

TRANS MOUNTAIN PIPELINE SUMAS TERMINAL

ABBOTSFORD, BRITISH COLUMBIA

2024 ANNUAL AIR QUALITY AND METEOROLOGICAL
MONITORING REPORT

RWDI #2105728

March 25, 2025

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1 SUMMARY

This report summarizes ambient air measurements made at the Trans Mountain Sumas Terminal (ST) Air Quality Monitoring (AQM) station during the operational period from May 1, 2024 to December 31, 2024. This time period follows a baseline survey that occurred from December 22, 2023 to April 30, 2024. This monitoring program addresses the requirements of the Canada Energy Regulator (CER) Condition 79 for the Trans Mountain Expansion Project (TMEP or Project).

The objective of the ST AQM program during the operational period, after the commissioning of the new tank built for the Project, was to monitor the ambient air quality in the vicinity of ST and compare the results to the applicable Ambient Air Quality Objectives (AAQOs). The ST AQM station is located near Abbotsford, so the ambient measurements were compared to the British Columbia (BC) AAQOs and supplemented with values from Alberta where none exist in BC. The monitoring methods follow the Air Emissions Management Plan for the Sumas and Burnaby Terminals (Trans Mountain 2017, CER Condition 79, Filing ID [A84102](#), Approval [A85838](#)) and the Ambient Air Quality Monitoring Plan (AQMP) for the Westridge Marine Terminal, Burnaby Terminal, and Sumas Terminal (Trans Mountain 2020).

The ST AQM station continuously monitors the following air quality parameters: particulate matter less than 2.5 microns (PM_{2.5}), nitrogen oxides (NO_x, NO, NO₂), sulphur dioxide (SO₂), total reduced sulphurs (TRS), ozone (O₃), black carbon (BC), visibility, benzene, toluene, ethylbenzene, and xylene (BTEX). The ST AQM station also continuously monitors the following meteorological parameters: wind speed, wind direction, ambient temperature, relative humidity, barometric pressure, and precipitation. Data validity for all parameters was in the acceptable range of greater than 75% (CCME 2019) for the monitoring period.

Throughout the operational monitoring period from May 1, 2024, to December 31, 2024, there was one (1) exceedance of the AAQOs reported. The O₃ value of 84 ppb was higher than the 82 ppb AAQO for one hour on July 8, 2024. The exceedance was attributed to elevated ground level ozone throughout the Lower Mainland. Metro Vancouver issued an air quality advisory for the region.

The operational values were comparable to the baseline values with differences generally being less than the accuracy and precision of the instruments. Overall, monitoring indicates ST operations are not likely having an adverse impact on local ambient air quality.

No comparison to the annual AAQOs can be made as the operational reporting period covers less than 75% of the 2024 year. Monitored data will be compared against the annual AAQOs in 2025 and onwards.



2 BACKGROUND

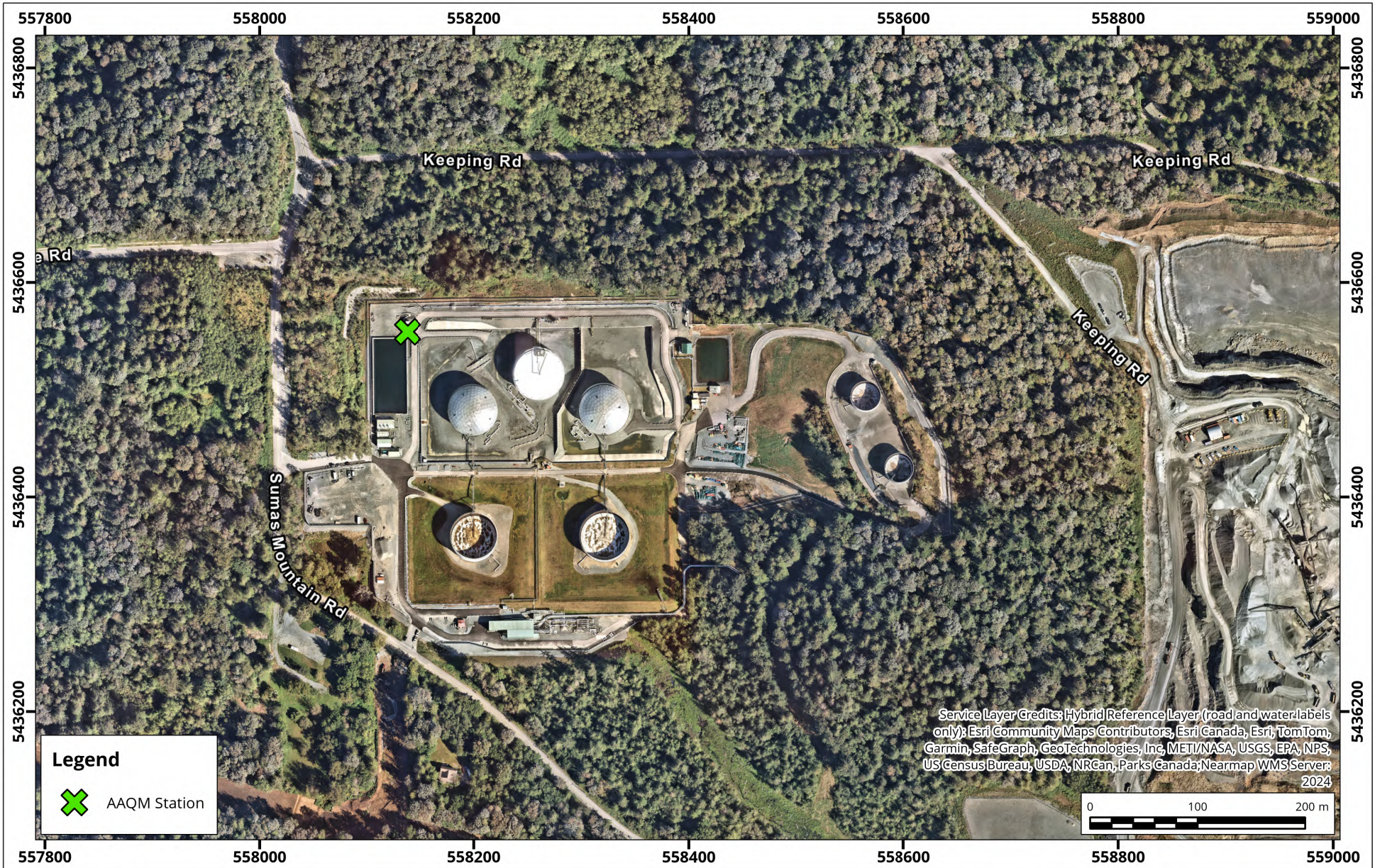
2.1 Geographical Area

The location of the ST AQM station is shown in **Figure 1**. The ST AQM station is in the northwest corner of the ST at 36969 Keeping Rd, Abbotsford, located within a depression in the upper section of Sumas Mountain. The surrounding land use around ST is a mixture of forest, residential and quarry areas. Mature trees directly surround the property. To the north and west is a mix of rural properties and subdivisions, and forested lands. There are two quarries and aggregate suppliers located to the south and southeast.

2.2 Air Emission Sources

The ST is a storage facility located along the Trans Mountain Pipeline System within the Lower Mainland. The existing emission sources at ST include VOCs from four storage tanks and routine engine testing of the emergency generators and diesel fire water pumps. For the Trans Mountain Expansion Project, one additional tank was added.

The two quarry and aggregate suppliers to the south and southeast are expected to be emission sources of particulate matter.



Air Quality Monitoring Station Location Sumas Terminal

Map Projection: NAD 1983 UTM Zone 10N
Trans Mountain Pipeline - Abbotsford, B.C.



Drawn by: PIP Figure: 1

Approx. Scale: 1:5,000

Date Revised: Feb 26, 2025

Project #: 2105728





3 MONITORING INSTRUMENTS

The ST 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 British Columbia Field Sampling Manual’s 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. Data is automatically checked using an automated diagnostic observation tool called HORNET and by a technician daily to ensure maximum uptime and data quality of the monitoring parameters. As required by CER Condition 79, the hourly raw data is also publicly available on the Envision data platform and accessible through the Trans Mountain website.

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 42iQTL	Nitrous Oxide/Nitrogen Dioxide/Total Nitrogen Oxides (NO/NO ₂ /NO _x)	ppb
Thermo 43iQTL	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
Nikira OEA	Visibility	km
CSCC Field Camera	Visibility	N/A
Magee AE-33 Aethalometer	Black Carbon (BC)	ng/m ³
R.M. Young 5305-10-L	Wind speed and wind direction	m/s and Degrees
Ott Pluvio	Precipitation	mm
Vaisala HC2-S3-L	Relative humidity and air temperature	% and °C
CS 106	Barometric pressure	mb

The gas analyzers (Thermo 43iQTL, 43iQTL with CDN101, 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 and Thermo 42iQTL are 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 zero and span check followed by a purge over a 30 min time period. These checks provide

a way to monitor daily performance of the analyzer. The IZS checks are not for calibration purposes but are 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 of the air passing through the filter tape constant.

The SHARP 5030i monitor is calibrated once a month to ensure accuracy and validity of its data. The PM_{2.5} inlet head and sharp cut cyclone are located on the roof of the AQM building. The inlet and cyclone are cleaned routinely to ensure 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. Instrument mass foil checks are performed quarterly or if diagnostics indicate a requirement to do so in accordance with the BCFM (Section 10 of SOP-05b).

3.2 NITROGEN OXIDES

The Thermo 42iQTL trace level Nitrogen Oxide (NO_x) analyzer uses chemiluminescence detection, coupled with microprocessor technology to provide sensitivity and stability for ambient air quality applications. The instrument determines real-time concentration of nitric oxide (NO), total nitrogen oxides (NO_x) (the sum of NO and NO₂), and nitrogen dioxide (NO₂). The amount of NO is measured by detecting the chemiluminescence reaction that occurs in the reaction cell when NO molecules are exposed to ozone (O₃). The NO and O₃ 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+NO₂) measurement, sample gas is periodically bypassed through a heated molybdenum converter cartridge that converts any NO₂ 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 NO₂, producing a NO_x measurement. The resultant NO₂ determination is the NO_x measurement subtracted from the NO measurement.

3.3 SULPHUR DIOXIDE

The Thermo 43iQTL trace level Sulphur Dioxide (SO₂) Analyzer is a microprocessor-controlled analyzer that determines the concentration of SO₂ in a sample gas drawn through the instrument. In the sample chamber, sample gas is excited by ultraviolet light causing the SO₂ to absorb energy from the light and move to an active state (SO₂*). These active SO₂* molecules must decay into a stable state back to SO₂, and when this happens a photon of light is released which is recognized by the instrument as fluorescence. The instrument measures the amount of fluorescence to determine the amount of SO₂ present in the sample gas.

3.4 OZONE

Monitoring for Ozone (O₃) is conducted using a Thermo 49iQ analyzer to provide sensitivity and stability for ambient air quality applications. The instrument determines real-time concentration of O₃ in a sample gas drawn through the instrument. The sample is split into two gas streams using solenoids, one stream is stripped of O₃ 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 O₃ concentrations.

3.5 TOTAL REDUCED SULPHUR

TRS monitoring uses a Thermo 43iQTL Trace level continuous SO₂ analyzer in conjunction with an CDN-101 thermal oxidizer convertor (oxidizer). This instrument is a two-fold device. Sample air first passes through SO₂ scrubber beads to eliminate any SO₂ 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 and any reduced sulphur compounds are converted into SO₂ molecules. The sample air is then directed to the SO₂ analyzer.

The 43iQTL is a microprocessor-controlled analyzer that determines the concentration of SO₂ in a sample gas drawn through the instrument. In the sample chamber, sample gas is exposed to pulsating ultraviolet light which causes the SO₂ 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 SO₂ molecules decay into a lower energy state where fluoresced light is emitted proportionally to the SO₂ concentration in the gas stream. This fluorescence is read by a photo-multiplier tube and the instrument reports the concentration of SO₂ in a ratio of 1:1 for TRS.

3.6 BTEX

Monitoring of benzene, toluene, ethylbenzene, m, p-xylenes 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 ultra-high



purity generator uses deionized water and compressor to generate ultra-high purity Hydrogen (H₂) as a supply gas for the FID flame and act as a carrier gas for the GC.

3.7 VISIBILITY

Visibility monitoring is conducted 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 measure the optical extinction coefficient of ambient aerosols. Ambient air is drawn into the cavity at ~1 m/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 CFCC field camera takes photographs of the horizon each hour of the day so the OEA visibility readings can be confirmed by visual records.

3.8 BLACK CARBON

Black carbon (BC) is measured using a Magee Model AE33 Aethalometer which collects aerosol particles continuously by drawing the aerosol laden air stream through a spot on a filter tape. The aerosols are analyzed by the transmission of light through one portion of the filter tape containing the sample compared to an unloaded portion of the filter tape. This analysis is done on 7 wavelengths spanning near infra-red to near ultraviolet. The aethalometer calculates the concentrations of optically absorbing aerosols from the rate of attenuation of light transmitted through the filter. The results of the two sample spots are combined to determine the BC mass concentration. Each month the readings are validated via checking the flow through the unit and the use of neutral density filters measuring the attenuation of each of the wavelengths.

3.9 METEOROLOGY

The Sumas AQM station continuously monitors wind speed (WS) and wind direction (WD) using a 20 m tower mounted R.M. Young Model 5305-10-L Wind Speed/Wind Direction sensor. Relative humidity and temperature are measured using a Vaisala HC2-S3-L probe. Barometric pressure is measured using 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. Meteorological equipment is physically inspected every 3 months to annually, or more frequently, if data QA/QC indicates the need. Calibrations for these sensors are recertified following manufacturer recommendations (typically every 1 to 2 years).



4 SUMMARY OF AMBIENT MEASUREMENTS

Data validity is the percentage of hourly values available over the given period of time that remain after final data quality assurance and control checks (QA/QC). For measured values to be compared to hourly, 8-hour, 24-hour and annual average values there needs to be >75% of the data available for each relevant time period in accordance with the Alberta (AB), Metro Vancouver (MV) and BC AAQO as informed by the Canadian Council of Ministers of the Environment (CCME 2019). Similar requirements exist in Alberta and BC in their respective ambient air monitoring guideline documents.

4.1 PM_{2.5}

During the operational period from May 1, 2024 to December 31, 2024, the hourly PM_{2.5} data validity was 99.6%. Summary statistics are presented in Appendix Tables A1, A2 and A6. There were no events over the AAQO of 25 µg/m³ 24-hour average. During the baseline period, the average hourly value was 3.9 µg/m³. The mean value during operations was 4.6 µg/m³.

4.2 NITROGEN OXIDES

During the operational period from May 1, 2024 to December 31, 2024, the hourly NO_x data validity was 99.0%. Summary statistics are presented in Appendix Tables A1, A2 and A6. There were no measured events over the 1-hour NO₂ AAQO during the operational monitoring period. Measured NO_x concentrations were found to be greatest in July 2024. During the baseline period, the mean was 3.0 ppb. The mean NO₂ concentration during operations was 2.4 ppb.

4.3 SULPHUR DIOXIDE

During the operational period from May 1, 2024 to December 31, 2024, hourly SO₂ data validity was 99.5%. Summary statistics are presented in Appendix Table A1, A2 and A6. There were no events that were over the 1-hour SO₂ AAQO during the monitoring period. The highest 1-hour (1.0 ppb) and 24-hour (0.4 ppb) both occurred in May. During the baseline period the mean concentration could not be determined, as data validity was <75% for that period. The operational period mean concentration was 0.2 ppb.

4.4 OZONE

During the operational period from May 1, 2024 to December 31, 2024, the hourly O₃ data validity was 98.8%. Summary statistics are presented in Appendix Tables A1, A2 and A6. There was one (1) measured event over the 1-hour AAQO of 82 ppb. On July 8, 2024, there was a regional air quality advisory issued for the region regarding high levels of ground-level ozone. The exceedance was related to regional elevated levels and not ST activities. Appendix Table A9 provides a summary of the elevated event. There were no measured events over the 8-hour AAQO during this period. During the baseline period, the highest 1-hour mean was 50.1 ppb, the maximum measured 8-hour average was 46 ppb, and the mean was 25.5 ppb. During the operational period, the highest 1-

hour mean was 84.1 ppb, the maximum measured 8-hour concentration was 61.7 ppb, and the mean was 21.4 ppb.

4.5 TOTAL REDUCED SULPHUR

During the operational period from May 1, 2024 to December 31, 2024, the hourly TRS data validity was 99.4%. Summary statistics are presented in Appendix Tables A1, A2 and A6. There were no measured 1-hour average events exceeding the BC Pollution Control Objective (PCO) of 5 ppb. During the baseline period, the highest 1-hour mean was 4.9 ppb and the period mean was 0.3 ppb. During the operational period, the highest 1-hour mean was also 4.9 ppb and the period mean was 0.4 ppb. None of the 24-hour averaged TRS readings exceeded the BC PCO of 2 ppb; the maximum 24-hour TRS value recorded was 0.6 ppb.

4.6 BTEX

During the operational period from May 1, 2024 to December 31, 2024, the hourly BTEX data validity was 76.7%. Summary statistics are presented in Appendix Tables A3, A4 and A6. In June, the deionizer on the hydrogen generator failed. A replacement tank of H₂ was brought in while the hydrogen generator was repaired. At the end of July, the mass flow controller on the GC failed causing the unit to be removed for repair. The parts needed for the repair have a long lead time. The GC uptime was maximized across the network by rotating BTEX equipment between stations to try and keep annual uptime after QA/QC >75% at all stations. In September, the GC from the Burnaby station was installed while the Sumas GC was still out for repair.

There were no events that were over the benzene, toluene, ethylbenzene, or xylene 1-hour and 24-hour AAQOs during the operational period. During the baseline period, the mean values of benzene, toluene, ethylbenzene, or xylene were 0.0 ppb, 0.1 ppb, 0.0 ppb and 0.6 ppb, respectively. The mean values of benzene, toluene ethylbenzene and xylene during operations were 0.1 ppb, 0.3 ppb, 0.1 ppb, and 0.4 ppb, respectively.

4.7 VISIBILITY

During the operational period from May 1, 2024 to December 31, 2024, the hourly visibility data validity was 99.8%. Summary statistics are presented in Appendix Table A5. The minimum 1-hour mean monthly values were measured in September of 2024 (30.6 km). During the baseline period the mean was 649.4 km. The mean during operations was 349.9 km.

Images are captured by a camera every hour onsite and can be made available for future reference. There are no criteria in BC for visibility. Based on a theoretical distance provided by the manufacturer, RWDI invalidates data over 15,000 km to eliminate extreme values.

4.8 BLACK CARBON

During the operational period from May 1, 2024 to December 31, 2024, the hourly black carbon data validity was 99.1%. Summary statistics are presented in Appendix Table A5. July 2024 had the highest 1-hour mean of



2261.5 ng/m³. During the baseline period, the mean was 227.8 ng/m³. The operational mean was 228.9 ng/m³. There are no AAQOs for black carbon.

4.9 METEOROLOGY

During the operational period from May 1, 2024 to December 31, 2024, the hourly meteorological valid data varied from 99.9 to 100.0%. Summary statistics are presented in Appendix Tables A7 and A8. The ambient temperature, barometric pressure, precipitation, and relative humidity sensors are connected to the same data logger in the AQM station and the short downtime events were due to updates to the logger program.

A wind rose, which visually plots the joint frequencies of wind speed and wind direction, is shown in **Figure 2** for the operational monitoring period.

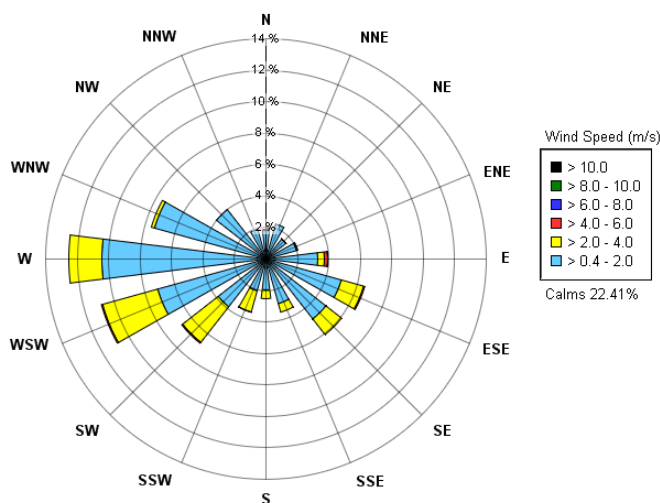


Figure 2 Sumas Terminal Wind Rose – May 1, 2024 to December 31, 2024

5 DISCUSSION

Data validity for all parameters, meets the minimum data completeness criteria acceptable range of >75%. BTEX, while still significant, was 76.7% due to ongoing repairs to the GC. When possible, the ST AQM station data were compared with the Metro Vancouver Burnaby Kensington Park, Burnaby Mountain, and Abbotsford Airport AQM stations, and the Trans Mountain Burnaby Terminal AQM station. Comparison of the same hourly readings showed a close agreement in measurements, suggesting that a reliable data set was achieved at the Sumas Terminal.



Throughout the monitoring period from May 1, 2024 to December 31, 2024, there was one (1) exceedance of the 1-hour AAQO of 82 ppb. On July 8, 2024, there was a regional air quality advisory issued for the region regarding high levels of ground-level ozone. The exceedance was related to regional elevated levels and not ST activities. Values, outside of that event, were determined to be low when compared to the available AAQOs. The baseline values were very comparable to the operational values with differences generally being less than the accuracy and precision of the instruments. Data coverage for all measured variables, excluding BTEX and Visibility, was above 98%.

No comparison to the annual AAQOs can be made as the operational reporting period covers less than 75% of the 2024 year. Monitored data will be compared against the annual AAQOs in 2025 and onwards.

6 REFERENCES

Canadian Council of Ministers of the Environment, 2019. Ambient Air Monitoring and Quality Assurance/Quality Control Guidelines. Downloaded from: https://ccme.ca/en/res/ambientairmonitoringandqa-qcguidelines_ensecure.pdf

Trans Mountain Pipeline, 2017. Air Emissions Management Plan for Sumas and Burnaby Terminals. Trans Mountain Expansion Project. CER Condition 79.

Trans Mountain Pipeline, 2020. Ambient Air Quality Monitoring Plan for the Westridge Marine Terminal, Burnaby Terminal and Sumas Terminal. Trans Mountain Expansion Project.

7 GENERAL STATEMENT OF LIMITATIONS

This report entitled Sumas Terminal 2024 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.

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APPENDIX A

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

Sumas Terminal 2024 Statistics	Maximum 1-Hour Mean							Maximum 24-Hour 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/m ³	ppb						µg/m ³	ppb					
AAQO	—	—	—	60 ^[1,2]	70 ^[1,3]	5 ^[5]	82 ^[1]	25 ^[4]	—	—	—	—	2 ^[5]	—
May	27.8	13.6	6.2	7.5	1.0	2.5	60.8	8.1	5.4	1.2	3.6	0.4	0.4	42.3
June	17.3	16.0	10.2	7.2	0.6	1.1	57.5	7.7	4.5	1.2	2.7	0.3	0.4	37.8
July	29.1	44.4	29.8	14.6	0.9	4.9	84.1	12.5	12.4	7.4	5.0	0.4	0.6	46.7
August	26.0	15.4	3.7	12.8	0.7	1.0	58.5	20.4	5.9	0.5	5.4	0.3	0.4	27.0
September	22.7	18.1	9.5	9.5	0.4	1.0	50.7	18.7	6.1	2.2	4.6	0.2	0.4	30.1
October	47.7	29.5	18.1	12.3	0.3	1.6	44.2	7.2	7.8	2.0	5.8	0.2	0.7	33.3
November	17.0	28.9	21.3	13.8	0.4	1.4	40.5	10.6	14.1	8.4	5.7	0.3	0.6	32.8
December	22.5	31.2	22.7	14.6	0.4	1.3	41.9	6.6	12.8	5.1	8.0	0.3	0.8	33.9
May to December	47.7	44.4	29.8	14.6	1.0	4.9	84.1	10.4	9.1	4.0	6.0	0.4	0.6	36.9

Notes:

— No AAQO available

^[1] British Columbia 1-hour average AAQO.

^[2] British Columbia 1-hour NO₂ AAQO based on 98th percentile of daily maximum 1-hour concentrations averaged over 3 consecutive years.

^[3] British Columbia 1-hour SO₂ AAQO based on 99th percentile of daily maximum 1-hour concentrations averaged over 3 consecutive years.

^[4] British Columbia 24-hour PM_{2.5} AAQO based on annual 98th percentile of daily average, over one year.

^[5] British Columbia 1-hour and 24-hour average TRS Pollution Control Objectives.

Operational period data collected between May 1, 2024 to December 31, 2024.



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

Sumas Terminal 2024 Statistics	Monthly 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	µg/m ³	ppb						Percentage of Time (hourly)						
AAQO	8 ^[1]	—	—	17 ^[1]	5 ^[1]	—	—							
May	3.2	2.7	0.4	1.3	0.2	0.3	28.2	99.6	98.9	98.9	98.9	99.6	99.3	98.9
June	3.7	2.5	0.4	1.1	0.2	0.3	25.7	99.7	98.9	98.9	98.9	99.4	99.6	99.0
July	6.4	2.8	0.4	2.4	0.3	0.4	24.1	99.7	99.5	99.5	99.5	99.7	99.6	98.8
August	7.2	3.7	0.2	3.5	0.2	0.3	18.1	99.6	97.4	97.4	97.4	99.6	99.1	99.1
September	6.2	3.7	0.6	3.1	0.1	0.3	16.3	99.4	99.6	99.6	99.6	99.3	99.2	98.2
October	3.7	3.3	0.6	2.7	0.2	0.4	18.7	99.7	98.9	98.9	98.9	98.9	99.1	98.8
November	3.8	3.4	0.7	2.7	0.2	0.5	18.8	99.6	99.6	99.6	99.6	99.6	99.4	98.5
December	2.7	3.2	0.8	2.5	0.3	0.7	21.1	99.7	99.3	99.3	99.3	99.5	99.6	99.1
May to December	4.6	3.2	0.5	2.4	0.2	0.4	21.4	99.6	99.0	99.0	99.0	99.5	99.4	98.8

Notes:

— No AAQO available

N/A - Not available: Data validity is below 75%.

^[1] British Columbia AAQO annual average of 1-hour concentrations, over one year.

Operational period data collected from May 1, 2024 to December 31, 2024.

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

Sumas Terminal 2024 Statistics	Maximum 1-Hour Mean				Maximum 24-Hour Mean			
Compound	Benzene	Toluene	Ethylbenzene	Xylenes	Benzene	Toluene	Ethylbenzene	Xylenes
Units	ppb				ppb			
AAQO	9 ^[1]	499 ^[1]	460 ^[1]	530 ^[1]	—	106 ^[2]	—	161 ^[2]
May	0.7	0.9	1.6	6.2	0.1	0.2	0.2	0.6
June	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
July	1.3	2.2	2.5	2.8	0.5	0.3	0.2	0.6
August	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
September	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
October	0.8	4.1	1.9	5.2	0.2	1.0	0.4	1.4
November	0.6	4.5	3.6	7.3	0.2	0.9	0.6	1.5
December	0.7	3.7	1.5	6.2	0.2	1.0	0.3	1.6
May to December	1.3	4.5	3.6	7.3	0.5	1.0	0.6	1.6

Notes:

— No AAQO available

^[1] Alberta 1-hour AAQO. British Columbia does not have an AAQO.^[2] Alberta 24-hour AAQO. British Columbia does not have an AAQO.

Operational period data collected from May 1, 2024 to December 31, 2024.

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

Sumas Terminal 2024 Statistics	Monthly Mean				Valid Data			
Compound	Benzene	Toluene	Ethylbenzene	Xylenes	Benzene	Toluene	Ethylbenzene	Xylenes
Units	ppb				Percentage of Time (hourly)			
AAQO	0.9^[1]	—	—	—				
May	0.0	0.1	0.1	0.2	93.7	93.7	93.7	93.7
June	N/A	N/A	N/A	N/A	56.9	56.9	56.9	56.9
July	0.1	0.1	0.1	0.3	91.3	91.3	91.3	91.3
August	N/A	N/A	N/A	N/A	19.2	19.2	19.2	19.2
September	N/A	N/A	N/A	N/A	65.7	65.7	65.7	65.7
October	0.1	0.3	0.1	0.4	95.4	95.4	95.4	95.4
November	0.1	0.4	0.2	0.6	95.8	95.8	95.8	95.8
December	0.1	0.5	0.2	0.7	95.3	95.3	95.3	95.3
May to December	0.1	0.3	0.1	0.4	76.7	76.7	76.7	76.7

Notes:

— No AAQO available

N/A- Not available: Data validity is below 75%.

^[1] Alberta annual average AAQO.

Operational period data collected from May 1, 2024 to December 31, 2024.

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

Sumas Terminal 2024 Statistics	Maximum 1-Hour Mean		Maximum 24-Hour Mean		Minimum 1-Hour Mean	Monthly Mean		Valid Data	
	Compound	BC	Visibility ^[1]	BC	Visibility	BC	Visibility	BC	Visibility
Units	ng/m ³	km	ng/m ³	km	km	ng/m ³	km	Percentage of Time (hourly)	
May	974.8	13453.0	398.9	2694.7	89.1	178.9	632.4	99.5	99.5
June	847.3	10001.1	358.9	2163.9	81.9	171.3	695.6	99.7	99.4
July	2261.5	6866.8	570.6	1105.7	32.9	260.6	228.4	99.2	100.0
August	1936.9	14807.5	874.1	2376.0	30.8	339.3	223.2	99.6	100.0
September	1615.6	3765.0	920.0	576.8	30.6	313.7	214.2	97.4	100.0
October	1569.2	11664.1	477.3	807.2	64.6	215.4	354.0	98.8	100.0
November	1824.9	3153.6	757.3	687.3	48.2	196.9	216.5	98.9	99.9
December	1364.7	2916.6	539.7	458.6	36.4	155.0	235.1	99.6	100.0
May to December	2261.5	14807.5	920.0	2694.7	30.6	228.9	349.9	99.1	99.8

Notes:

^[1] RWDI Uses 15,000 km as a maximum cutoff for visibility.

Operational period data collected from May 1, 2024 to December 31, 2024.

Table A6. Trans Mountain Sumas 1-hour and 24-hour Average AAQO exceedances

Sumas Terminal 2024 Event Statistics	1-Hour Average > AAQO								24-Hour Average > AAQO		
Compound	NO ₂	SO ₂	TRS	O ₃	B ^[1]	T ^[1]	E ^[1]	X ^[1]	PM _{2.5}	T ^[1]	X ^[1]
AAQO and Units	60	70	5	82	9	499	460	530	25	106	161
Exceedance Count	ppb								µg/m ³	Ppb	
Exceedance Count	Number > AAQO								Number > AAQO		
May	0	0	0	0	0	0	0	0	0	0	0
June	0	0	0	0	0	0	0	0	0	0	0
July	0	0	0	1	0	0	0	0	0	0	0
August	0	0	0	0	0	0	0	0	0	0	0
September	0	0	0	0	0	0	0	0	0	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
May to December	0	0	0	1	0	0	0	0	0	0	0

Notes:

N/A - Not available: Data validity is below 75%.

^[1] B-Benzene, T-Toluene, E-Ethylbenzene, X-Xylenes, AAQO adopted from Alberta.

Operational period data collected from May 1, 2024 to December 31, 2024.



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

2024 Meteorological Statistics	Maximum 1-Hour Mean					Minimum 1-Hour Mean				
Parameter	WS	Temp	RH	Pres	Rain	WS	Temp	RH	Pres	Rain
Units	m/s	°C	%	mb	mm	m/s	°C	%	Mb	mm
May	4.5	27.6	100.0	1030.0	7.9	0.1	1.5	23.8	999.0	0.0
June	4.1	27.9	100.0	1024.0	6.5	0.0	5.2	21.0	995.8	0.0
July	3.8	33.4	100.0	1025.0	3.2	0.0	8.3	28.0	1010.0	0.0
August	3.6	30.9	100.0	1026.0	6.2	0.0	6.8	45.1	1006.1	0.0
September	3.4	32.4	100.0	1031.0	7.0	0.0	4.2	42.0	1003.0	0.0
October	3.5	21.1	100.0	1028.0	14.3	0.0	3.4	46.6	1004.1	0.0
November	6.0	13.9	100.0	1030.0	7.3	0.0	0.0	48.6	997.1	0.0
December	4.1	12.3	100.0	1033.0	7.9	0.0	-0.8	60.8	989.0	0.0
May to December	6.0	33.4	100.0	1033.0	14.3	0.0	-0.8	21.0	989.0	0.0

Notes:

Operational period data collected from May 1, 2024 to December 31, 2024.



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

2024 Meteorological Statistics	Monthly Mean					Total	Valid Data					
Parameter	WS	Temp	RH	Pres	Rain	Rain	WS	WD	Temp	RH	Pres	Rain
Units	m/s	°C	%	Mb	mm	mm	%					
May	1.3	11.9	80.9	1016.9	0.2	119.8	100.0	100.0	99.7	99.7	99.7	99.7
June	1.3	14.7	80.5	1015.1	0.2	110.1	100.0	100.0	100.0	100.0	100.0	100.0
July	1.2	19.0	79.4	1017.4	0.0	34.2	100.0	100.0	100.0	100.0	99.9	100.0
August	1.0	17.7	88.9	1017.0	0.1	109.5	100.0	100.0	100.0	100.0	100.0	100.0
September	1.0	15.2	92.4	1015.8	0.1	70.2	100.0	100.0	100.0	100.0	100.0	100.0
October	1.0	10.3	94.1	1017.2	0.4	269.1	100.0	100.0	100.0	100.0	100.0	100.0
November	1.2	6.1	95.0	1013.8	0.3	235.3	100.0	100.0	100.0	100.0	100.0	100.0
December	1.3	5.4	95.2	1016.0	0.3	230.3	100.0	100.0	100.0	100.0	100.0	100.0
May to December	1.2	12.5	88.3	1016.1	0.2	1178.4	100.0	100.0	100.0	100.0	99.9	100.0

Notes:

Operational period data collected between May 1, 2024 to December 31, 2024.

Table A9. Trans Mountain Sumas 1-Hour Ozone Exceedance Summary

Date	1-hour Average (ppb)	Wind Speed (m/s)	Wind Direction (deg)	Discussion
July 8, 2024, 15:00-15:00	84.1	2.1	258.3	<p>There are no ozone emissions from the Sumas tank farm; rather, it forms as a secondary product from photochemical reactions taking place in the atmosphere involving oxides of nitrogen (NO_x) and volatile organic compounds (VOC).</p> <p>In this episode, the elevated ozone reading originated from ambient air throughout the Lower Mainland. Metro Vancouver released an air quality advisory due to elevated ground level ozone expected to last for a few days. The advisory covered Metro Vancouver, and the Central and Eastern Fraser Valley.</p>