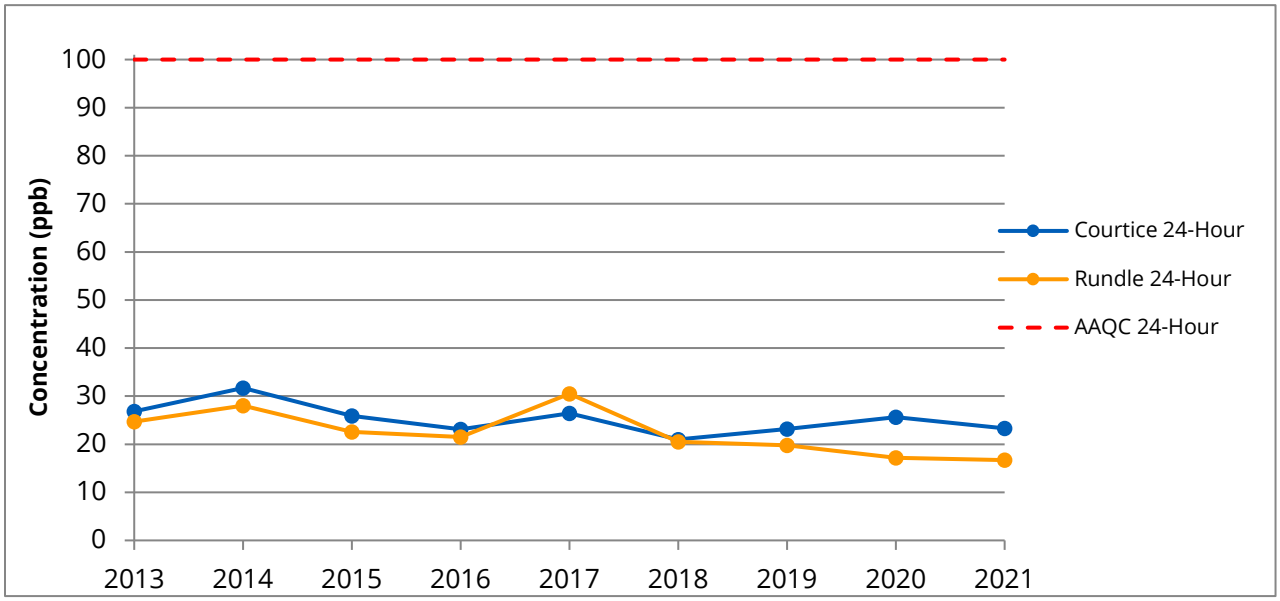
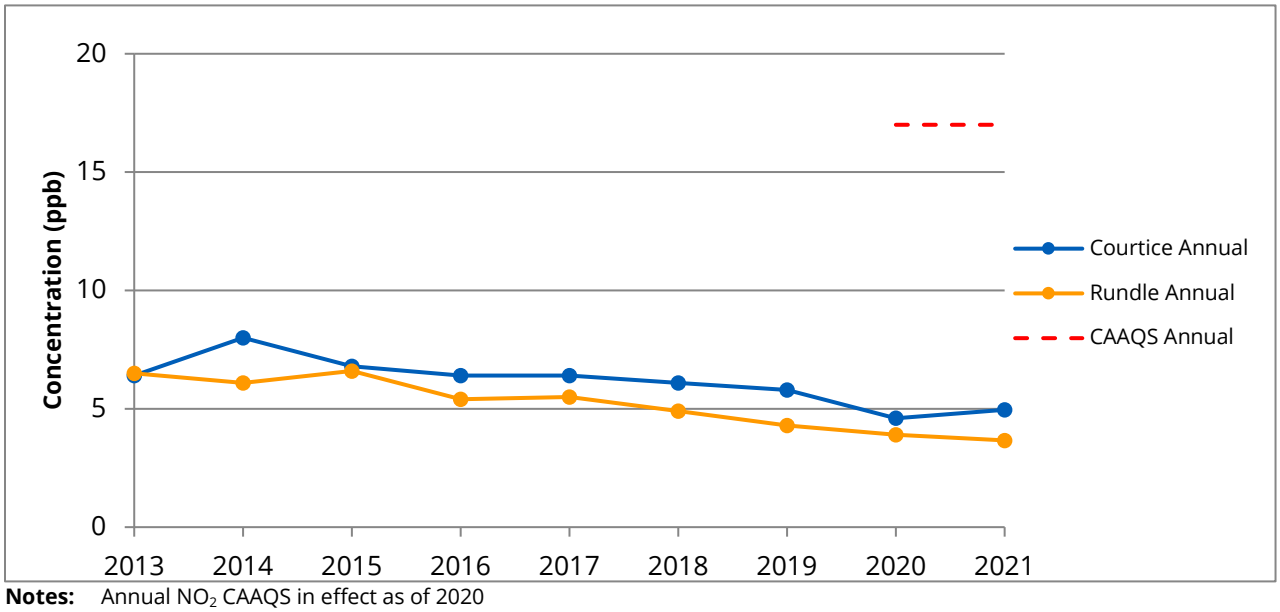


Figure 5: Maximum Measured 24-hour Running Mean NO_2 Concentrations by Year



Notes: Annual NO_2 CAAQS in effect as of 2020

Figure 6: Maximum Measured Annual Mean NO_2 Concentrations by Year

7.1.2 SO_2 Comparison

In 2021, 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 start of 2021. A summary of annual SO_2 data for both stations is presented in **Table 15** for 2013-2021.

Table 15: 2013-2021 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	2013 [1]	2014 [1]	2015 [1]	2016 [1]	2017 [1]	2018 [1]	2019	2020	2021
SO_2 (ppb)	Annual Arithmetic Mean	1.6	1.5	1	1.7	1.8	2.7	1.9	1.4	1.7	0	0.7	0.7	0.8	0.6	0.7	0.5	0.4	0.4
	Annual AAQC	20	20	20	20	20	20	4[3]	4	4	20	20	20	20	20	20	4[3]	4	4
	Events > Annual AAQC	N/A [2]	0	0	0	0	0	0	0	0	N/A [2]	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	N/A	N/A	N/A	N/A	N/A	N/A	N/A	M	96.7
	10-min AAQC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	M	67	N/A	N/A	N/A	N/A	N/A	N/A	N/A	M	67
	Events > 10-min AAQC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	M	85	N/A	N/A	N/A	N/A	N/A	N/A	N/A	M	7
	Maximum 1-hour Running Mean	56.3	43.3	39	57.1	95.6	96.2	58.2	67.2	134.1	24.8	34.1	28.3	30.7	61.0	66.0	34.8	59.7	70.5
	1-hour AAQC	250	250	250	250	250	250	250	40	40	250	250	250	250	250	250	250	40	40
	Events > 1-hour AAQC	0	0	0	0	0	0	0	19	38	0	0	0	0	0	0	0	5	3
	99th Percentile (Daily Maximum 1-hr Mean) [2]						73.0	50.8	51.6	65.5						33.4	25.7	35.8	16.2
	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	N/A	N/A	N/A	N/A	N/A	N/A	N/A	31.6	25.9
	1-Hour CAAQS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	70	70	N/A	N/A	N/A	N/A	N/A	N/A	N/A	70	70
	Events > 1-Hour CAAQS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0
	Maximum Running 24-hour Mean	13.8	15.6	8.8	13	18.7	17.0	18.6	21.4	12.0	3.9	4.2	8.3	6.2	5.2	8.1	5.6	6.7	7.8

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 annual averages are not comparable to the AAQC
[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
M-Missing Values
The 2021 reporting year was the first annual report to include 10-minute and 1-hour running means

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 2021 there were thirty-eight (38) exceedances of the new criteria at the Courtice station and three (3) exceedances at the Rundle Road station.
- In 2020, a new 10 minute AAQC was introduced (67 ppb). In 2021, there were eighty-five (85) and seven (7) 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.
- 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.

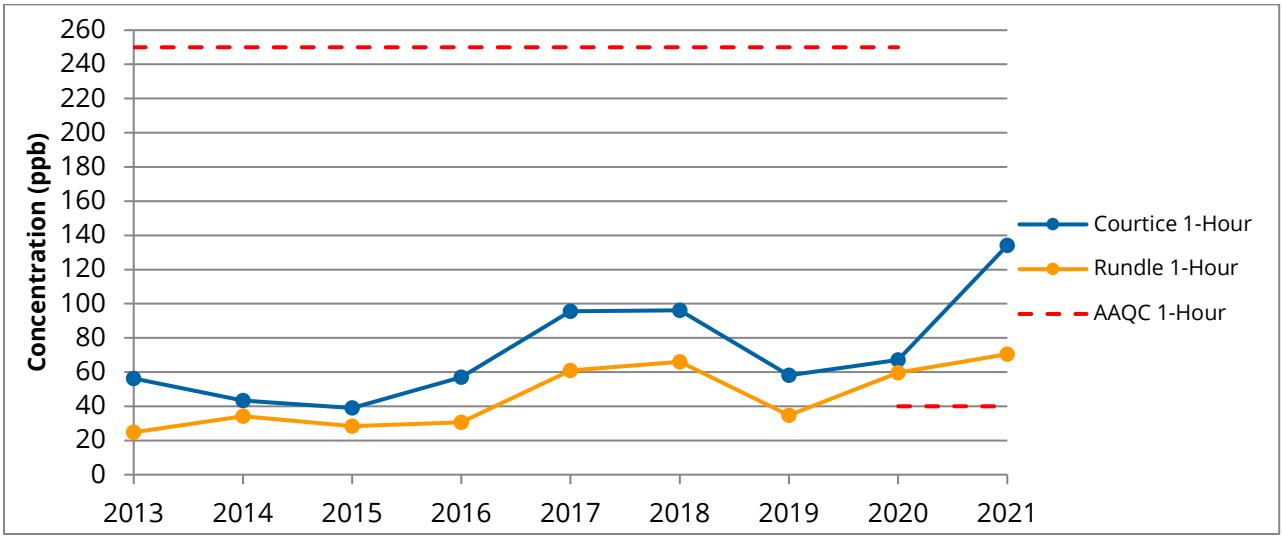
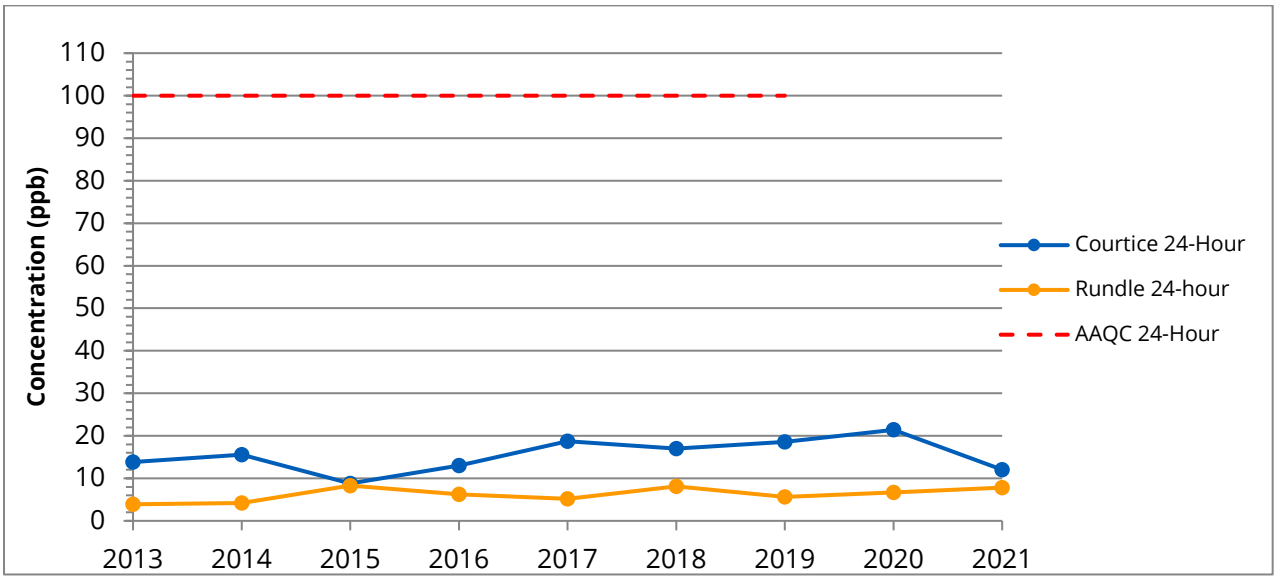


Figure 7: Maximum Measured 1-hour Mean SO_2 Concentrations by Year (Running Mean 2021)



Notes: 24-Hour SO_2 AAQC removed as of 2020

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

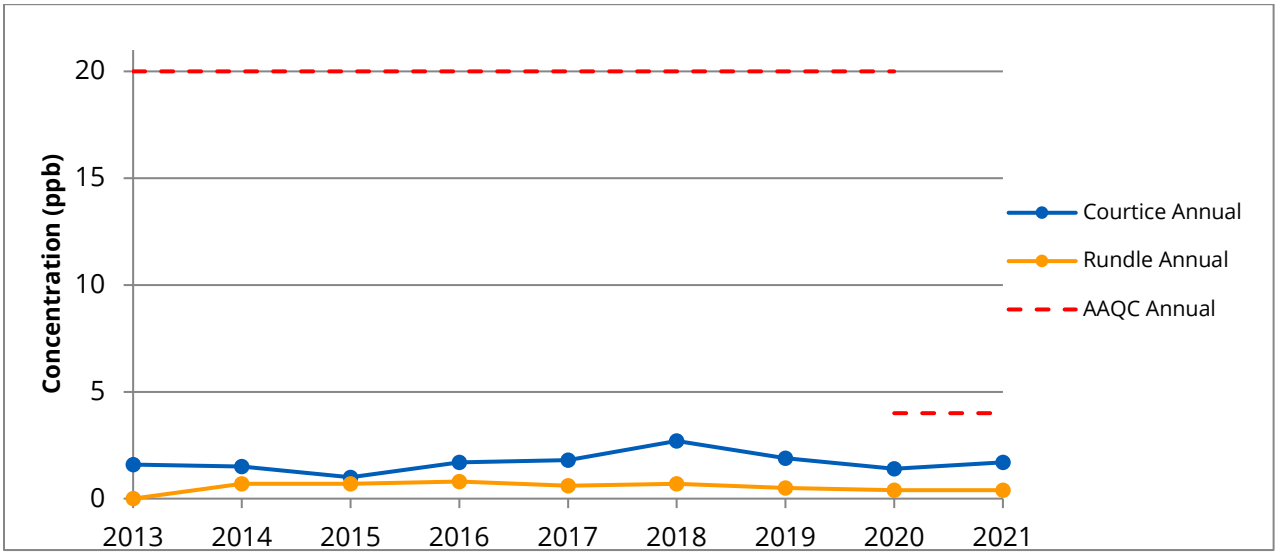


Figure 9: Maximum Measured Annual Mean SO_2 Concentrations by Year

7.1.3 $PM_{2.5}$ Comparison

All continuously monitored $PM_{2.5}$ levels were below the applicable CAAQS' from 2013 to 2021 for both the Courtice and Rundle Road Monitoring Stations. A summary of annual $PM_{2.5}$ data for both stations is presented in **Table 16** for 2013-2021. In 2020 CAAQS' were lowered for the 24-hour and annual limits as described in Section 5 Air Quality Criteria and Standards.

Table 16: 2013-2021 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	2013 [1]	2014 [1]	2015 [1]	2016 [1]	2017 [1]	2018[1]	2019	2020	2021
$PM_{2.5}$ ($\mu g/m^3$)	Annual Arithmetic Mean	8.4	8.6	7.7	6.8	6.4	6.3	6.4	5.9	6.3	8.4	8.5	9.5	9.6	6.3	6.1	5.7	5.2	5.9
	3-Year Average of the Annual Arithmetic Mean of all 1-hour Concentrations	N/A	N/A	N/A [2]	7.7	7.0	6.5	6.4	6.2	6.2	N/A	N/A	N/A [2]	9.2	8.5	7.3	6.0	5.7	5.6
	Annual CAAQS	10	10	10	10	10	10	10	8.8	8.8	10	10	10	10	10	10	10	8.8	8.8
	Events > Annual CAAQS	N/A [3]	N/A [3]	N/A [3]	0	0	0	0	0	0	N/A [3]	N/A [3]	N/A [3]	0	0	0	0	0	0
	Maximum 1-hour Running Mean						64.8	68.6	45.1	68.3						68.3	49.0	45.2	62.1
	Maximum Running 24-hour Mean	27	43.2	59.6	34.7	70.6	34.6	35.7	28.6	43.3	50.6	41.3	64.7	43.1	35.8	31.4	33.6	23.1	39.6
	98th Percentile (24-hour Mean)	21.5	22.3	27.3	21.6	19.8	18.7	18.5	17	21.3	21.7	21.1	28.4	32.9	20.3	18.6	17.4	16.1	18.8
	3-Year Average of the Annual 98th Percentile of the Daily 24-hour Mean Concentrations	N/A	N/A	N/A [2]	23.7	22.9	20.0	19.0	18.1	18.9	N/A	N/A	N/A [2]	27.5	27.2	23.9	18.8	17.4	17.4
	24-hour CAAQS	30	30	28	28	28	28	28	27	27	30	30	28	28	28	28	28	27	27
	Events > 24-hour CAAQS	N/A [3]	N/A [3]	N/A [3]	0	0	0	0	0	0	N/A [3]	N/A [3]	N/A [3]	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.
The 2021 reporting year was the first annual report to include 1-hour running means

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 2017-2021 both stations 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 2017-2021 both stations averages stabilized and the Courtice Station surpassed Rundle Road averages The Rundle Road Station historically had a higher average, but this has changed in recent years (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 70% of the CAAQS in the 2019-2021 grouping as seen in **Figure 10** and **Figure 11**, respectively.

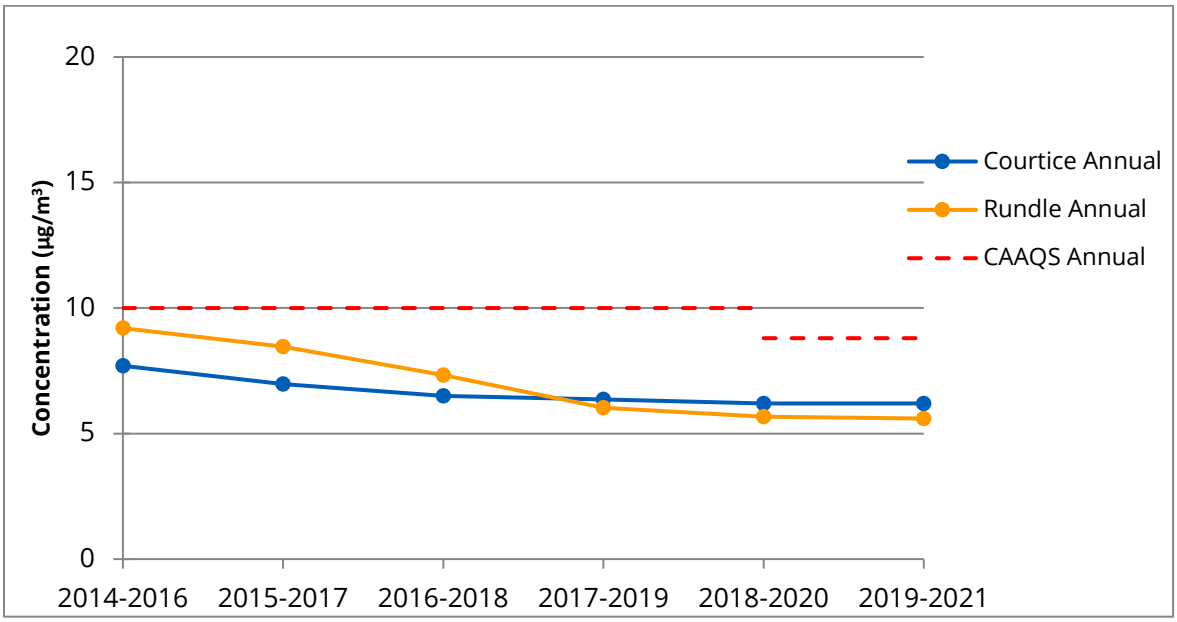


Figure 10: 3-Year Averages of Annual $PM_{2.5}$ Arithmetic Means (of 1-Hour Average Concentrations) by 3-Year Grouping

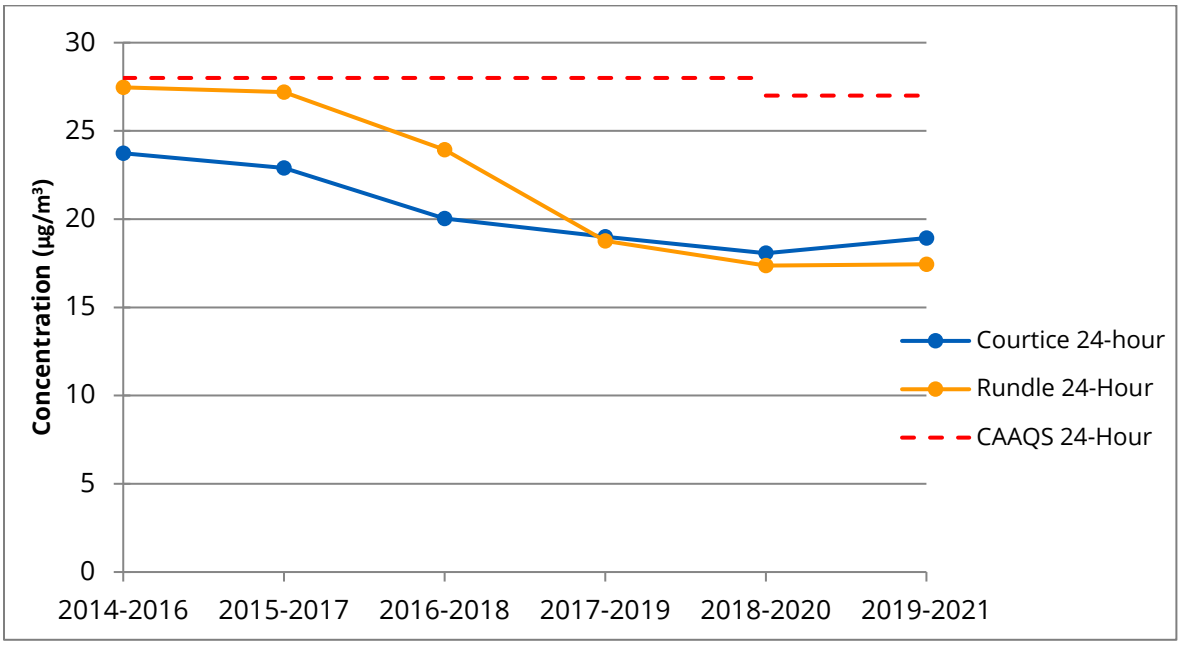


Figure 11: 3-Year Averages of Annual 98th Percentile 24-Hour $PM_{2.5}$ Mean Concentrations by 3-Year Grouping

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 2016-2021 at the Courtice and Rundle Road Monitoring Stations is presented in **Table 17** and **18,** 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, and one (1) exceedance in 2019. No other exceedances of TSP or Metals have occurred at the Courtice or Rundle Road Monitoring Stations from 2013 to 2021.

Table 17: 2013-2021 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	2013 [1]	2014 [1]	2015 [1]	2016 [1]	2017 [1]	2018[1]	2019	2020	2021
Particulate (TSP)	µg/m³	*120*	*120*	62.0	57.0		94.7	59.6	84.7	146.4	69.7	101.0	51.7%	47.5%		78.9%	49.7%	70.6%	122.0%	58.1%	84.2%
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	0.002%	0.001%		0.002%	0.002%	0.002%	0.004%	0.002%	0.004%
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	7.0%	7.4%		14.1%	9.4%	18.6%	20.8%	10.4%	22.3%
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	0.01%	0.02%		0.01%	0.01%	0.03%	0.01%	0.02%	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	1.3%	0.8%		0.7%	1.4%	1.4%	0.9%	1.1%	4.5%
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	0.2%	0.2%		0.3%	0.2%	0.2%	0.2%	0.2%	0.2%
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	2.7%	3.9%		3.7%	3.7%	15.6%	0.7%	0.3%	0.5%
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	-	-		-	-	-	-	-	-
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	0.009%	0.005%		0.007%	0.004%	0.011%	0.012%	0.011%	0.014%
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	2.2%	4.7%		2.9%	3.0%	7.6%	2.8%	21.8%	2.4%
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	0.8%	1.3%		1.5%	2.1%	1.9%	4.5%	0.9%	1.1%
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	0.6%	0.8%		0.7%	0.7%	1.4%	0.7%	0.7%	1.0%
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	0.2%	0.1%		0.3%	0.2%	0.1%	0.1%	0.1%	0.2%
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	24.8%	23.2%		39.5%	25.3%	63.3%	82.8%	31.6%	42.1%
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	0.3%	0.3%		0.4%	0.5%	0.7%	0.7%	0.4%	1.6%
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	-	-		-	-	-	-	-	-
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	8.3%	7.7%		12.2%	13.1%	18.1%	30.1%	9.2%	12.4%
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	0.001%	0.002%		0.003%	0.004%	0.006%	0.002%	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	2.2%	1.4%		1.2%	2.0%	1.9%	2.7%	1.5%	1.8%
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	-	-		-	-	-	-	-	-
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	0.03%	0.04%		0.04%	0.04%	0.07%	0.03%	0.03%	0.03%
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	0.2%	0.2%		0.2%	0.2%	0.4%	0.0%	0.03%	0.05%
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	0.01%	0.01%		0.02%	0.01%	0.01%	0.04%	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	-	-		-	-	-	-	-	-
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	0.05%	0.04%		0.04%	0.04%	0.07%	0.03%	0.02%	0.03%
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	0.01%	0.02%		0.02%	0.02%	0.03%	0.04%	0.03%	0.04%
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	0.04%	0.06%		0.06%	0.06%	1.19%	0.04%	0.02%	0.03%
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	3.3%	5.7%		4.8%	12.3%	0.2%	1.0%	0.1%	0.1%
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	0.001%	0.002%		0.002%	0.002%	0.155%	0.138%	0.1%	0.1%
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	0.010%	0.010%		0.009%	0.009%	0.008%	0.012%	0.017%	0.003%

N/A (AAQC and HHRA columns)

N/A (2015 [1] columns)

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 18: 2013-2021 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	2013 [1]	2014 [1]	2015 [1]	2016 [1]	2017 [1]	2018[1]	2019	2020	2021
Particulate (TSP)	µg/m³	*120*	*120*	78.0	59.0		97.1	232	203.6	81.7	102.3	75.6	65.0%	49.2%		80.9%	193.3%	169.7%	68.1%	85.2%	63.0%
Total Mercury (Hg)	µg/m³	*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	0.003%	0.001%		0.001%	0.002%	0.005%	0.003%	0.002%	0.009%
Aluminum (Al)	µg/m³	*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	9.5%	6.0%		16.4%	22.5%	29.6%	13.8%	24.8%	19.3%
Antimony (Sb)	µg/m³	*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	0.01%	0.01%		0.01%	0.01%	0.11%	0.02%	0.006%	0.012%
Arsenic (As)	µg/m³	*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	0.6%	0.7%		1.6%	0.7%	6.9%	1.6%	3.7%	43.1%
Barium (Ba)	µg/m³	*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	0.2%	0.1%		0.2%	0.3%	0.3%	0.3%	0.2%	0.2%
Beryllium (Be)	µg/m³	*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	2.9%	3.4%		3.6%	3.7%	18.1%	0.3%	0.3%	0.4%
Bismuth (Bi)	µg/m³	-	-	1.76E-03	2.05E-03		2.14E-03	2.21E-03	2.63E-03	1.46E-03	6.07E-04	1.65E-03	-	-		-	-	-	-	-	-
Boron (B)	µg/m³	*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	0.012%	0.004%		0.006%	0.005%	0.011%	0.011%	0.01%	0.02%
Cadmium (Cd)	µg/m³	*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	3.6%	2.7%		2.9%	3.0%	18.9%	2.6%	14.2%	2.4%
Chromium (Cr)	µg/m³	*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	3.6%	1.0%		1.6%	3.5%	1.6%	1.7%	1.0%	1.0%
Cobalt (Co)	µg/m³	*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	0.6%	0.7%		2.8%	0.7%	0.9%	0.7%	1.3%	0.7%
Copper (Cu)	µg/m³	*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	0.5%	0.4%		0.2%	0.5%	0.1%	0.2%	0.1%	0.5%
Iron (Fe)	µg/m³	*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	32.8%	23.3%		45.8%	56.5%	74.1%	31.2%	50.1%	43.2%
Lead (Pb)	µg/m³	*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	0.3%	0.4%		0.4%	0.7%	19.8%	0.3%	0.3%	1.5%
Magnesium (Mg)	µg/m³	-	-	6.76E-01	2.97E-01		1.10E+00	1.76E+00	2.10E+00	9.90E-01	9.86E-01	9.01E-01	-	-		-	-	-	-	-	-
Manganese (Mn)	µg/m³	*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	25.5%	6.5%		16.4%	19.4%	28.1%	13.9%	9.2%	10.9%
Molybdenum (Mo)	µg/m³	*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	0.003%	0.002%		0.005%	0.026%	0.005%	0.002%	0.002%	0.022%
Nickel (Ni)	µg/m³	*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	2.3%	2.3%		9.7%	1.8%	1.6%	1.2%	1.5%	1.4%
Phosphorus (P)	µg/m³	-	-	1.59E-01	1.85E-01		1.03E-01	1.45E-01	1.75E+00	2.15E+00	6.77E-01	2.33E-01	-	-		-	-	-	-	-	-
Selenium (Se)	µg/m³	*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	0.03%	0.03%		0.04%	0.04%	0.04%	0.03%	0.03%	0.03%
Silver (Ag)	µg/m³	*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	0.2%	0.2%		0.2%	0.2%	1.1%	0.0%	0.03%	0.05%
Strontium (Sr)	µg/m³	*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	0.02%	0.01%		0.02%	0.06%	0.05%	0.03%	0.03%	0.02%
Thallium (Tl)	µg/m³	-	-	2.86E-03	3.41E-03		3.57E-03	3.69E-03	4.39E-03	6.36E-05	3.03E-05	7.40E-05	-	-		-	-	-	-	-	-
Tin (Sn)	µg/m³	*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	0.03%	0.03%		0.41%	0.04%	0.31%	0.04%	0.03%	0.11%
Titanium (Ti)	µg/m³	*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	0.02%	0.01%		0.03%	0.05%	0.05%	0.02%	0.06%	0.03%
Uranium (Ur)	µg/m³	*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	0.04%	0.05%		0.05%	0.06%	0.07%	0.01%	0.05%	0.03%
Vanadium (V)	µg/m³	*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	3.7%	6.2%		3.3%	14.8%	0.9%	1.7%	0.1%	0.1%
Zinc (Zn)	µg/m³	*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	0.001%	0.001%		0.001%	0.002%	0.093%	0.049%	0.087%	0.105%
Zirconium (Zr)	µg/m³	*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	0.016%	0.009%		0.016%	0.017%	0.011%	0.003%	0.01%	0.003%

N/A

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 2016-2021 for both Courtice and Rundle Road Monitoring Stations is presented in **Table 19** and **20,** 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 2013-2021. There have been twenty-seven (27) exceedances of Benzo(a)Pyrene above the applicable AAQC from 2013-2021 at the Courtice Monitoring Station and forty-four (44) exceedances of Benzo(a)Pyrene above the applicable AAQC from 2013-2021 at the Rundle Road Monitoring Station.

Table 19: 2013-2021 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	2013 [1]	2014 [1]	2015 [1]	2016 [1]	2017 [1]	2018[1]	2019	2020	2021
1-Methylnaphthalene	ng/m^3	*12000*	-	27.2	8.2		24.0	19.7	21.8	14.6	16.9	34.1	0.2%	0.1%		0.2%	0.2%	0.2%	0.1%	0.1%	0.3%
2-Methylnaphthalene	ng/m^3	*10000*	-	54.3	13.9		50.4	33.5	39.9	23.5	28.8	77.0	0.5%	0.1%		0.5%	0.3%	0.4%	0.2%	0.3%	0.8%
Acenaphthene	ng/m^3	-	-	38.7	11.8		29.6	17.0	20.2	10.1	14.3	37.9	-	-		-	-	-	-	-	-
Acenaphthylene	ng/m^3	*3500*	-	1.1	0.4		0.3	0.8	0.6	0.5	1.6	1.3	0.03%	0.01%		0.01%	0.02%	0.02%	0.01%	0.05%	0.04%
Anthracene	ng/m^3	*200*	-	13.1	1.1		0.5	0.6	0.8	0.4	0.5	1.4	6.6%	0.6%		0.3%	0.3%	0.4%	0.2%	0.3%	0.7%
Benzo(a)Anthracene	ng/m^3	-	-	0.2	0.2		0.1	0.1	0.1	0.1	0.1	0.1	-	-		-	-	-	-	-	-
Benzo(a)fluorene	ng/m^3	-	-	0.3	0.3		0.2	0.2	0.2	0.1	0.1	0.1	-	-		-	-	-	-	-	-
Benzo(a)Pyrene	ng/m^3	*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	129.6%	264%		207%	176%	361%	197%	185%	397%
Benzo(b)Fluoranthene	ng/m^3	-	-	0.4	0.6		2.5	0.1	0.3	0.1	0.3	0.2	-	-		-	-	-	-	-	-
Benzo(b)fluorene	ng/m^3	-	-	0.3	0.3		0.2	0.2	0.2	0.1	0.1	0.1	-	-		-	-	-	-	-	-
Benzo(e)Pyrene	ng/m^3	-	-	0.3	0.3		0.2	0.2	0.2	0.1	0.2	0.2	-	-		-	-	-	-	-	-
Benzo(g,h,i)Perylene	ng/m^3	-	-	0.4	0.3		2.5	0.1	0.1	0.1	0.2	0.2	-	-		-	-	-	-	-	-
Benzo(k)Fluoranthene	ng/m^3	-	-	0.4	0.3	N/A	2.5	0.1	0.1	0.1	0.2	0.2	-	-	N/A	-	-	-	-	-	-
Biphenyl	ng/m^3	-	-	14.9	4.5		11.1	9.7	10.1	5.0	8.6	19.7	-	-		-	-	-	-	-	-
Chrysene	ng/m^3	-	-	0.2	0.5		0.2	0.1	0.3	0.2	0.4	0.3	-	-		-	-	-	-	-	-
Dibenzo(a,h)Anthracene	ng/m^3	-	-	0.3	0.5		2.8	0.1	0.1	0.03	0.0	0.0	-	-		-	-	-	-	-	-
Fluoranthene	ng/m^3	-	-	4.5	4.0		3.2	2.6	3.3	1.2	2.1	2.3	-	-		-	-	-	-	-	-
Fluorene	ng/m^3	-	-	-	-		-	-	-	2.9	9.8	21.3	-	-		-	-	-	-	-	-
Indeno(1,2,3-cd)Pyrene	ng/m^3	-	-	0.4	0.5		2.8	0.1	0.1	0.1	0.2	0.2	-	-		-	-	-	-	-	-
Naphthalene	ng/m^3	*22500*	*22500*	143.0	38.7		60.9	92.2	77.8	48.1	67.1	119.2	0.6%	0.2%		0.3%	0.4%	0.3%	0.2%	0.3%	0.5%
o-Terphenyl	ng/m^3	-	-	0.3	0.3		0.2	0.2	0.2	0.02	0.0	0.0	-	-		-	-	-	-	-	-
Perylene	ng/m^3	-	-	0.3	0.3		0.2	0.2	0.2	0.02	0.0	0.0	-	-		-	-	-	-	-	-
Phenanthrene	ng/m^3	-	-	33.9	14.2		23.1	16.4	21.6	8.7	15.8	22.0	-	-		-	-	-	-	-	-
Pyrene	ng/m^3	-	-	1.7	2.5		1.3	1.2	1.4	0.6	1.0	1.0	-	-		-	-	-	-	-	-
Tetralin	ng/m^3	-	-	5.8	25.3		3.8	4.9	4.6	7.8	12.7	80.0	-	-		-	-	-	-	-	-
Total PAH[5]	ng/m^3	-	-	327.0	95.0		208.7	200.0	203.6	117.9	170.2	333.0	-	-		-	-	-	-	-	-

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] 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 20: 2013-2021 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	2013 [1]	2014 [1]	2015 [1]	2016 [1]	2017 [1]	2018[1]	2019	2020	2021
1-Methylnaphthalene	ng/m^3	*12000*	-	26.6	10.8		238.2	29.4	26.6	16.1	27.0	22.1	0.2%	0.1%		2.0%	0.2%	0.2%	0.1%	0.2%	0.2%
2-Methylnaphthalene	ng/m^3	*10000*	-	45.4	18.7		502.5	69.2	54.1	29.4	48.5	43.0	0.5%	0.2%		5.0%	0.7%	0.5%	0.3%	0.5%	0.4%
Acenaphthene	ng/m^3	-	-	18.9	8.1		303.2	44.1	40.4	18.0	26.9	17.5	-	-		-	-	-	-	-	-
Acenaphthylene	ng/m^3	*3500*	-	1.6	2.0		3.3	1.2	0.6	0.6	0.9	0.7	0.1%	0.1%		0.1%		0.02%	0.02%	0.02%	0.02%
Anthracene	ng/m^3	*200*	-	1.5	0.7		7.5	3.1	2.6	1.9	2.1	1.2	0.8%	0.4%		3.8%		1.3%	0.9%	1.1%	0.6%
Benzo(a)Anthracene	ng/m^3	-	-	0.5	0.2		0.2	0.1	0.1	0.1	0.2	0.1	-	-		-	-			-	-
Benzo(a)fluorene	ng/m^3	-	-	0.6	0.3		0.4	0.4	0.3	0.1	0.2	0.1	-	-						-	-
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	826%	576%		415%	316%	278%	221%	364%	653.7%
Benzo(b)Fluoranthene	ng/m^3	-	-	1.0	0.7		0.5	0.4	0.1	0.2	0.2	0.2	-	-		-	-	-	-	-	-
Benzo(b)fluorene	ng/m^3	-	-	0.5	0.3		0.2	0.3	0.3	0.1	0.1	0.1	-	-		-	-	-	-	-	-
Benzo(e)Pyrene	ng/m^3	-	-	0.5	0.3		0.2	0.3	0.3	0.1	0.2	0.2	-	-		-	-	-	-	-	-
Benzo(g,h,i)Perylene	ng/m^3	-	-	0.6	0.3		0.1	0.1	0.1	0.1	0.2	0.2	-	-		-	-	-	-	-	-
Benzo(k)Fluoranthene	ng/m^3	-	-	0.3	0.2	N/A	0.1	0.1	0.1	0.1	0.2	0.2	-	-	N/A	-	-	-	-	-	-
Biphenyl	ng/m^3	-	-	7.4	5.8		125.9	14.2	13.2	5.5	19.3	9.9	-	-		-	-	-	-	-	-
Chrysene	ng/m^3	-	-	0.9	0.7		0.4	0.1	0.2	0.2	0.3	0.3	-	-		-	-	-	-	-	-
Dibenzo(a,h)Anthracene	ng/m^3	-	-	0.2	0.2		0.1	0.1	0.1	0.03	0.1	0.0	-	-		-	-	-	-	-	-
Fluoranthene	ng/m^3	-	-	7.7	3.5		14.7	13.9	13.5	4.7	6.2	3.3	-	-		-	-	-	-	-	-
Fluorene	ng/m^3	-	-	-	-		-	-	-	6.9	16.5	12.2	-	-		-	-	-	-	-	-
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	-	-		-	-	-	-	-	-
Naphthalene	ng/m^3	*22500*	*22500*	94.1	92.6		294.6	85.4	74.2	53.7	104.7	81.1	0.4%	0.4%		1.3%	0.4%	0.3%	0.2%	0.5%	0.4%
o-Terphenyl	ng/m^3	-	-	0.5	0.3		0.2	0.3	0.3	0.02	0.0	0.0	-	-		-	-	-	-	-	-
Perylene	ng/m^3	-	-	0.5	0.3		0.2	0.3	0.3	0.02	0.0	0.0	-	-		-	-	-	-	-	-
Phenanthrene	ng/m^3	-	-	29.4	13.0		209.7	69.8	58.1	24.0	30.6	16.2	-	-		-	-	-	-	-	-
Pyrene	ng/m^3	-	-	3.2	1.9		6.6	5.6	5.4	2.0	3.6	1.4	-	-		-	-	-	-	-	-
Tetralin	ng/m^3	-	-	5.1	4.0		4.4	3.8	7.7	36.0	16.8	94.5	-	-		-	-	-	-	-	-
Total PAH[5]	ng/m^3	-	-	165.0	153.9		1710.2	309.0	292.1	160.3	274.2	216.3	-	-		-	-	-	-	-	-

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 – 2021 and their specific measurement period for both Courtice and Rundle Road Monitoring Stations is presented in **Table 21**. 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 2019-2021. The maximum measured toxic equivalent D&F concentrations at the Rundle Road Station were all below the applicable AAQC from 2013-2021.

Table 21: 2013-2021 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/m^3)	No. of Exceedances	Maximum Concentration (pg TEQ/m^3)	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

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 2021 had eleven (11) Benzo(a)pyrene daily average concentrations above the applicable AAQC at the Courtice and Rundle Road Monitoring Stations.

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 2021 had forty-one (41) SO_2 1-hour average concentrations above the AAQC at the Courtice and Rundle Road Monitoring Stations. There were also ninety-two (92) exceedances of the rolling 10-minute average AAQC for SO_2 throughout 2021.

Throughout the 2021 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.

APPENDIX A

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

2021 Sampling Schedule // Horaire Échantillonnage **2021**

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	8	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
7	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	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	

May // mai

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					

June // juin

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			

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	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						

November // novembre

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				

December // decembre

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	

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: 2021 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.	%
2021	6.3	68.3	43.3	21.3	8718	99.5

[1] - This value is the 98th percentile of daily average levels for the 2021 year.

Table B2: 2021 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.	%
2021	5.9	62.1	39.6	18.8	8740	99.8

[1] - This value is the 98th percentile of daily average levels for the 2021 year.

Table B3: 2021 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.	%
2021	N/A	N/A	6.2	92.5	46.3	8701	99.3

[1] - This value is the 98th percentile of daily maximum 1-hour average concentrations for the 2021 year.

Table B4: 2021 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.	%
2021	N/A	N/A	4.4	107.4	23.1	8705	99.4

[1] - This value is the 98th percentile of daily maximum 1-hour average concentrations for the 2021 year.

Table B5: 2021 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.	%
2021	N/A	N/A	1.4	67.7	23.0	8701	99.3

[1] - This value is the 98th percentile of daily maximum 1-hour average concentrations for the 2021 year.

Table B6: 2021 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.	%
2021	N/A	N/A	0.9	66.5	8.0	8705	99.4

[1] - This value is the 98th percentile of daily maximum 1-hour average concentrations for the 2021 year.

Table B7: 2021 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	98^{th} Percentile (Daily Max 1 hr Mean) [2]	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.	%
2021	0	0	0	5.0	37.6	33.2	23.3	8701	99.3

[1] - This value is the 98th percentile of daily maximum 1-hour average concentrations for the 2021 year.

Table B8: 2021 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) [2]	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.	%
2021	0	0	0	3.7	41.0	25.7	16.7	8705	99.4

[1] - This value is the 98th percentile of daily maximum 1-hour average concentrations for the 2021 year.

Table B9: 2021 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.	%
2021	85	38	0	1.7	275.9	134.1	65.5	12.0	8724	99.6

[1] - This value is the 99th percentile of daily maximum 1-hour average concentrations for the 2021 year.

Table B10: 2021 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.	%
2021	7	3	0	0	0.4	96.7	70.5	16.2	7.8	8704	99.4

[1] - This value is the 99th percentile of daily maximum 1-hour average concentrations for the 2021 year.

APPENDIX C

Table C1: 2021 Courtice Station Monitoring Results for TSP and Metals

DYEC AAQM Courtice Station Monitoring Results for Total Suspended Particulate and Metals								
Contaminant	**Units**	**AAQC**	**HHRA Health Based Criteria**	**No. > AAQC**	**Arithmetic Mean**	**Maximum Concentration**	**Number of Valid Samples**	**% Valid data**
Particulate (TSP)	µg/m^3	*120*	*120*	0	22.5	101.0	61	100.0
Total Mercury (Hg)	µg/m^3	*2*	*2*	0	1.13E-05	8.80E-05	61	100.0
Aluminum (Al)	µg/m^3	*4.8*	-	0	1.54E-01	1.07E+00	61	100.0
Antimony (Sb)	µg/m^3	*25*	*25*	0	8.14E-04	3.16E-03	61	100.0
Arsenic (As)	µg/m^3	*0.3*	*0.3*	0	1.14E-03	1.35E-02	61	100.0
Barium (Ba)	µg/m^3	*10*	*10*	0	7.19E-03	2.10E-02	61	100.0
Beryllium (Be)	µg/m^3	*0.01*	*0.01*	0	1.80E-05	4.55E-05	61	100.0
Bismuth (Bi)	µg/m^3	-	-	-	5.53E-04	1.57E-03	61	100.0
Boron (B)	µg/m^3	*120*	-	0	5.33E-03	1.64E-02	61	100.0
Cadmium (Cd)	µg/m^3	*0.025*	*0.025*	0	1.56E-04	5.96E-04	61	100.0
Chromium (Cr)	µg/m^3	*0.5*	-	0	2.06E-03	5.69E-03	61	100.0
Cobalt (Co)	µg/m^3	*0.1*	*0.1*	0	1.81E-04	9.77E-04	61	100.0
Copper (Cu)	µg/m^3	*50*	-	0	2.04E-02	7.73E-02	61	100.0
Iron (Fe)	µg/m^3	*4*	-	0	3.79E-01	1.68E+00	61	100.0
Lead (Pb)	µg/m^3	*0.5*	*0.5*	0	2.41E-03	7.97E-03	61	100.0
Magnesium (Mg)	µg/m^3	-	-	-	2.01E-01	9.57E-01	61	100.0
Manganese (Mn)	µg/m^3	*0.4*	-	0	1.03E-02	4.97E-02	61	100.0
Molybdenum (Mo)	µg/m^3	*120*	-	0	1.04E-03	3.03E-03	61	100.0
Nickel (Ni)	µg/m^3	*0.2*	-	0	1.15E-03	3.51E-03	61	100.0
Phosphorus (P)	µg/m^3	-	-	-	2.28E-01	5.06E-01	61	100.0
Selenium (Se)	µg/m^3	*10*	*10*	0	7.30E-04	2.98E-03	61	100.0
Silver (Ag)	µg/m^3	*1*	*1*	0	5.83E-05	4.71E-04	61	100.0
Strontium (Sr)	µg/m^3	*120*	-	0	4.93E-03	2.34E-02	61	100.0
Thallium (Tl)	µg/m^3	-	-	-	2.93E-05	1.08E-04	61	100.0
Tin (Sn)	µg/m^3	*10*	*10*	0	8.74E-04	3.46E-03	61	100.0
Titanium (Ti)	µg/m^3	*120*	-	0	7.70E-03	4.25E-02	61	100.0
Uranium (Ur)	µg/m^3	*0.3*	-	0	2.07E-05	9.63E-05	61	100.0
Vanadium (V)	µg/m^3	*2*	*1*	0	1.51E-03	2.95E-03	61	100.0
Zinc (Zn)	µg/m^3	*120*	-	0	3.42E-02	1.49E-01	61	100.0
Zirconium (Zr)	µg/m^3	*20*	-	0	5.96E-04	6.17E-04	61	100.0

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

Table C2: 2021 Rundle Station Monitoring Results for TSP and Metals

DYEC AAQM Rundle Station Monitoring Results for Total Suspended Particulate and Metals								
Contaminant	**Units**	**AAQC**	**HHRA Health Based Criteria**	**No. > AAQC**	**Arithmetic Mean**	**Maximum Concentration**	**Number of Valid Samples**	**% Valid data**
Particulate (TSP)	µg/m^3	*120*	*120*	0	22.6	75.6	58	95.1
Total Mercury (Hg)	µg/m^3	*2*	*2*	0	1.42E-05	1.87E-04	58	95.1
Aluminum (Al)	µg/m^3	*4.8*	-	0	1.53E-01	9.25E-01	58	95.1
Antimony (Sb)	µg/m^3	*25*	*25*	0	6.32E-04	3.06E-03	58	95.1
Arsenic (As)	µg/m^3	*0.3*	*0.3*	0	3.64E-03	1.29E-01	58	95.1
Barium (Ba)	µg/m^3	*10*	*10*	0	6.59E-03	2.14E-02	58	95.1
Beryllium (Be)	µg/m^3	*0.01*	*0.01*	0	1.68E-05	4.15E-05	58	95.1
Bismuth (Bi)	µg/m^3	-	-	-	5.55E-04	1.65E-03	58	95.1
Boron (B)	µg/m^3	*120*	-	0	5.41E-03	1.87E-02	58	95.1
Cadmium (Cd)	µg/m^3	*0.025*	*0.025*	0	1.64E-04	6.10E-04	58	95.1
Chromium (Cr)	µg/m^3	*0.5*	-	0	2.00E-03	4.87E-03	58	95.1
Cobalt (Co)	µg/m^3	*0.1*	*0.1*	0	1.73E-04	7.16E-04	58	95.1
Copper (Cu)	µg/m^3	*50*	-	0	2.43E-02	2.55E-01	58	95.1
Iron (Fe)	µg/m^3	*4*	-	0	3.55E-01	1.73E+00	58	95.1
Lead (Pb)	µg/m^3	*0.5*	*0.5*	0	2.45E-03	7.56E-03	58	95.1
Magnesium (Mg)	µg/m^3	-	-	-	2.00E-01	9.01E-01	58	95.1
Manganese (Mn)	µg/m^3	*0.4*	-	0	9.55E-03	4.35E-02	58	95.1
Molybdenum (Mo)	µg/m^3	*120*	-	0	1.32E-03	2.65E-02	58	95.1
Nickel (Ni)	µg/m^3	*0.2*	-	0	1.07E-03	2.84E-03	58	95.1
Phosphorus (P)	µg/m^3	-	-	-	2.23E-01	2.33E-01	58	95.1
Selenium (Se)	µg/m^3	*10*	*10*	0	6.83E-04	3.05E-03	58	95.1
Silver (Ag)	µg/m^3	*1*	*1*	0	6.12E-05	5.29E-04	58	95.1
Strontium (Sr)	µg/m^3	*120*	-	0	5.31E-03	1.87E-02	58	95.1
Thallium (Tl)	µg/m^3	-	-	-	2.76E-05	7.40E-05	58	95.1
Tin (Sn)	µg/m^3	*10*	*10*	0	9.77E-04	1.11E-02	58	95.1
Titanium (Ti)	µg/m^3	*120*	-	0	6.99E-03	3.51E-02	58	95.1
Uranium (Ur)	µg/m^3	*0.3*	-	0	1.83E-05	7.80E-05	58	95.1
Vanadium (V)	µg/m^3	*2*	*1*	0	1.49E-03	1.55E-03	58	95.1
Zinc (Zn)	µg/m^3	*120*	-	0	3.84E-02	1.27E-01	58	95.1
Zirconium (Zr)	µg/m^3	*20*	-	0	5.95E-04	6.21E-04	58	95.1

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

Table C3: 2021 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**	**Arithmetic Mean**	**Maximum Concentration**	**Number of Valid Samples**	**% Valid data**
1-Methylnaphthalene	ng/m^3	*12000*	-	0	8.73E+00	3.41E+01	29	96.7
2-Methylnaphthalene	ng/m^3	*10000*	-	0	1.64E+01	7.70E+01	29	96.7
Acenaphthene	ng/m^3	-	-	-	5.85E+00	3.79E+01	29	96.7
Acenaphthylene	ng/m^3	*3500*	-	0	2.58E-01	1.29E+00	29	96.7
Anthracene	ng/m^3	*200*	-	0	3.55E-01	1.36E+00	29	96.7
Benzo(a)Anthracene	ng/m^3	-	-	-	2.14E-02	1.20E-01	29	96.7
Benzo(a)fluorene	ng/m^3	-	-	-	4.22E-02	9.34E-02	29	96.7
Benzo(a)Pyrene	ng/m^3	*0.05* [1] *5* [2] *1.1* [3]	*1*	3	3.10E-02	1.99E-01	29	96.7
Benzo(b)Fluoranthene	ng/m^3	-	-	-	4.88E-02	1.57E-01	29	96.7
Benzo(b)fluorene	ng/m^3	-	-	-	2.81E-02	8.71E-02	29	96.7
Benzo(e)Pyrene	ng/m^3	-	-	-	3.67E-02	1.55E-01	29	96.7
Benzo(g,h,i)Perylene	ng/m^3	-	-	-	3.46E-02	2.22E-01	29	96.7
Benzo(k)Fluoranthene	ng/m^3	-	-	-	4.46E-02	2.48E-01	29	96.7
Biphenyl	ng/m^3	-	-	-	4.59E+00	1.97E+01	29	96.7
Chrysene	ng/m^3	-	-	-	7.78E-02	2.97E-01	29	96.7
Dibenzo(a,h)Anthracene	ng/m^3	-	-	-	6.43E-03	2.73E-02	29	96.7
Fluoranthene	ng/m^3	-	-	-	8.10E-01	2.25E+00	29	96.7
Fluorene	ng/m^3	-	-	-	3.72E+00	2.13E+01	29	96.7
Indeno(1,2,3-cd)Pyrene	ng/m^3	-	-	-	3.37E-02	1.84E-01	29	96.7
Naphthalene	ng/m^3	*22500*	*22500*	0	3.71E+01	1.19E+02	29	96.7
o-Terphenyl	ng/m^3	-	-	-	1.23E-02	3.28E-02	29	96.7
Perylene	ng/m^3	-	-	-	4.73E-03	3.52E-02	29	96.7
Phenanthrene	ng/m^3	-	-	-	5.60E+00	2.20E+01	29	96.7
Pyrene	ng/m^3	-	-	-	3.99E-01	1.05E+00	29	96.7
Tetralin	ng/m^3	-	-	-	8.14E+00	8.00E+01	29	96.7
Total PAH[4]	ng/m^3	-	-	-	9.23E+01	3.33E+02	29	96.7

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: 2021 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**	**Arithmetic Mean**	**Maximum Concentration**	**Number of Valid Samples**	**% Valid data**
1-Methylnaphthalene	ng/m^3	*12000*	-	0	5.76E+00	2.21E+01	29	96.7
2-Methylnaphthalene	ng/m^3	*10000*	-	0	9.68E+00	4.30E+01	29	96.7
Acenaphthene	ng/m^3	-	-	-	3.42E+00	1.75E+01	29	96.7
Acenaphthylene	ng/m^3	*3500*	-	0	1.95E-01	7.21E-01	29	96.7
Anthracene	ng/m^3	*200*	-	0	3.02E-01	1.24E+00	29	96.7
Benzo(a)Anthracene	ng/m^3	-	-	-	2.63E-02	1.03E-01	29	96.7
Benzo(a)fluorene	ng/m^3	-	-	-	5.21E-02	1.43E-01	29	96.7
Benzo(a)Pyrene	ng/m^3	*0.05* [1] *5* [2] *1.1* [3]	*1*	8	4.47E-02	3.27E-01	29	96.7
Benzo(b)Fluoranthene	ng/m^3	-	-	-	6.37E-02	2.11E-01	29	96.7
Benzo(b)fluorene	ng/m^3	-	-	-	3.55E-02	1.10E-01	29	96.7
Benzo(e)Pyrene	ng/m^3	-	-	-	4.57E-02	1.59E-01	29	96.7
Benzo(g,h,i)Perylene	ng/m^3	-	-	-	4.26E-02	2.26E-01	29	96.7
Benzo(k)Fluoranthene	ng/m^3	-	-	-	5.65E-02	2.10E-01	29	96.7
Biphenyl	ng/m^3	-	-	-	3.00E+00	9.94E+00	29	96.7
Chrysene	ng/m^3	-	-	-	9.15E-02	2.81E-01	29	96.7
Dibenzo(a,h)Anthracene	ng/m^3	-	-	-	8.00E-03	2.53E-02	29	96.7
Fluoranthene	ng/m^3	-	-	-	8.96E-01	3.31E+00	29	96.7
Fluorene	ng/m^3	-	-	-	2.62E+00	1.22E+01	29	96.7
Indeno(1,2,3-cd)Pyrene	ng/m^3	-	-	-	4.13E-02	1.87E-01	29	96.7
Naphthalene	ng/m^3	*22500*	*22500*	0	2.51E+01	8.11E+01	29	96.7
o-Terphenyl	ng/m^3	-	-	-	1.10E-02	3.53E-02	29	96.7
Perylene	ng/m^3	-	-	-	6.02E-03	3.14E-02	29	96.7
Phenanthrene	ng/m^3	-	-	-	4.56E+00	1.62E+01	29	96.7
Pyrene	ng/m^3	-	-	-	4.35E-01	1.42E+00	29	96.7
Tetralin	ng/m3	-	-	-	7.94E+00	9.45E+01	29	96.7
Total PAH[4]	ng/m^3	-	-	-	6.44E+01	2.16E+02	29	96.7

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 C5: 2021 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**	**Arithmetic Mean**	**Maximum Concentration**	**Number of Valid Samples**	**% Valid data**
2,3,7,8-TCDD	pg TEQ/m^3	-	-	-	1.49E-03	4.83E-03	14	93.3
1,2,3,7,8-PeCDD	pg TEQ/m^3	-	-	-	1.71E-03	7.57E-03	14	93.3
1,2,3,4,7,8-HxCDD	pg TEQ/m^3	-	-	-	2.39E-04	7.61E-04	14	93.3
1,2,3,6,7,8-HxCDD	pg TEQ/m^3	-	-	-	3.64E-04	1.07E-03	14	93.3
1,2,3,7,8,9-HxCDD	pg TEQ/m^3	-	-	-	3.93E-04	1.06E-03	14	93.3
1,2,3,4,6,7,8-HpCDD	pg TEQ/m^3	-	-	-	5.09E-04	1.15E-03	14	93.3
OCDD	pg TEQ/m^3	-	-	-	6.69E-05	1.75E-04	14	93.3
2,3,7,8-TCDF	pg TEQ/m^3	-	-	-	2.03E-04	5.68E-04	14	93.3
1,2,3,7,8-PeCDF	pg TEQ/m^3	-	-	-	5.41E-05	1.37E-04	14	93.3
2,3,4,7,8-PeCDF	pg TEQ/m^3	-	-	-	8.82E-04	3.40E-03	14	93.3
1,2,3,4,7,8-HxCDF	pg TEQ/m^3	-	-	-	2.84E-04	7.01E-04	14	93.3
1,2,3,6,7,8-HxCDF	pg TEQ/m^3	-	-	-	2.51E-04	8.39E-04	14	93.3
2,3,4,6,7,8-HxCDF	pg TEQ/m^3	-	-	-	2.80E-04	1.12E-03	14	93.3
1,2,3,7,8,9-HxCDF	pg TEQ/m^3	-	-	-	2.41E-04	6.44E-04	14	93.3
1,2,3,4,6,7,8-HpCDF	pg TEQ/m^3	-	-	-	1.22E-04	3.24E-04	14	93.3
1,2,3,4,7,8,9-HpCDF	pg TEQ/m^3	-	-	-	3.02E-05	6.70E-05	14	93.3
OCDF	pg TEQ/m^3	-	-	-	5.78E-06	1.77E-05	14	93.3
Total Toxic Equivalency	pg TEQ/m^3	0.1 1[1]	-	0	7.13E-03	1.53E-02	14	93.3

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: 2021 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**	**Arithmetic Mean**	**Maximum Concentration**	**Number of Valid Samples**	**% Valid data**
2,3,7,8-TCDD	pg TEQ/m^3	-	-	-	1.61E-03	8.86E-03	14	93.3
1,2,3,7,8-PeCDD	pg TEQ/m^3	-	-	-	3.09E-03	1.25E-02	14	93.3
1,2,3,4,7,8-HxCDD	pg TEQ/m^3	-	-	-	5.99E-04	3.60E-03	14	93.3
1,2,3,6,7,8-HxCDD	pg TEQ/m^3	-	-	-	8.18E-04	5.53E-03	14	93.3
1,2,3,7,8,9-HxCDD	pg TEQ/m^3	-	-	-	8.00E-04	4.40E-03	14	93.3
1,2,3,4,6,7,8-HpCDD	pg TEQ/m^3	-	-	-	8.67E-04	4.20E-03	14	93.3
OCDD	pg TEQ/m^3	-	-	-	7.29E-05	3.19E-04	14	93.3
2,3,7,8-TCDF	pg TEQ/m^3	-	-	-	1.83E-04	6.33E-04	14	93.3
1,2,3,7,8-PeCDF	pg TEQ/m^3	-	-	-	6.41E-05	2.59E-04	14	93.3
2,3,4,7,8-PeCDF	pg TEQ/m^3	-	-	-	1.23E-03	1.04E-02	14	93.3
1,2,3,4,7,8-HxCDF	pg TEQ/m^3	-	-	-	4.71E-04	3.56E-03	14	93.3
1,2,3,6,7,8-HxCDF	pg TEQ/m^3	-	-	-	4.15E-04	3.14E-03	14	93.3
2,3,4,6,7,8-HxCDF	pg TEQ/m^3	-	-	-	4.00E-04	2.42E-03	14	93.3
1,2,3,7,8,9-HxCDF	pg TEQ/m^3	-	-	-	3.32E-04	1.61E-03	14	93.3
1,2,3,4,6,7,8-HpCDF	pg TEQ/m^3	-	-	-	1.91E-04	1.28E-03	14	93.3
1,2,3,4,7,8,9-HpCDF	pg TEQ/m^3	-	-	-	3.81E-05	2.04E-04	14	93.3
OCDF	pg TEQ/m^3	-	-	-	6.20E-06	1.93E-05	14	93.3
Total Toxic Equivalency	pg TEQ/m^3	*0.1* *1* [1]	-	0	1.12E-02	4.57E-02	14	93.3

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

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