REPORT

TRANS MOUNTAIN PIPELINE EDMONTON TERMINAL

EDMONTON, ALBERTA

ANNUAL OPERATIONAL AIR QUALITY AND METEOROLOGICAL MONITORING REPORT, 2023

RWDI #2105728

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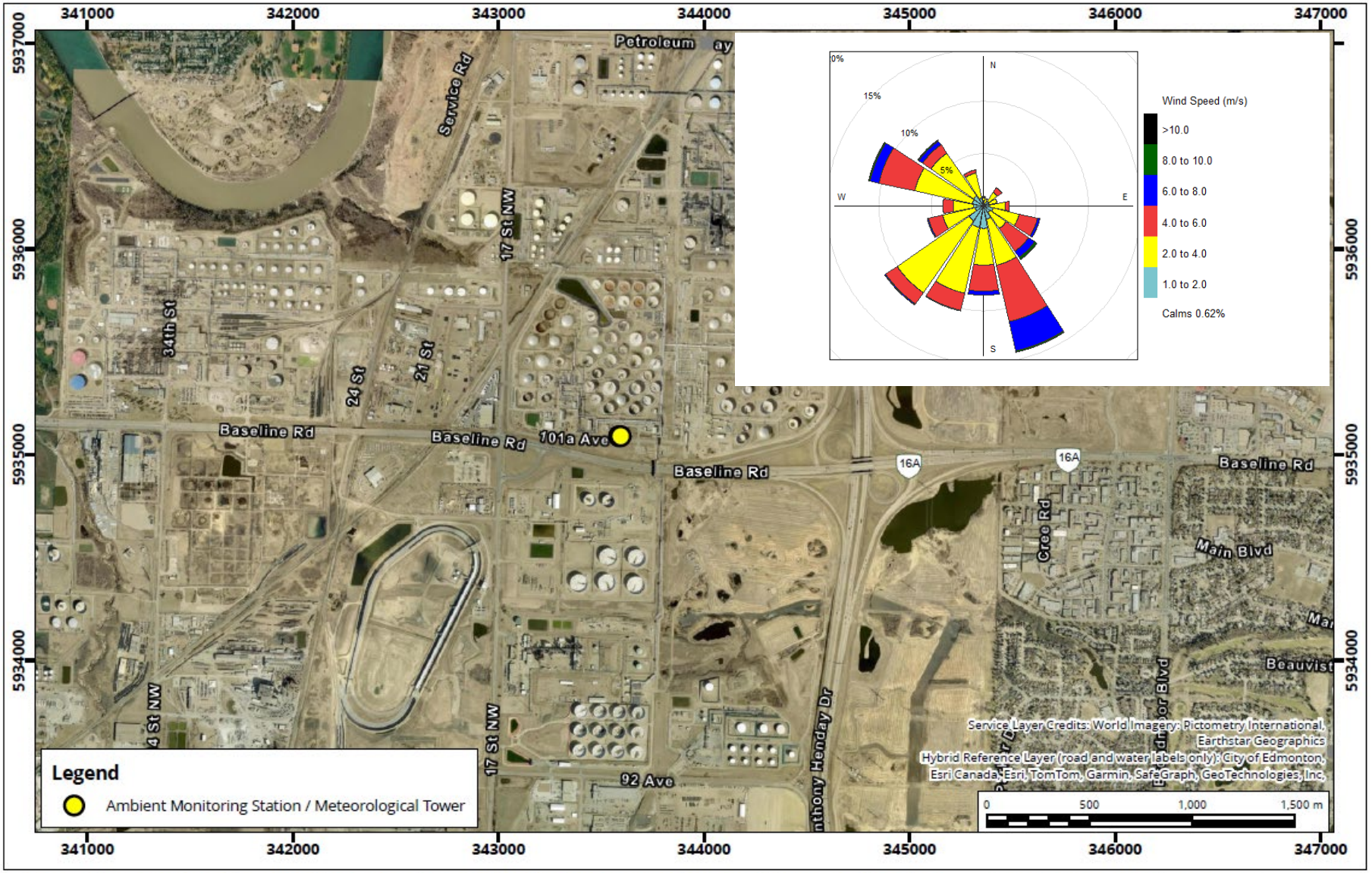
1 INTRODUCTION

This report summarizes ambient air measurements made at the Trans Mountain Edmonton Terminal (ET) Air Quality Monitoring (AQM) station from August 5 to December 31, 2023. This follows an extended baseline survey that occurred from November 9, 2022 to August 4, 2023, which exceeded the 90-day requirement of the Canada Energy Regulator (CER; formerly National Energy Board) Condition 79 for the Trans Mountain Expansion Project (TMEP or Project). The objective of the ET AQM program during this operational period after commissioning of the four new storage tanks was to monitor the ambient air quality in the vicinity of the ET and make comparisons to the applicable Alberta Ambient Air Quality Objectives (AAQOs). The available measurements since the AQM station began operating cover <75% of the 2023 year, and are therefore, not comparable to annual AAQOs for 2023. To introduce the annual AAQO values, comments are made within the relevant sections and values are included in Appendix A Table A6 for 2023. The monitoring methods follow the Air Emissions Management Plan for the Edmonton Terminal (Trans Mountain 2017) and the Ambient Air Quality Monitoring Plan (AQMP) for the Edmonton Terminal (Trans Mountain 2020) both of reference the Alberta Air Monitoring Directive (AMD).

The location of the ET AQM station is shown in **Figure 1**. This station continuously monitors the following air quality parameters: particulate matter less than 2.5 microns ($PM_{2.5}$), nitrogen oxides (NO_X, NO, NO_2), sulfur dioxide (SO_2), total reduced sulphurs (TRS), ozone (O_3), visibility, and benzene, toluene, ethyl benzene and xylene (BTEX). The AQM station also continuously monitors the following meteorological parameters: wind speed, wind direction, temperature, relative humidity, barometric pressure, and precipitation. A wind rose, which visually plots the joint frequencies of wind speed and wind direction, is shown in **Figure 1** for the almost 5-month operational monitoring period.

Throughout the monitoring period from August 5, 2023, to December 31, 2023, there were 14 events over the 24-hour $PM_{2.5}$ Alberta AAQO. Forest fire smoke experienced across the region was determined to be the main cause of the $PM_{2.5}$ exceedances and not ET operations. Values outside of these events, were otherwise low when compared to the AAQO. Data recovery rates were over 85% for all measured continuous parameters during this monitoring period. No annual comparison to the annual $PM_{2.5}$ AAQO can be made, as operationally there was <75% data validity for 2023. There were no other events over the available AAQOs over this monitoring period for all other parameters measured.



Air Quality Monitoring Station Location and Wind Rose During Baseline Monitoring

Edmonton Terminal

Map Projection: NAD 1983 UTM Zone 12N

Trans Mountain Pipeline - Edmonton, AB

True North

Project #: 2105728

Drawn by: PIP	Figure: 1
Approx. Scale:	1:26,000
Date Revised:	Jan 12, 2024

2 BACKGROUND

2.1 Geographical Area

The ET AQM station is located in the northeast corner of the intersection of Baseline Road/101 Avenue NW and 17 Street NW. Access to the Trans Mountain office buildings can be reached from a service road called 101A Avenue. The surrounding land use around ET is heavy industrial and the geographical area features fairly flat terrain with the North Saskatchewan River valley located approximately 1 km northwest of the facility.

2.2 Air Emission Sources

The ET is the starting point of the existing Trans Mountain Pipeline System. The existing emission sources include 35 tanks holding heavy crude, light sweet or light sour crude, and refined products. For the Project, four new tanks were built resulting in a total of 39 storage tanks. Heavy crude oil will be stored in the new tanks. All of the new storage tanks include an internal floating roof with odour abatement equipment (i.e., TVAU or Tank Vapour Adsorption Unit).

The ET is surrounded by industrial emitters such as the Imperial Oil refinery, Enbridge storage and distribution terminal, Suncor Energy refinery and terminal, Celanese Polymers and Keyera Envirofuels. Many of these facilities emit VOCs that contain benzene, xylenes and hydrogen sulphide.

3 MONITORING INSTRUMENTS

The ET AQM station is equipped with air quality and meteorological monitoring instruments shown in Table 1. The ambient air quality and meteorological parameters being monitored are recorded at 1-minute and 60-minute intervals, as per AMD requirement, on a Campbell Scientific CR1000x datalogger. The data is stored on the datalogger but is also pushed to a central database for processing and backup and presented in a web-based platform called Envision for public viewing per CER Condition 79. Data is automatically checked using an automated diagnostic observation tool and by a technician daily to ensure maximum uptime and data quality of the monitored parameters.

Table 1. Air Quality and Meteorological Monitoring Instrumentation

Instrument	Parameters measured	Units
Thermo Sharp 5030i	Particulate Matter$_{2.5}$ ($PM_{2.5}$)	µg/m^3
Thermo 42iQ	Nitrous Oxide/Nitrogen Dioxide/Total Nitrous Oxides ($NO/NO_2/NO_x$)	ppb
Thermo 43iQ	Sulphur Dioxide (SO_2)	ppb
Thermo 49iQ	Ozone (O_3)	ppb
Thermo 43iQTL with CDN101	Total Reduced Sulphur (TRS)	ppb
AMA GC 5000	Benzene, Toluene, Ethylbenzene, Xylene (BTEX)	ppb
Vaisala HC2-S3-L	Relative humidity and air temperature	% and °C
CS 106	Barometric pressure	mb
Ott Pluvio	Precipitation	mm
Nikira OEA	Visibility	Km
Campbell CFCC Field Camera	Visibility	N/A

Per Alberta AMD requirements, the gas analyzers (Thermo 42iQ, 43iQ**,** 43iQTL with CDN101 oxidizer, and 49iQ) are zero and span checked daily using the internal zero (charcoal and/or purafil cartridge) and span (permeation wafer in an internal permeation oven) system, referred to as the IZS system. The AMA GC 5000 is also zero and span checked daily, but with certified standard span gas and a dilution system. Automatic IZS checks are performed daily, and the checks consist 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. The IZS checks are not for calibration purposes but are merely a diagnostic tool to identify instrument drift. Monthly calibration visits are undertaken to perform full range linear calibrations and maintenance for all the analyzers.

3.1 $PM_{2.5}$

The SHARP 5030i 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 level of the air passing through the filter tape.

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 flow calibration.

3.2 NITROGEN OXIDES

The Thermo 42iQ Nitrogen Oxide (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.

3.3 SULPHUR DIOXIDE

The Thermo 43iQ Sulphur Dioxide (SO_2) analyzer is a microprocessor-controlled analyzer that determines the concentration of SO_2 in a sample gas drawn through the instrument. In the sample chamber, sample gas is excited by ultraviolet light causing the SO_2 to absorb energy from the light and move to an active state (SO_2*). These active SO_2* molecules must decay into a stable state back to SO_2, and when this happens a photon of light is released which is recognized by the instrument as fluorescence. The instrument measures the amount of florescence to determine the amount of SO_2 present in the sample gas.

3.4 TOTAL REDUCED SULPHUR

TRS sampling was done using a Thermo 43iQTL trace level continuous SO_2 analyzer in conjunction with an CDN-101 thermal oxidizer convertor (oxidizer). This instrument is a two-fold device. Sample air first passes through sulphur dioxide (SO_2) scrubber beads to eliminate any SO_2 molecules that might be in the sample air stream. Sample air is then passed through a glass tube surrounded by an oven inside of the oxidizer which is continuously heated to 800°C. It is here where any reduced sulfur compounds are converted into SO_2 molecules. The sample air is then directed to the SO_2 analyzer.

The 43iQTL 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 exposed to pulsating ultraviolet light which causes the SO_2 molecules to become excited and enter into a higher energy state.

When the light is shut off during one of the pulse cycles, these excited SO_2 molecules decay into a lower energy state where fluoresced light is emitted proportionally to the SO_2 concentration in the gas stream. This fluorescence is read by a photo-multiplier tube and the instrument reports the concentration of SO_2 in a ratio of 1:1 for TRS.

3.5 OZONE

Sampling for Ozone (O_3) is being completed using a Thermo 49iQ O_3 to provide sensitivity and stability for ambient air quality applications. The instrument determines real-time concentration of O_3 in a sample gas drawn through the instrument. The sample is split into two gas streams using solenoids, one stream is stripped of O_3 by a scrubber to become a reference gas. Each stream is then intermittently stored in two different cells within, which the UV light intensities are measured, and the instrument calculates the O_3 concentrations.

3.6 VISIBILITY

Visibility sampling is being completed using a Nikira Optical Extinction Analyzer (Model NIK-OEA-52001-C01OP). The instrument combines open-path cavity ringdown measurements with a patented self-referencing system to rapidly directly measure the optical extinction coefficient of ambient aerosols. Ambient air is drawn into the cavity at ~1m/s where direct optical extinction coefficient measurement is made. The cavity is closed off to ambient air and purged with filtered air to provide a background measurement to use in a comparison calculation for aerosol optical extinction. A Campbell Scientific CCFC field camera takes photos of the southeast horizon each hour to support the direct measurements from the OEA.

3.7 BTEX

Sampling of Benzene, Toluene, Ethylbenzene, m,p-Xylene and o-Xylene (BTEX) is being completed using an AMA Gas Chromatograph (GC) 5000 BTX fitted with a flame ionization detector (FID). An ambient air sample is drawn into the instrument every 15 min and the gaseous eluent is ignited to produce gas-phase ions of the analytes of interest. These ions are detected by an electrode and the integration of the electrical signal produced is calibrated and used to quantify the concentration of each analyte in the sample. An AMA HG 500 generator uses deionized water and a compressor to generate ultra-high purity Hydrogen (H_2) as a supply gas for the FID flame, and act as a carrier gas for the GC.

3.8 METEOROLOGY

The Edmonton AQM station continuously monitors wind speed (WS) and wind direction (WD) using a 20 m tower mounted R.M. Young 5305-10-L Wind Speed/Wind Direction sensor. Relative humidity and temperature are measured using a Vaisala HC2-S3-L. Air pressure is measured using a Vaisala model CS-106. Precipitation is measured using an Ott Pluvio, a highly sensitive weight-based measurement system that maximizes capture and quantification of snow and rain, with the attachment of a wind shield and antifreeze inside the collection bucket.

4 SUMMARY OF AMBIENT MEASUREMENTS

4.1 $PM_{2.5}$

During the monitoring period from August 5, 2023, to December 31, 2023, the hourly $PM_{2.5}$ data validity was 99.9%. Summary statistics are presented in Appendix Tables A1, A2 and A6. There were 5 events that were over the $PM_{2.5}$ 24-hour AAQO in August and 9 in September. These elevated events were largely attributed to forest fire activity in central and northern Alberta and British Columbia. Appendix B provides the Trans Mountain Air Quality Exceedance Report Notification issued after each event. Following guidance recommended by the Canadian Council of Ministers of the Environment (CCME 2012) on demonstrating the influence of transboundary flows on exceptional events such as exceedances, each date with an exceedance or excursion was checked against records of the Hazard Mapping System (HMS) Fire and Smoke Product website published by the Office of Satellite and Product Operations of the US National Oceanic and Atmospheric Administration (NOAA 2022) to determine whether the station was affected by smoke on that day. Hot summer temperatures and light wind speeds can create stagnant conditions which contribute to these episodes as well. Exceedance reports for each event are attached in Appendix B. No comparison was made to the annual AAQO as the operational data validity for the year was less than 75%. The annual AAQO for future comparison will be based on the Metro Vancouver annual AAQO of 8 $\mu g/m^3$, in the absence of one for Alberta.

4.2 NITROGEN OXIDES

During the monitoring period from August 5, 2023, to December 31, 2023, the hourly NO_x data validity was 99.5%. Summary statistics are presented in Appendix Tables A1, A2 and A6. There were no events over the NO_2 1-hour AAQO during the monitoring period. The highest concentration of NO_x occurred in December of 2023, with NO_2 contributing to >60% of the total NO_x measured. Higher NO_x levels were seen to be more prevalent during winter months due to thermal inversions and lower humidity causing fewer precipitation events. No annual comparison was made to the AAQO as the operational data validity for the year was less than 75%. The annual AAQO for future comparison will be based on the Alberta annual AAQO of 24 ppb.

4.3 SULPHUR DIOXIDE

During the monitoring period from August 5, 2023, to December 31, 2023, the hourly SO_2 data validity was 99.6%. Summary statistics are presented in Appendix Tables A1, A2 and A6. There were no events that were over the SO_2 1-hour, 24-hour, or 30-day AAQO during the monitoring period. The highest maximum 1-hour mean during the monitoring period was on October 23, 2023 with a value of 27.3 ppb, which is <16% of the AAQO (172 ppb). Winter months can have poorer air quality due to thermal inversions and lower humidity causing fewer precipitation events. No annual comparison was made to the AAQO as the operational data validity for the year was less than 75%. The annual AAQO for future comparison will be based on the Alberta annual AAQO of 8 ppb.

4.4 TOTAL REDUCED SULPHUR

During the monitoring period from August 5, 2023, to December 31, 2023, the hourly TRS data validity was 99.6%. Summary statistics are presented in Appendix Tables A1, A2 and A6. There were no events that were over the TRS 1-hour AAQO in the monitoring period. The TRS AAQO being referenced was adopted from Metro Vancouver's guidelines, as there is no Alberta AAQO for TRS. There is no annual AAQO for TRS.

4.5 OZONE

During the monitoring period from August 5, 2023, to December 31, 2023, the hourly O_3 data validity was 99.2%. Summary statistics are presented in Appendix Tables A1, A2 and A6. There were no O_3 events that were over the daily 1-hour daily maximum or daily 8-hour maximum AAQO during the monitoring period. There is no annual AAQO for O_3. There is no O_3 emitted from operations at the ET ; however, ozone forms in the atmosphere as a secondary pollutant typically under hot, stagnant air summertime conditions.

4.6 VISIBILITY

During the monitoring period from August 5, 2023, to December 31, 2023, the hourly visibility data validity was 85.5%. Summary statistics are presented in Appendix Table A5. The Nikira Optical Extinction Analyzer was swapped out in November due to soiling of the internal mirrors, and this resulted in a lower data validity for November. The minimum 1-hour mean value was measured in September of 2023 (2.5 km). This was the month with the most elevated $PM_{2.5}$ readings, indicating that wide-spread fire smoke was the likely cause of the poor visibility. Pictures are also taken by a camera every hour onsite and are available upon request. There are no AAQO or criteria in Alberta for reduced visibility.

4.7 BTEX

During the monitoring period from August 5, 2023, to December 31, 2023, the hourly BTEX data validity was 92.1%. Summary statistics are presented in Appendix Tables A3, A4 and A6. No annual comparison was made to the AAQO for benzene as the operational data validity for the year was less than 75%. The annual AAQO for future comparison will be based on the Alberta annual AAQO for benzene of 0.9 ppb. There are no annual AAQOs for toluene, ethylbenzene, or xylene.

4.8 METEOROLOGY

During the monitoring period from August 5, 2023, to December 31, 2023, the hourly meteorological data validity was above 99%. Summary statistics are presented in Appendix Tables A7 and A8.

5 Discussion

Data validity for all parameters was in the statistically significant acceptable range of >75% for the monitoring period; however, due to the change from baseline to operational monitoring, the year did not have >75% data validity for the operational period. Wherever possible, ET AQM station data comparisons were made with the near-by Edmonton East AEPA station in the data QA/QC. All comparable data over this monitoring period showed a close agreement in measurement.

Forest fire smoke experienced across the region were determined to be the main cause of most of the events over the AAQOs for $PM_{2.5}$ and not related to ET operations. Values outside of these events were determined to be low when compared to the available AAQOs.

6 REFERENCE

Canadian Council of Ministers of the Environment, 2012. Guidance Document on Achievement Determination Canadian Ambient Air Quality Standards for Fine Particulate Matter and Ozone. Downloaded from: https://ccme.ca/en/res /pn1483_ gdad_engsecured.pdf.

National Oceanic and Atmospheric Administration, 2023. Hazard Mapping System Fire and Smoke Product: Fire Data Search and Retrieval. Downloaded from: https://www.ospo.noaa.gov/Products/land/hms.html. Accessed February 2023.

7 GENERAL STATEMENT OF LIMITATIONS

This report entitled Edmonton Terminal Annual Air Quality and Meteorological Monitoring Report was prepared by RWDI AIR Inc. (“RWDI”) for Trans Mountain (“Client”). The findings and conclusions presented in this report have been prepared for Trans Mountain and are specific to the project described herein (“Project”). This report was prepared using scientific principles, published methodologies and professional judgment in assessing available information and data. The findings presented within this document are based on available data within the limits of the existing information, budgeted scope of work, and schedule. The conclusions contained in this report are based on the information available to RWDI when this report was prepared; subsequent changes made by the Client after the date of this report have not been reflected in the conclusions.

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

8 CLOSING

If you have any questions with respect to this report or any other aspect of our services, please do not hesitate to contact the undersigned directly.

Yours very truly,

RWDI

Candace Bell, M.Sc., PMP
Senior Project Manager

APPENDIX A

Table A1. Trans Mountain Edmonton Maximum 1-hour and Maximum 24-hour Summary Statistics

Edmonton Station 2023 Data Statistics	Maximum 1-hr Mean							Maximum 24-hr Mean						
Compound	$PM_{2.5}$	NO_x	NO	NO_2	SO_2	TRS	O_3	$PM_{2.5}$	NO_x	NO	NO_2	SO_2	TRS	O_3
Units	µg/m³	ppb						µg/m³	ppb					
AAQO				159	172	10[1]	76	29						
August 5-31	104.5	74.0	41.3	37.6	18.0	5.0	69.4	**45.3**	23.0	6.2	16.8	4.1	1.0	41.6
September	182.2	129.0	97.8	35.9	21.7	5.5	56.9	**124.3**	41.6	21.1	20.5	3.3	1.3	41.6
October	92.5	97.9	68.5	30.2	27.3	3.1	42.6	11.7	27.6	12.2	15.5	4.8	0.8	29.5
November	24.7	129.4	95.8	41.2	24.6	1.7	41.1	15.2	39.6	17.0	24.7	6.3	0.4	28.2
December	24.4	131.7	93.9	38.4	20.5	1.6	38.8	12.0	61.8	35.8	26.4	4.0	0.5	28.6

Note: Alberta AAQO's referenced unless noted otherwise

Indicates an exceedance of the AAQO

[1] TRS AAQO adopted from Metro Vancouver 1-hour acceptable AAQO

Operational period data collected between August 5, 2023, and December 31, 2023.

Table A2. Trans Mountain Edmonton Monthly Mean and Valid Data Summary Statistics

Edmonton Station 2023 Data Statistics	Period Mean							Valid Data						
Compound	$PM_{2.5}$	NO_x	NO	NO_2	SO_2	TRS	O_3	$PM_{2.5}$	NO_x	NO	NO_2	SO_2	TRS	O_3
Units	$\mu g/m^3$	ppb						% (hourly)						
AAQO														
August 5-31	17.6	9.1	2.1	7.0	1.1	0.3	27.4	96.0	98.9	98.9	98.9	99.2	99.5	98.8
September	26.8	14.2	4.7	9.5	0.9	0.6	24.8	99.9	99.6	99.6	99.6	99.6	99.6	99.6
October	6.5	13.6	4.2	9.4	0.6	0.4	20.1	99.9	99.6	99.6	99.6	99.6	99.6	98.7
November	7.2	22.7	8.0	14.7	1.2	0.1	14.9	99.7	99.6	99.6	99.6	99.7	99.6	99.6
December	5.4	25.3	9.7	15.6	0.9	0.1	15.6	99.9	99.6	99.6	99.6	99.6	99.7	99.5
August 5 – December 31	12.7	17.0	5.7	11.2	0.9	0.3	20.6	99.9	99.5	99.5	99.5	99.6	99.6	99.2
January 1 - December 31	NA	NA	NA	NA	NA	NA	NA	40.8	40.6	40.6	40.6	40.6	40.7	40.5

Notes:

Operational period data collected between August 5, 2023, and December 31, 2023.

NA: Not available-indicates <75% data availability.

Table A3. Trans Mountain Edmonton Maximum 1-hour and Maximum 24-hour BTEX Summary Statistics

Edmonton Station 2023 Data Statistics	Maximum 1-hr Mean				Maximum 24-hr Mean			
Compound	Benzene	Toluene	Ethylbenzene	Xylenes	Benzene	Toluene	Ethylbenzene	Xylenes
Units	ppb				ppb			
AAQO	9	499	460	530		106		161
August 5-31	4.2	9.3	2.5	5.6	1.1	1.9	0.5	1.9
September	1.8	5.4	1.7	5.7	1.0	1.8	1.2	2.0
October	1.4	11.9	1.4	5.8	0.3	2.7	0.4	1.4
November	0.7	3.9	0.6	2.4	0.3	1.3	0.2	0.7
December	1.5	3.7	0.6	1.9	0.4	1.4	0.2	0.9

Notes:

No AAQO available

Operational period data collected between August 5, 2023, and December 31, 2023.

Table A4. Trans Mountain Edmonton Monthly Mean and Valid Data BTEX Summary Statistics

Edmonton Station 2023 Data Statistics	Period Mean				Valid Data			
Compound	Benzene	Toluene	Ethylbenzene	Xylene	Benzene	Toluene	Ethylbenzene	Xylene
Units	ppb				% (hourly)			
August 5-31	0.4	1.0	0.3	1.1	91.5	91.5	91.5	91.5
September	0.4	1.0	0.7	1.2	91.1	91.1	91.1	91.1
October	0.2	0.7	0.1	0.4	93.4	88.8	88.8	88.8
November	0.2	0.6	0.1	0.3	90.3	93.1	93.1	93.1
December	0.2	0.6	0.1	0.4	94.0	94.0	94.0	94.0
August 5 – December 31	0.3	0.8	0.3	0.7	92.1	92.1	92.1	92.1
January 1 - December 31	NA	NA	NA	NA	37.6	37.6	37.6	37.6

Notes:

Operational period data collected between August 5, 2023, and December 31, 2023.

NA: Not available-indicates <75% data availability.

Table A5. Trans Mountain Edmonton Maximum 1 hour, Maximum 24-hour, Monthly Mean and Valid Data Visibility Summary Statistics

Edmonton Station 2023 Data Statistics	Minimum 1-hr Mean	Period Mean	Valid Data
Compound	Visibility	Visibility	Visibility
Units	Km	Km	%
August 5-31	4.6	175.7	100.0
September	2.5	70.4	100.0
October	25.3	157.1	100.0
November	N/A	N/A	28.1
December	25.1	87.3	100.0
August 5 – 31 December	2.5	115.9	85.5
January 1 – December 31	NA	NA	34.9

Notes:

Operational period data collected between August 5, 2023, and December 31, 2023.

NA: Not available-indicates <75% data availability.

Table A6. Trans Mountain Edmonton 1-hour, 24-hour and Annual Average AAQO exceedances

2023 Event Statistics	1-hr average > AAQO								24-hr average > AAQO			Annual average > AAQO			
Compound	NO_2	SO_2	TRS	O_3	B	T	E	X	$PM_{2.5}$	T	X	NO_2	SO_2	B	$PM_{2.5}$
AAQO	159	172	10[1]	76[2]	9	499	460	530	29	106	161	24	8	0.9	8[3]
	ppb								µg/m³	ppb		ppb			µg/m³
Units	No. > AAQO								No. > AAQO			No. > AAQO			
August 5-31	0	0	0	0	0	0	0	0	**5**	0	0				
September	0	0	0	0	0	0	0	0	**9**	0	0				
October	0	0	0	0	0	0	0	0	0	0	0				
November	0	0	0	0	0	0	0	0	0	0	0				
December	0	0	0	0	0	0	0	0	0	0	0				
August 5 – December 31	0	0	0	0	0	0	0	0	14	0	0				
January 1 – December 31	0	0	0	0	0	0	0	0	14	0	0	NA	NA	NA	NA

Notes:

[1] TRS AAQO adopted from Metro Vancouver 1-hour acceptable AAQO.

[2] Averaging period: 1-hour daily maximum

[3] $PM_{2.5}$ annual AAQO adopted from British Columbia Provincial limits.

Bold text indicates events that exceed the AAQO.

Operational period data collected between August 5, 2023, and December 31, 2023.

NA: Not available-indicates <75% data availability.

Table A7. Trans Mountain Edmonton Maximum 1-hour and Maximum 24-hour Meteorological Summary Statistics

2023 MET Statistics	Maximum 1-hr Mean					Minimum 1-hr Mean				
Parameter	WS	Temp	RH	Pres	Precip	WS	Temp	RH	Pres	Precip
Units	m/s	°C	%	mb	mm	m/s	°C	%	mb	mm
August 5-31	8.8	31.7	100.0	1026.0	9.2	0.5	8.8	25.5	1001.1	0.0
September	9.0	25.3	100.0	1026.0	2.6	0.2	1.6	24.0	1003.0	0.0
October	8.9	24.2	98.1	1031.0	0.8	0.2	-8.5	23.0	996.6	0.0
November	8.5	14.5	100.0	1029.0	0.2	0.3	-8.7	25.6	994.0	0.0
December	8.4	12.1	100.0	1025.1	0.9	0.4	-9.6	20.6	993.5	0.0

Notes:

Operational period data collected between August 5, 2023, and December 31, 2023.

Table A8. Trans Mountain Edmonton Monthly Mean and Valid Data Meteorological Summary Statistics

2023 MET Statistics	Period Mean				Total	Valid Data					
Parameter	WS	Temp	RH	Pres	Precip	WS	WD	Temp	RH	Pres	Precip
Units	m/s	°C	%	mb	mm	(%)					
August 5-31	3.3	18.6	67.7	1015.4	67.6	100.0	100.0	100.0	100.0	99.7	100.0
September	3.4	14.6	59.7	1014.0	12.0	100.0	100.0	100.0	100.0	100.0	100.0
October	3.6	6.6	62.5	1016.4	3.9	96.8	96.8	96.8	96.8	96.8	100.0
November	3.3	1.5	64.7	1012.1	0.4	100.0	100.0	100.0	100.0	100.0	100.0
December	3.3	-0.5	65.9	1011.0	4.7	99.5	99.5	100.0	100.0	100.0	100.0
August 5 – December 31	3.4	8.2	64.1	1013.8	17.7	99.9	99.9	100.0	100.0	99.9	100.0
January 1 – December 31	NA	NA	NA	NA	40.8	40.8	40.8	40.8	40.8	40.8	40.8

Notes:

Operational period data collected between August 5, 2023, and December 31, 2023.

NA: Not available-indicates <75% data availability.

APPENDIX B

Trans Mountain Air Quality Exceedance Report Notification

Reporting Date	August 25, 2023
Station Name	Edmonton
Station Location	Edmonton, AB
Reported By	Tom Bourque
QA/QC	Victoria Latam
Exceedance Details	
Exceedance Interval	24-hour
Exceedance Date	August 24, 2023
Hour Start (MST)	0:00
Hour Stop (MST)	23:00
Parameter	$PM_{2.5}$
Wind Speed (m/s)	2.9
Wind Direction (deg)	308
24-hour Average ($\mu g/m^3$)	41.0
Alberta AAQO ($\mu g/m^3$)	29.0

Exceedance Details (RWDI)

Air quality in the City of Edmonton was poor for on August 24th. Environment and Climate Change Canada (ECCC) issued air quality advisories based on Air Quality Health Index (AQHI) readings that reached values ranging from 2 to 7 on August 24th. (low to high risk). It is very likely that the source of the elevated AQHI values was forest fire smoke from active fires in BC, Northern Alberta and Southern North West Territories.

Onsite Details During Exceedance (Trans Mountain)

Trans Mountain Air Quality Exceedance Report Notification

Reporting Date	August 28, 2023
Station Name	Edmonton
Station Location	Edmonton, AB
Reported By	Tom Bourque
QA/QC	Matt Agombar
Exceedance Details	
Exceedance Interval	24-hour
Exceedance Date	August 25, 2023
Hour Start (MST)	0:00
Hour Stop (MST)	23:00
Parameter	$PM_{2.5}$
Wind Speed (m/s)	3.5
Wind Direction (deg)	165
24-hour Average ($\mu g/m^3$)	45.3
Alberta AAQO ($\mu g/m^3$)	29.0

Exceedance Details (RWDI)

Air quality in the City of Edmonton was poor for on beginning on August 24th. Environment and Climate Change Canada (ECCC) issued air quality advisories based on Air Quality Health Index (AQHI) readings that reached values ranging from 2 to 7 on August 24th and 25th (low to high risk). It is very likely that the source of the elevated AQHI values was forest fire smoke from active fires in BC, Northern Alberta and Southern North West Territories.

Onsite Details During Exceedance (Trans Mountain)

Trans Mountain Air Quality Exceedance Report Notification

Reporting Date	August 28, 2023
Station Name	Edmonton
Station Location	Edmonton, AB
Reported By	Tom Bourque
QA/QC	Matt Agombar
Exceedance Details	
Exceedance Interval	24-hour
Exceedance Date	August 27, 2023
Hour Start (MST)	0:00
Hour Stop (MST)	23:00
Parameter	$PM_{2.5}$
Wind Speed (m/s)	2.1
Wind Direction (deg)	238
24-hour Average ($\mu g/m^3$)	35.0
Alberta AAQO ($\mu g/m^3$)	29.0

Exceedance Details (RWDI)

Air quality in the City of Edmonton was poor on August 27th. Environment and Climate Change Canada (ECCC) issued air quality advisories based on Air Quality Health Index (AQHI) readings that reached values ranging from 4 to 5 on August 27th (low to high risk). It is very likely that the source of the elevated AQHI values was forest fire smoke from active fires in BC, Northern Alberta and Southern North West Territories.

Onsite Details During Exceedance (Trans Mountain)

Trans Mountain Air Quality Exceedance Report Notification

Reporting Date	August 29, 2023
Station Name	Edmonton
Station Location	Edmonton, AB
Reported By	Tom Bourque
QA/QC	Matt Agombar
Exceedance Details	
Exceedance Interval	24-hour
Exceedance Date	August 28, 2023
Hour Start (MST)	0:00
Hour Stop (MST)	23:00
Parameter	$PM_{2.5}$
Wind Speed (m/s)	2.5
Wind Direction (deg)	213
24-hour Average ($\mu g/m^3$)	37.7
Alberta AAQO ($\mu g/m^3$)	29.0

Exceedance Details (RWDI)

Air quality in the City of Edmonton was poor on August 28th. Environment and Climate Change Canada (ECCC) issued air quality advisories based on Air Quality Health Index (AQHI) readings that reached values ranging from 4 to 7 on August 28th (moderate to high risk). It is very likely that the source of the elevated AQHI values was forest fire smoke from active fires in BC, Northern Alberta and Southern North West Territories.

Onsite Details During Exceedance (Trans Mountain)

Trans Mountain Air Quality Exceedance Report Notification

Reporting Date	September 5, 2023
Station Name	Edmonton
Station Location	Edmonton, AB
Reported By	Tom Bourque
QA/QC	Victoria Latam
Exceedance Details	
Exceedance Interval	24-hour
Exceedance Date	August 31, 2023
Hour Start (MST)	0:00
Hour Stop (MST)	23:00
Parameter	$PM_{2.5}$
Wind Speed (m/s)	3.4
Wind Direction (deg)	303.0
24-hour Average ($\mu g/m^3$)	33.4
Alberta AAQO ($\mu g/m^3$)	29.0

Exceedance Details (RWDI)

Air quality in the City of Edmonton was poor on August 31th. Environment and Climate Change Canada (ECCC) issued air quality advisories based on Air Quality Health Index (AQHI) readings that ranged from 3 to 9 (low to high risk). It is very likely that the source of the elevated AQHI values was forest fire smoke from active fires in BC, Northern Alberta and Southern North West Territories.

Onsite Details During Exceedance (Trans Mountain)

Trans Mountain Air Quality Exceedance Report Notification

Reporting Date	September 5, 2023
Station Name	Edmonton
Station Location	Edmonton, AB
Reported By	Tom Bourque
QA/QC	Victoria Latam
Exceedance Details	
Exceedance Interval	24-hour
Exceedance Date	September 1, 2023
Hour Start (MST)	0:00
Hour Stop (MST)	23:00
Parameter	$PM_{2.5}$
Wind Speed (m/s)	4.1
Wind Direction (deg)	240
24-hour Average ($\mu g/m^3$)	52.4
Alberta AAQO ($\mu g/m^3$)	29.0

Exceedance Details (RWDI)

Air quality in the City of Edmonton was poor on September 1st. Environment and Climate Change Canada (ECCC) issued air quality advisories based on Air Quality Health Index (AQHI) readings that ranged from 4 to 7 (moderate to high risk). It is very likely that the source of the elevated AQHI values was forest fire smoke from active fires in BC, Northern Alberta and Southern North West Territories.

Onsite Details During Exceedance (Trans Mountain)

Trans Mountain Air Quality Exceedance Report Notification

Reporting Date	September 5, 2023
Station Name	Edmonton
Station Location	Edmonton, AB
Reported By	Tom Bourque
QA/QC	Victoria Latam
Exceedance Details	
Exceedance Interval	24-hour
Exceedance Date	September 2, 2023
Hour Start (MST)	0:00
Hour Stop (MST)	23:00
Parameter	$PM_{2.5}$
Wind Speed (m/s)	3.6
Wind Direction (deg)	233
24-hour Average ($\mu g/m^3$)	68.7
Alberta AAQO ($\mu g/m^3$)	29.0

Exceedance Details (RWDI)

Air quality in the City of Edmonton was poor on September 2nd. Environment and Climate Change Canada (ECCC) issued air quality advisories based on Air Quality Health Index (AQHI) readings that ranged from 3 to 10+ (low to very high risk). It is very likely that the source of the elevated AQHI values was forest fire smoke from active fires in BC, Northern Alberta and Southern North West Territories.

Onsite Details During Exceedance (Trans Mountain)

Trans Mountain Air Quality Exceedance Report Notification

Reporting Date	September 5, 2023
Station Name	Edmonton
Station Location	Edmonton, AB
Reported By	Tom Bourque
QA/QC	Victoria Latam
Exceedance Details	
Exceedance Interval	24-hour
Exceedance Date	September 3, 2023
Hour Start (MST)	0:00
Hour Stop (MST)	23:00
Parameter	$PM_{2.5}$
Wind Speed (m/s)	2.6
Wind Direction (deg)	209
24-hour Average (µg/m^3)	124.3
Alberta AAQO (µg/m^3)	29.0

Exceedance Details (RWDI)

Air quality in the City of Edmonton was poor on September 3rd. Environment and Climate Change Canada (ECCC) issued air quality advisories based on Air Quality Health Index (AQHI) readings that ranged from 8 to 10+ (high to very high risk). It is very likely that the source of the elevated AQHI values was forest fire smoke from active fires in BC, Northern Alberta and Southern North West Territories.

Onsite Details During Exceedance (Trans Mountain)

Trans Mountain Air Quality Exceedance Report Notification

Reporting Date	September 5, 2023
Station Name	Edmonton
Station Location	Edmonton, AB
Reported By	Tom Bourque
QA/QC	Victoria Latam
Exceedance Details	
Exceedance Interval	24-hour
Exceedance Date	September 4, 2023
Hour Start (MST)	0:00
Hour Stop (MST)	23:00
Parameter	$PM_{2.5}$
Wind Speed (m/s)	2.6
Wind Direction (deg)	278
24-hour Average ($\mu g/m^3$)	60.2
Alberta AAQO ($\mu g/m^3$)	29.0

Exceedance Details (RWDI)

Air quality in the City of Edmonton was poor on September 4th. Environment and Climate Change Canada (ECCC) issued air quality advisories based on Air Quality Health Index (AQHI) readings that ranged from 2 to 10+ on September 4th (low to very high risk). It is very likely that the source of the elevated AQHI values was forest fire smoke from active fires in BC, Northern Alberta and Southern North West Territories.

Onsite Details During Exceedance (Trans Mountain)

Trans Mountain Air Quality Exceedance Report Notification

Reporting Date	September 6, 2023
Station Name	Edmonton
Station Location	Edmonton, AB
Reported By	Tom Bourque
QA/QC	Victoria Latam
Exceedance Details	
Exceedance Interval	24-hour
Exceedance Date	September 5, 2023
Hour Start (MST)	0:00
Hour Stop (MST)	23:00
Parameter	$PM_{2.5}$
Wind Speed (m/s)	4.4
Wind Direction (deg)	150
24-hour Average ($\mu g/m^3$)	38.5
Alberta AAQO ($\mu g/m^3$)	29.0

Exceedance Details (RWDI)

Air quality in the City of Edmonton was poor on September 5th. Environment and Climate Change Canada (ECCC) issued air quality advisories based on Air Quality Health Index (AQHI) readings that ranged from 2 to 7 on September 5th (low to high risk). It is very likely that the source of the elevated AQHI values was forest fire smoke from active fires in BC, Northern Alberta and Southern North West Territories.

Onsite Details During Exceedance (Trans Mountain)

Trans Mountain Air Quality Exceedance Report Notification

Reporting Date	September 8, 2023
Station Name	Edmonton
Station Location	Edmonton, AB
Reported By	Tom Bourque
QA/QC	Victoria Latam
Exceedance Details	
Exceedance Interval	24-hour
Exceedance Date	September 6, 2023
Hour Start (MST)	0:00
Hour Stop (MST)	23:00
Parameter	$PM_{2.5}$
Wind Speed (m/s)	2.1
Wind Direction (deg)	192
24-hour Average ($\mu g/m^3$)	36.5
Alberta AAQO ($\mu g/m^3$)	29.0

Exceedance Details (RWDI)

Air quality in the City of Edmonton was poor on September 6th. The Alberta Government reported Air Quality Health Index (AQHI) readings that ranged from 4 to 7 (moderate to high risk). The AQHI ranges between 1-10 and is a tool to help the general public understand local air quality health risks and appropriate precautions. It is very likely that the source of the elevated AQHI values was forest fire smoke from active fires in BC, Northern Alberta and Southern North West Territories.

Onsite Details During Exceedance (Trans Mountain)

Trans Mountain Air Quality Exceedance Report Notification

Reporting Date	September 18, 2023
Station Name	Edmonton
Station Location	Edmonton, AB
Reported By	Tom Bourque
QA/QC	Victoria Latam
Exceedance Details	
Exceedance Interval	24-hour
Exceedance Date	September 16, 2023
Hour Start (MST)	0:00
Hour Stop (MST)	23:00
Parameter	$PM_{2.5}$
Wind Speed (m/s)	2.9
Wind Direction (deg)	153
24-hour Average ($\mu g/m^3$)	53.1
Alberta AAQO ($\mu g/m^3$)	29.0

Exceedance Details (RWDI)

Air quality in the City of Edmonton was poor on September 16th. The Alberta Government reported Air Quality Health Index (AQHI) readings that ranged from 3 to 10+ (low to high risk). The AQHI ranges between 1-10 and is a tool to help the general public understand local air quality health risks and appropriate precautions. It is very likely that the source of the elevated AQHI values was forest fire smoke from active fires in BC, Northern Alberta and Southern North West Territories.

Onsite Details During Exceedance (Trans Mountain)

Trans Mountain Air Quality Exceedance Report Notification

Reporting Date	September 18, 2023
Station Name	Edmonton
Station Location	Edmonton, AB
Reported By	Tom Bourque
QA/QC	Victoria Latam
Exceedance Details	
Exceedance Interval	24-hour
Exceedance Date	September 17, 2023
Hour Start (MST)	0:00
Hour Stop (MST)	23:00
Parameter	$PM_{2.5}$
Wind Speed (m/s)	2.9
Wind Direction (deg)	195
24-hour Average ($\mu g/m^3$)	73.3
Alberta AAQO ($\mu g/m^3$)	29.0

Exceedance Details (RWDI)

Air quality in the City of Edmonton was poor on September 17th. The Alberta Government reported Air Quality Health Index (AQHI) readings that ranged from 3 to 10+ (low to high risk). The AQHI ranges between 1-10 and is a tool to help the general public understand local air quality health risks and appropriate precautions. It is very likely that the source of the elevated AQHI values was forest fire smoke from active fires in BC, Northern Alberta and Southern North West Territories.

Onsite Details During Exceedance (Trans Mountain)

Trans Mountain Air Quality Exceedance Report Notification

Reporting Date	September 20, 2023
Station Name	Edmonton
Station Location	Edmonton, AB
Reported By	Tom Bourque
QA/QC	Victoria Latam
Exceedance Details	
Exceedance Interval	24-hour
Exceedance Date	September 18, 2023
Hour Start (MST)	0:00
Hour Stop (MST)	23:00
Parameter	$PM_{2.5}$
Wind Speed (m/s)	3.9
Wind Direction (deg)	258
24-hour Average ($\mu g/m^3$)	42.6
Alberta AAQO ($\mu g/m^3$)	29.0

Exceedance Details (RWDI)

Air quality in the City of Edmonton was poor on September 18th. The Alberta Government reported Air Quality Health Index (AQHI) readings that ranged from 2 to 10+ (low to high risk). The AQHI ranges between 1-10 and is a tool to help the general public understand local air quality health risks and appropriate precautions. It is very likely that the source of the elevated AQHI values was forest fire smoke from active fires in BC, Northern Alberta and Southern North West Territories.

Onsite Details During Exceedance (Trans Mountain)