

Ambient Air and Sound

Monthly Report

STONEY TRAIL AGGREGATE RESOURCE

BURNCO

LAFARGE



Volker Stevin
Contracting Ltd.

August 2018

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Introduction

This report summarizes the ambient air quality, metrological data and sound data collected at the Stoney Trail Aggregate Resource (STAR) pit monitoring locations in Calgary, AB. The E-Sampler particulate monitors and noise monitor are maintained by Promet on behalf of the BLV Group (BLV). This report contains data collected between August 1, 2018 and August 31, 2018.

It is important to note that the monitoring stations are located inside the property boundary, adjacent to operations and not at site boundaries. Measurements are intended to help monitor the internal operations. Detailed information regarding the monitors can be found in Appendix A.

The location of the monitors can be found in Figure 1-1.



Figure 1-1: Location of BLV Monitors

STAR Monitor Summary

Particulate and Metrological Data

Table 2-1 provides a summary of the particulate and metrological data during the month of August. Guidelines and trends for the particulate data can be found in Appendix B. BLV's monitoring data is compared with the Calgary Region Airshed Zone's (CRAZ) northwest particulate monitor in Appendix C.

Table 2-1: STAR data summary for particulate and metrological data

Parameter	Data Completeness (%)	1-Hour Average		24-Hour Average	
		Maximum Concentration	Exceedances of AAAQO or AAAQG	Maximum Concentration	Exceedances of AAAQO
PM _{2.5} (ug/m ³)	100	450.5	128	321.7	16
TSP (ug/m ³)	100	-	-	560.9	9
Wind Speed (km/hr)/Direction (Degrees)	100	38.7/WNW	-	21.8/ENE	-
Precipitation (mm)	100	4.9	-	27.4*	-

*Monthly total accumulation of precipitation (mm)

Data Quality Notes:

- There were 16 exceedances of the 24- hour PM_{2.5} AAAQO and 128 exceedances of the 1-hour PM_{2.5} AAAQG
- There were nine exceedances of the 24-hour TSP AAAQO

Explanations:

It is important to note that STAR pit and much of British Columbia and Alberta were impacted heavily by smoke from wildfires during August 2018. Smoke from wildfires was the primary cause of elevated levels of particulate matter at the monitor.

Noise Data

A summary of the noise data during the month of August can be found in Table 2-2. The guidelines and trends can be found in Appendix D.

Table 2-2: STAR data summary for sound data

Parameter	Data Completeness (%)	Maximum 1-Hour Sound Level (dBA)	Exceedances of City of Calgary Bylaw
Sound Level Day Time	100	62.18	0
Sound Level Nighttime	100	60.53	6

Data Quality Notes:

- There were no exceedances of the daytime 1-hour City of Calgary Community Standards Bylaw Sound Level
- There were 6 exceedances of the nighttime 1-hour City of Calgary Community Standards Bylaw Sound Level

Explanations:

Of the six nighttime exceedances, five were due to equipment starting up in the morning; no crushers were running at this time. These exceedances were slightly over the bylaw limit, as measured within the property boundaries. The remaining nighttime exceedance occurred when no crushers were operating.

A detailed description of exceedances are in Table 2-3.

Table 2-3: Sound Level Exceedances at STAR

Date	Hour	Daytime or Nighttime	Sound Level (dBA Leq)		Ground Cover	Windspeed (km/hr)	Wind Direction	Precipitation (mm)	Potential Reason for Exceedance
			Measured Sound	City of Calgary Limit					
8/2/2018	600	Nighttime	50.92	50	Bare	1.806	W	0	Operations starting, no crushers running.
8/4/2018	100	Nighttime	60.53	50	Bare	10.61	NNW	0.2	No crushers running.
8/8/2018	600	Nighttime	51.25	50	Bare	6.503	WNW	0	Operations starting, no crushers running.
8/9/2018	600	Nighttime	50.26	50	Bare	6.216	WNW	0	Operations starting, no crushers running.
8/16/2018	600	Nighttime	51.11	50	Bare	4.83	WSW	0	Operations starting, no crushers running.
8/17/2018	600	Nighttime	51.08	50	Bare	6.7	N	0	Operations starting, no crushers running.

Appendix A – Monitor Information

There are two monitoring stations at STAR, one is located on the west berm and the other is located at the scale house. The west berm station contains particulate and sound, and is shown in Figure A1. A particulate and sound station has been at this location since 2005. Met One E-Samplers replaced the older monitors used at this location in February 2018. The sound and particulate meter is located approximately 240 meters inside the property boundary and approximately 360 meters from the nearest resident.

The scale house station contains metrological parameters, and has been at this location since 2008.

This section provides a summary of the monitoring activities for both stations, including: a table of instrumentation (Table A), and site visit notes.

Table A: Instrumentation list

Equipment Description	Parameter Measured
Met One E-Sampler	PM2.5 Concentrations
Met One E-Sampler	TSP Concentrations
Bruel and Kjaer 2238	Sound
TE25M Tipping Bucket Rain Gauge	Precipitation
R.M. Young Model 5103 anemometer	Wind Speed
R.M. Young Model 5103 anemometer	Wind Direction



Figure A1 Picture of West Berm Station

Site Visit Notes

A summary of site visit notes for each of the monitors is provided in this section.

PM Monitoring

All west berm monitors underwent monthly calibration in August. The flow rates were checked on both particulate monitors. The operation time for the PM_{2.5} monitor was 100% and the TSP monitor was 100%. There were no outstanding concerns with the data.

Meteorological Monitoring

All metrological sensors had 100% uptime for the month of August.

Noise Monitoring

The noise monitor had 100% uptime for the month of August.

Appendix B – Particulate Criteria and Results

Alberta's ambient air quality objectives (AAAQO) and guidelines (AAAQG) are issued by Alberta Environment, under Section 14 (1) and 14(4), the *Environmental Protection and Enhancement Act, 1992*. The AAAQO and AAAQG are used to compare actual air quality measurements to evaluate facility performance and address local concerns. Table B1 and Table B2 outlines the AAAQO and AAAQG.

Table B1: Alberta Ambient Air Quality Objectives

Particulate	Averaging Period	Measurement ($\mu\text{g}/\text{m}^3$)
Total Suspended Particulate Matter	24-hour	100
Particulate Matter Fine – 2.5 microns of less	24-hour	30

Table B2: Alberta Ambient Air Quality Guidelines

Particulate	Averaging Period	Measurement ($\mu\text{g}/\text{m}^3$)
Particulate Matter Fine – 2.5 microns or less	1-hour	80

Monitoring Results and Trends

The following wind rose (Figure B1) illustrates the frequency of wind speed by wind direction for the month of August 2018. Table B3 summarizes the hourly and daily concentrations recorded in August 2018. Figure B2 graphically illustrates the time series for hourly concentrations of $\text{PM}_{2.5}$, while Figure B3 and B4 shows daily average concentrations recorded during August 2018 for particulate matter.

There were nine exceedances of the 24-hour TSP ($100\mu\text{g}/\text{m}^3$) and 16 $\text{PM}_{2.5}$ ($30\mu\text{g}/\text{m}^3$) AAAQO.

It is important to note that STAR pit and much of British Columbia and Alberta were impacted heavily by smoke from wildfires during August 2018. Smoke from wildfires was the primary cause of elevated levels of particulate matter at the monitor.

The wind rose (Figure B1) indicates that the winds predominately came from the WNW, SSW, and NNE.

Table B3: Summary of August 2018 data

Parameter	Objectives		Station	Exceedances		Monthly Average	1-Hour					24-Hour		Operational Time (%)
	1-hr	24-hr		1-hr	24-hr		Maximum Concentration/ Metrological Variable	Day	Hour	Wind Speed (km/hr)	Wind Direction (Degrees)	Maximum Concentration/ Metrological Variable	Day	
PM _{2.5} (ug/m ³)	80	30	West Berm	128	16	51.0	450.5	15	2100	10.4	74.8/S	321.7	15	100
TSP (ug/m ³)	-	100	West Berm	-	9	96.1	-	-	-	-	-	560.9	15	100
Temperature (°C)	-	-	Scale house	-	-	21.8	26.6	*	*	-	-	24.6	8	100
Wind Speed (km/hr)/ Direction (degrees)	-	-	Scale house	-	-	12.2/ENE	38.7/WNW	31	1600	-	-	21.8/ENE	27	100
Precipitation (mm)	-	-	Scale house	-	-	0.9	4.9	24	1000	-	-	8.2	24	100

*Multiple hours with this maximum temperature

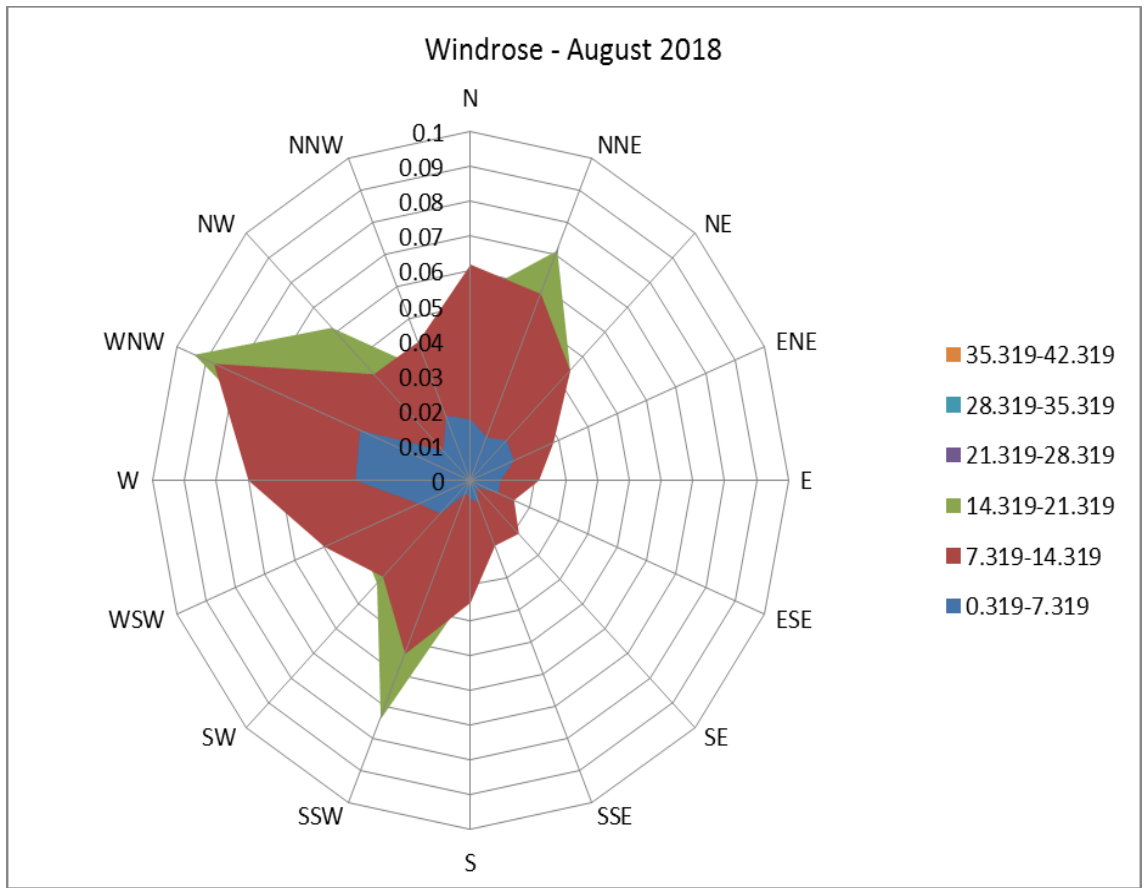


Figure B1: August 2018 wind rose from the scale house station

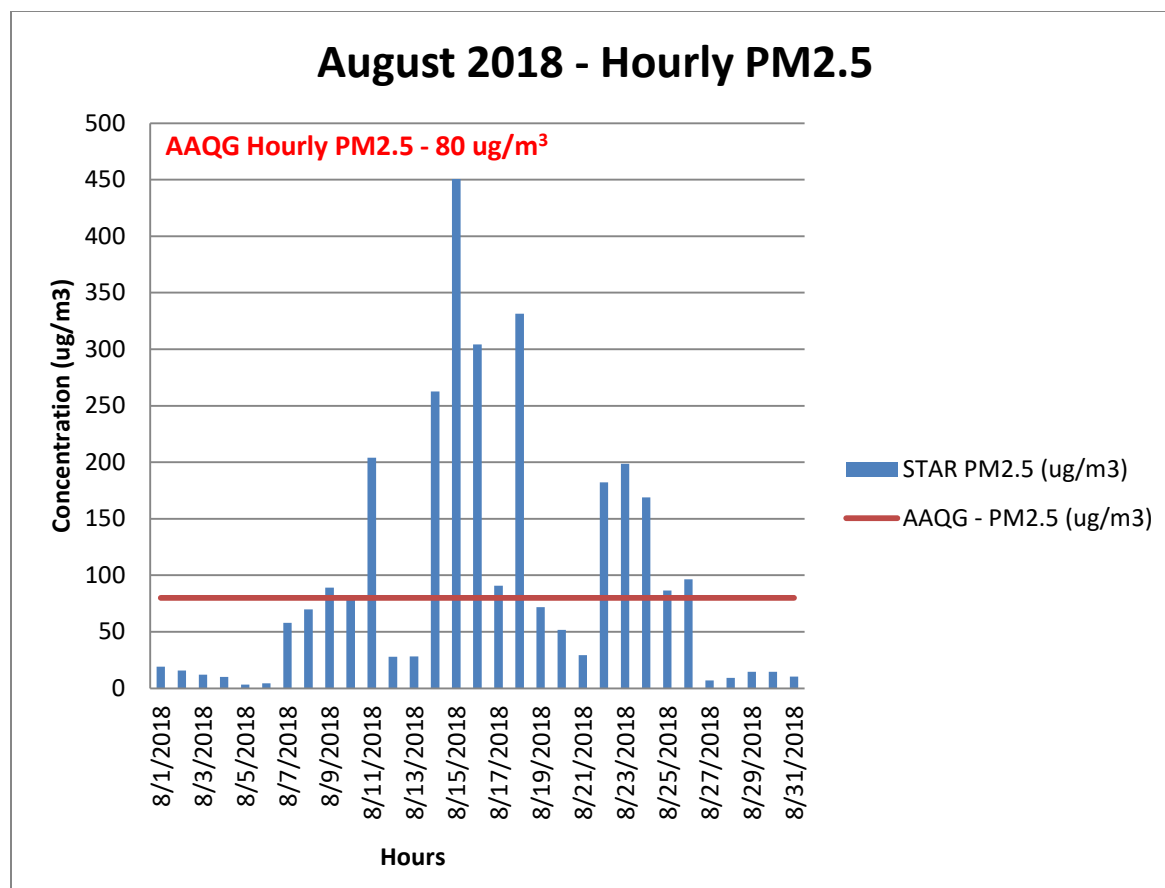


Figure B2: 1-hour concentrations of PM_{2.5} STAR

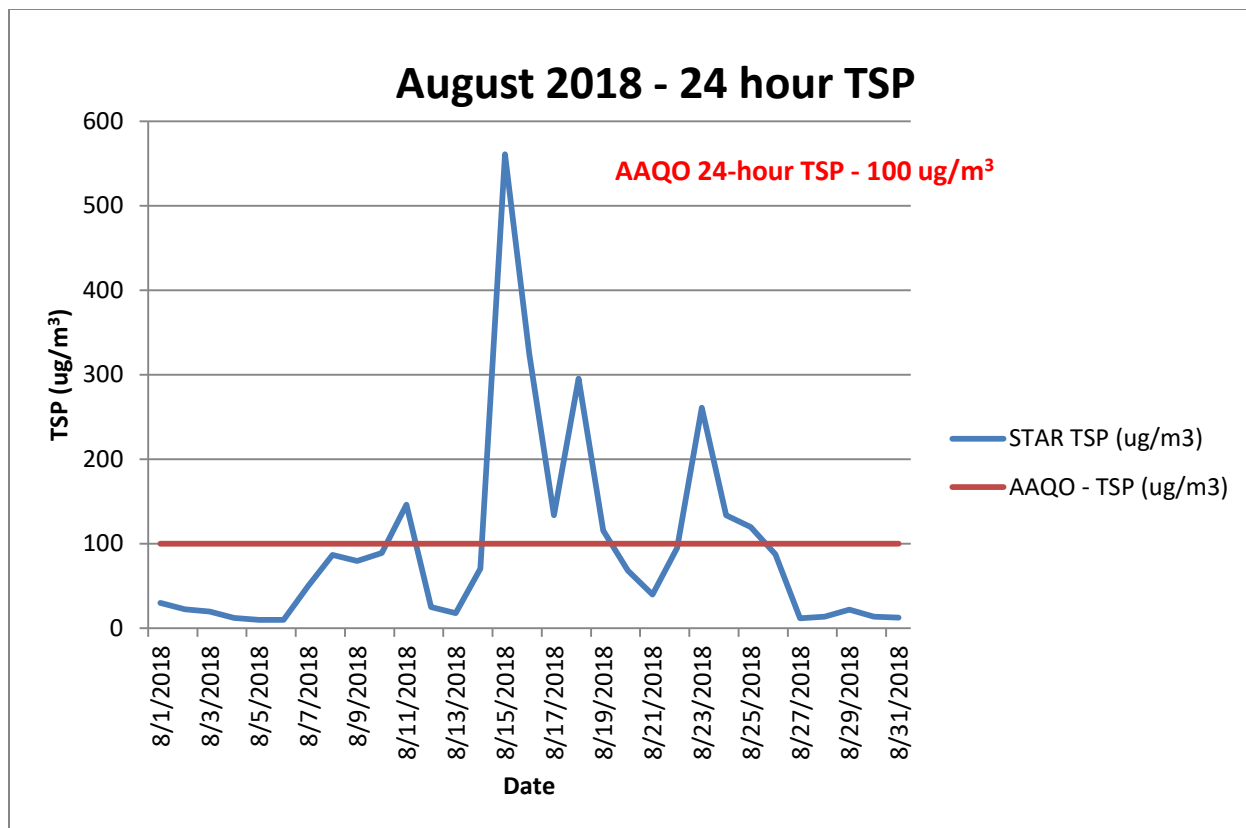


Figure B3: 24-hour concentrations of TSP at STAR

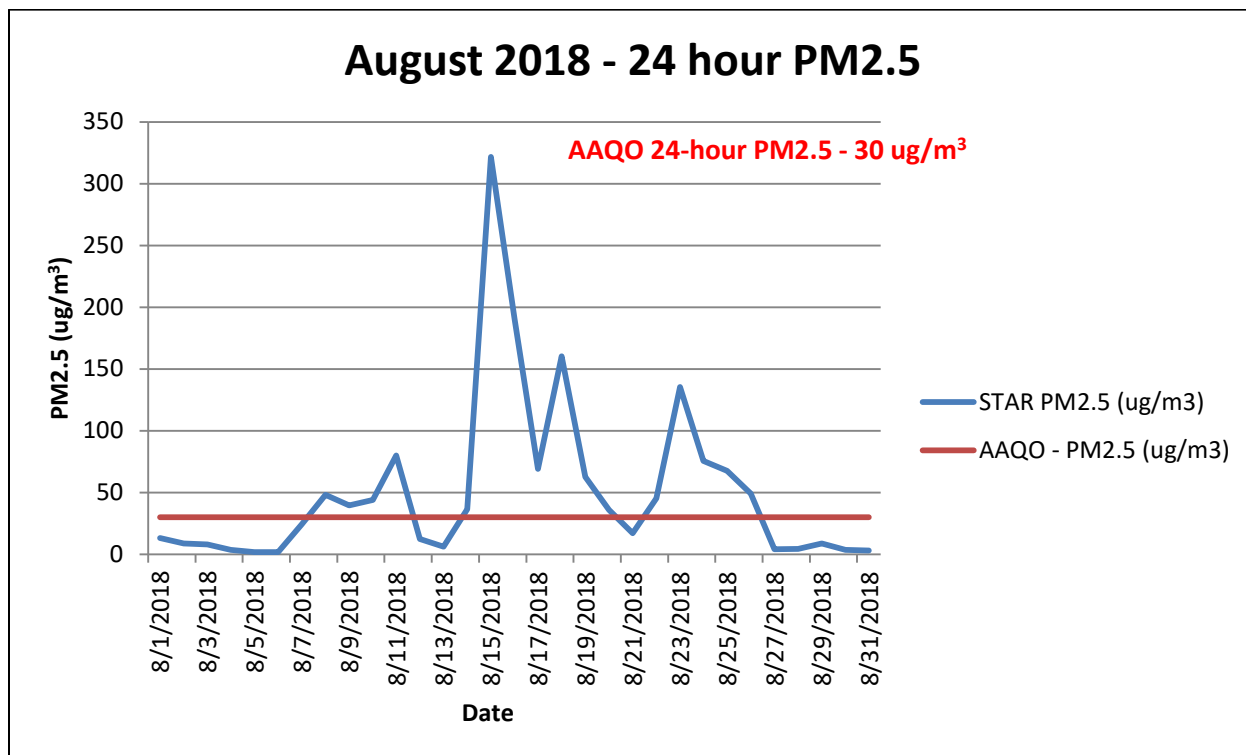
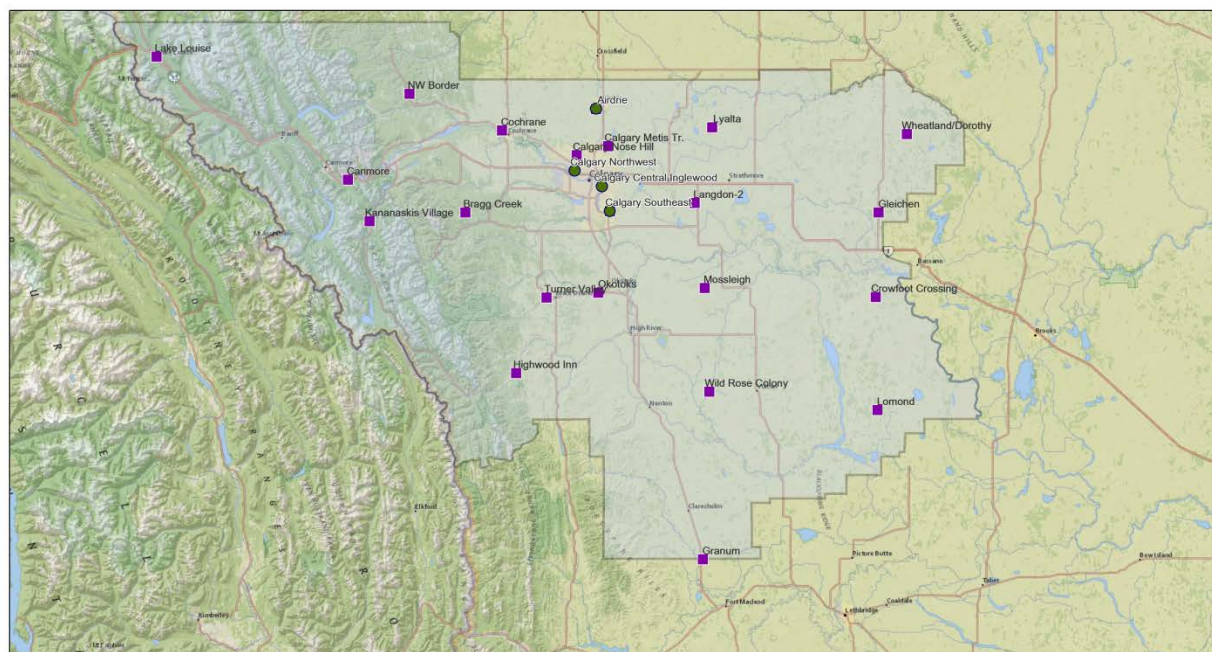


Figure B4: 24-hour concentrations of PM_{2.5} at STAR

Appendix C - BLV and CRAZ Comparison

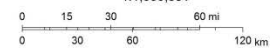
CRAZ is a non-profit association with multiple stakeholder members (government, NGOs, industry and public) which encompasses a large area surrounding the City of Calgary (Figure C1).



June 2, 2017

- Current_continuous_monitoring_locations
- Passive_monitoring_locations
- CRAZ_boundary

1:1,655,581



Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

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Figure C1: CRAZ boundary map

Within the City of Calgary, CRAZ monitors, analyzes and provides information on air quality and helps to develop strategies to manage air quality issues within the airshed. Three monitors are located around the city and measure various air contaminants, which includes $PM_{2.5}$ (Figure C2).



Figure C2: CRAZ Monitor Location

The results from BLV pit and the CRAZ NW station for PM_{2.5} are shown graphically below (Figure C3). Elevated levels of PM_{2.5} were noted at the BLV and CRAZ locations due to the wildfires impacting Alberta and British Columbia in August.

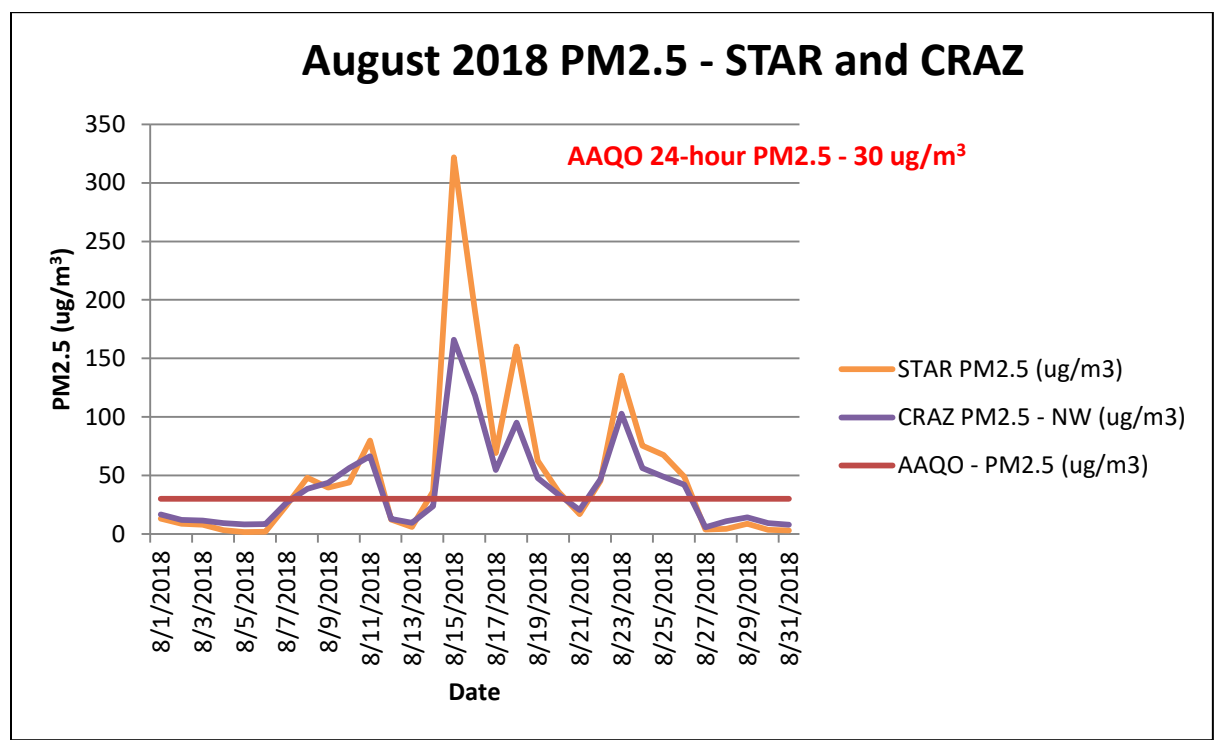


Figure C3: CRAZ and BLV Comparison for PM_{2.5}

Appendix D - Noise Criteria and Results

At the BLV pit, there is one noise monitor to document the outdoor sound levels and determine the environmental noise impact of the site. The results will also determine if the facility complies with the Permissible Sound Levels of the City of Calgary's *Community Standards Bylaw 5M2004*.

The topography of the areas between the site and the surrounding neighbors is variable. Crushing equipment is located in the depression of the pit, where the scale house and entrance are relatively flat.

The noise meter used at the STAR pit is a Bruel & Kjaer 2238 mediator sound monitor with outdoor microphone.

On occasion City of Calgary bylaw officers will monitor the perimeter of the site for sound. To date no exceedances have been noted by the City of Calgary bylaw officer.

Noise Criteria

The City of Calgary's *Community Standards Bylaw 5M2004* is a receiver-oriented noise regulation that applies to any person within the City of Calgary limits and varies depending on the location in the City. As the STAR pit is located near residential developments these limits are applicable:

1.2(e.6) "Daytime" means the period:

- (i) beginning at 7:00 A.M. and ending at 10:00 P.M. of the same day on Weekdays; or
- (ii) beginning at 9:00 A.M. and ending at 10:00 P.M. of the same day on a Weekend;

1.2(i.4) "Night-time" means the period beginning at 10:00 P.M. and ending the following day at:

- (i) 7:00 A.M. if the following day is a Weekday; or
- (ii) 9:00 A.M. if the following day is a Weekend;

1.2(m.3) "Weekday" means Monday through Saturday, inclusive unless it falls on a holiday, as defined in the Interpretation Act, R.S.A. 2000, c. I-8, as amended or replaced from time to time;

1.2(m.4) "Weekend" means Sunday and any other holiday, as defined in the Interpretation Act, R.S.A. 2000, c. I-8, as amended or replaced from time to time;

28(1) No person shall cause or permit to be caused a Continuous Sound that exceeds the following sound levels:

- a) 65 decibels (dBA) Leq measured over a one (1) hour period during the day-time; or
- b) 50 decibels (dBA) Leq measured over a one (1) hour period during the night-time;

at any point of reception within a residential development.

28(2) Notwithstanding subsection (1), where the Ambient Sound Level for an area is at or above the maximum allowable Day-time or Night-time Sound Levels referred to in subsection (1), measured over a one (1) hour period, a Sound Level must exceed 5 decibels (dBA) Leq over the Ambient Sound Level before it becomes an offence.

30 No person shall cause or permit to be caused a Non-Continuous sound that exceeds

- a) 85 decibels(dBA) Leq measured over a period of 15 minutes during the day-time; or*
- b) 75 decibels (dBA) Leq measured over a period of 15 minutes during the night-time;*

at any point of reception within a residential development or downtown.

The Leq is the A-weighted equivalent continuous sound level. This is an energy average of the varying sound level and the length of time that the sound level occurs. The use of this index permits the description of a varying sound level environment as a single number. This type of average is not an arithmetic average as sound is measured in decibels which are logarithmic values.

Noise Results

For the month of August 2018 the sound levels were below the City of Calgary's *Community Standards Bylaw 5M2004*, except for six hours outlined in Table 2-3.

As noise can be impacted by a variety of conditions, data is considered invalid by Promet Environmental Group Ltd., if the wind speed is above 11.5 km/hour and rainfall is less than 3mm/hour.

Figure D1 shows the graphical representation of hourly sound levels at the STAR pit. Figure D2 shows the month of hours for the sound levels at the STAR pit, this graphical representation shows the average of each hour every day to determine trends in a day over a month of readings.

Of the six nighttime exceedances, five were due to equipment starting up in the morning; no crushers were running at this time. These exceedances were slightly over the bylaw limit, as measured within the property boundaries. The remaining nighttime exceedance occurred when no crushers were operating.

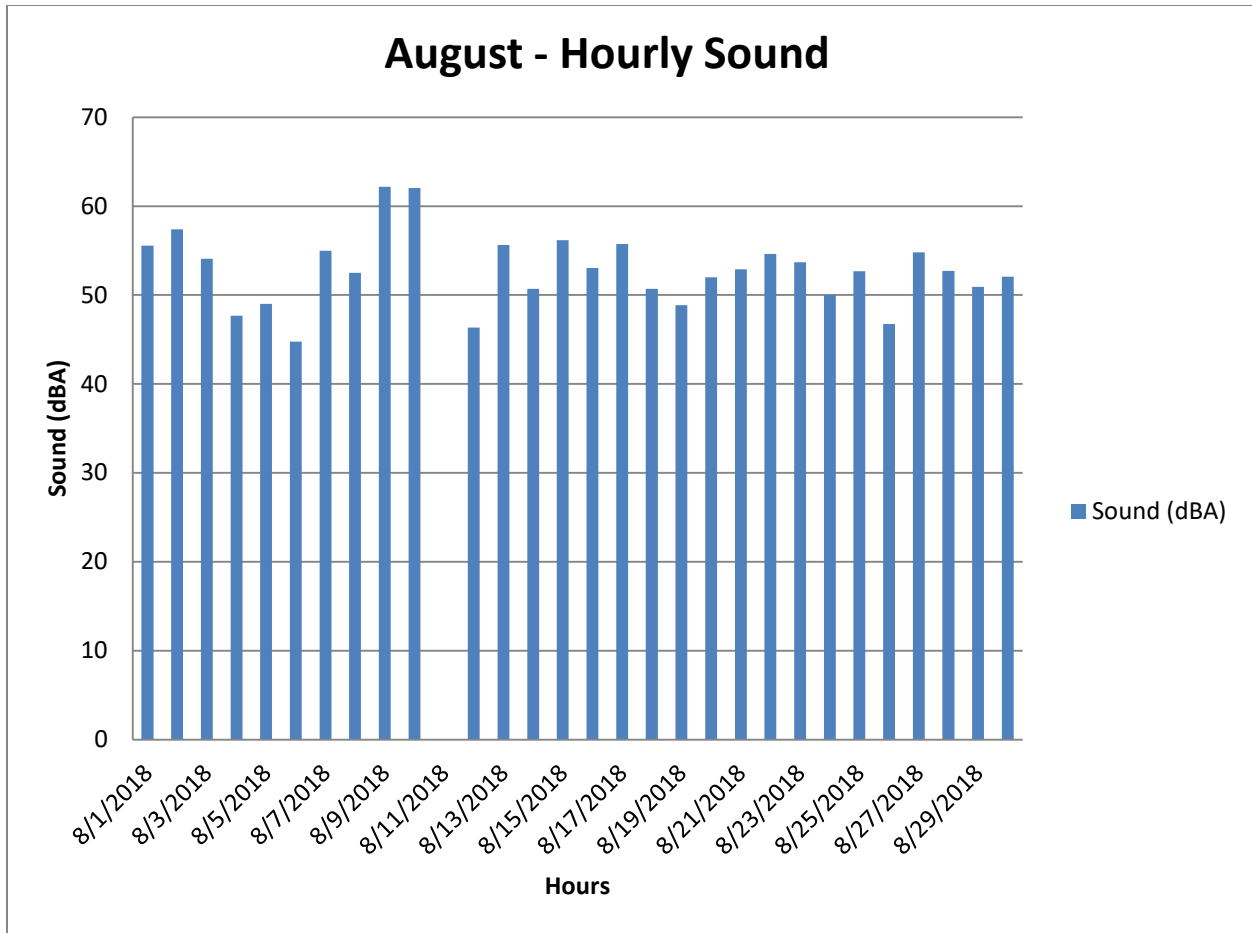


Figure D1: Hourly sound level at the STAR Pit

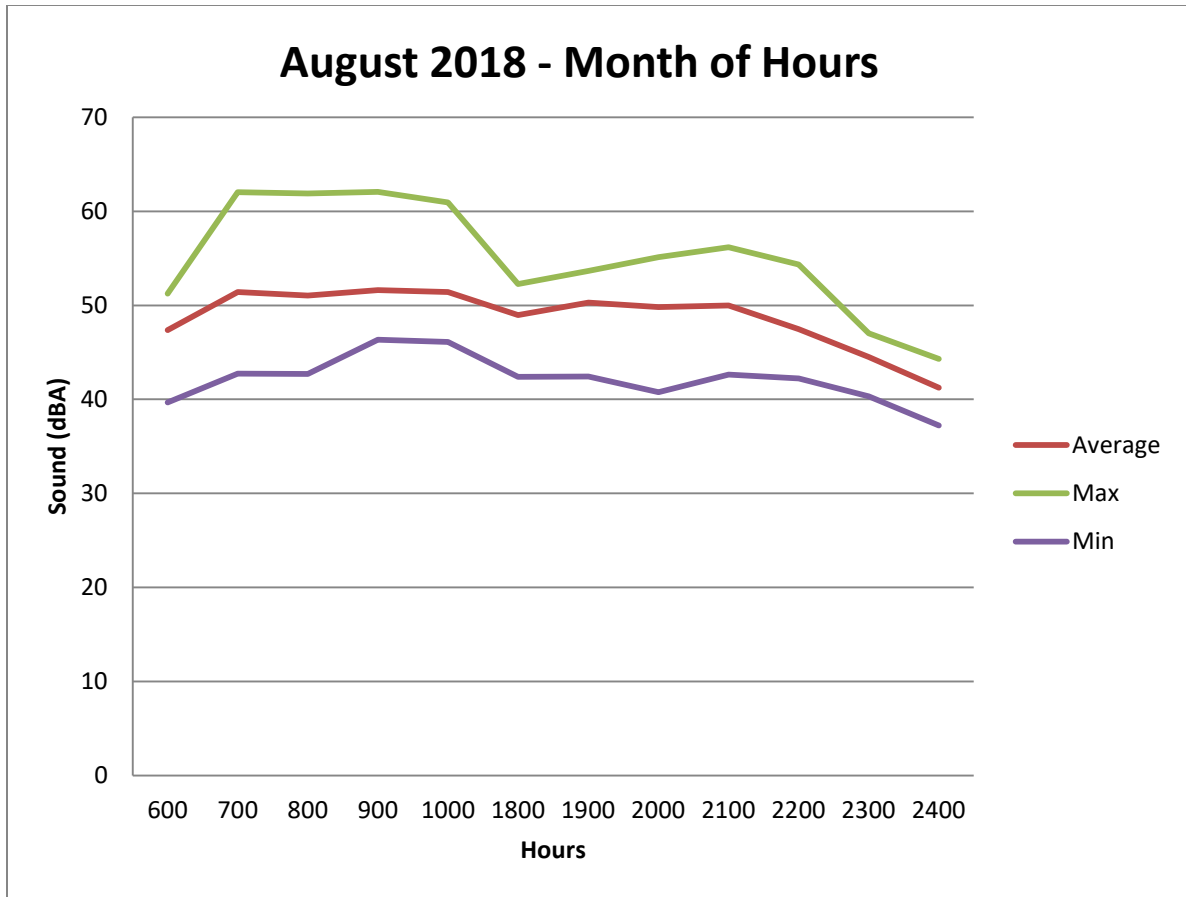


Figure D2: Month of Hours sound levels at the STAR Pit