Ambient Air and Sound

Monthly Report

STONEY TRAIL AGGREGATE RESOURCE

BURNCO LAFARGE Volker Stevin Contracting Ltd.

July 2019

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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. This report contains data collected between July 1, 2019 and July 31, 2019.

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 July. 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_{25}(ug/m^3)	100	14.4	0	6.451	0
TSP (ug/m^3)	100	-	-	10.078	0
Wind Speed (km/hr)/Direction (Degrees)	100	46.23/SSW	-	28.11/WNW	-
Precipitation (mm)	100	7.7	-	73*	-

*Monthly total accumulation of precipitation (mm)

Data Quality Notes:

- There were no exceedances of the 24- hour $PM_{2.5}$ AAAQO or the 1-hour $PM_{2.5}$ AAAQG.
- There were no exceedances of the 24-hour TSP AAAQO

Noise Data

A summary of the noise data during the month of July 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	65.01	1
Sound Level Nighttime	100	53.99	16

Data Quality Notes:

- There was one exceedance of the daytime 1-hour City of Calgary Community Standards Bylaw Sound Level
- There was sixteen exceedances of the nighttime 1-hour City of Calgary Community Standards Bylaw Sound Level

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 January. Cleaning of the west berm air monitors occurred in May 2019. The flow rates were checked on both particulate monitors. The operation time for the PM2.5 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 July.

Noise Monitoring

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

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 (ug/m^3)
Total Suspended Particulate Matter	24-hour	100
Particulate Matter Fine – 2.5 microns or less	24-hour	29

Table B2: Alberta Ambient Air Quality Guidelines

Particulate	Averaging Period	Measurement (ug/m^3)
Particulate Matter Fine – 2.5 microns or less	1-hour	80

Monitoring Results and Trends

Table B3 summarizes the hourly and daily concentrations recorded in July 2019. The wind rose (Figure B1) illustrates the frequency of wind speed by wind direction for the month of July 2019. Figure B2 graphically illustrates the time series for hourly concentrations of $PM_{2.5}$, while Figure B3 and B4 shows daily average concentrations recorded during July 2019 for particulate matter.

There were no exceedances of the 24-hour TSP (100ug/m^3) or the 24 hour $PM_{2.5}$ (29ug/m^3) values. There were no exceedances for the the hourly $PM_{2.5}$ values.

The wind rose (Figure B1) indicates that the winds predominately came from the West - Northwest (WNW).

Table B3: Summary of July 2019 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	29	West Berm	0	0	2.72	14.4	11	1400	14.9	101/E	6.451	10	100
TSP (ug/m^3)	-	100	West Berm	-	0	5.47	-	-	-	-	-	10.08	11	100
Temperature (^oC)	-	-	Scale house	-	-	21.64	26.7	23	2100	-	-	24.84	23	100
Wind Speed (km/hr)/ Direction (degrees)	-	-	Scale house	-	-	13.47/SSW	46.23/SSW	24	1500	-	-	28.11/WNW	24	100
Precipitation (mm)	-	-	Scale house	-	-	2.36	7.7	16	600	7.95	22.9/NNE	22.7	04	100

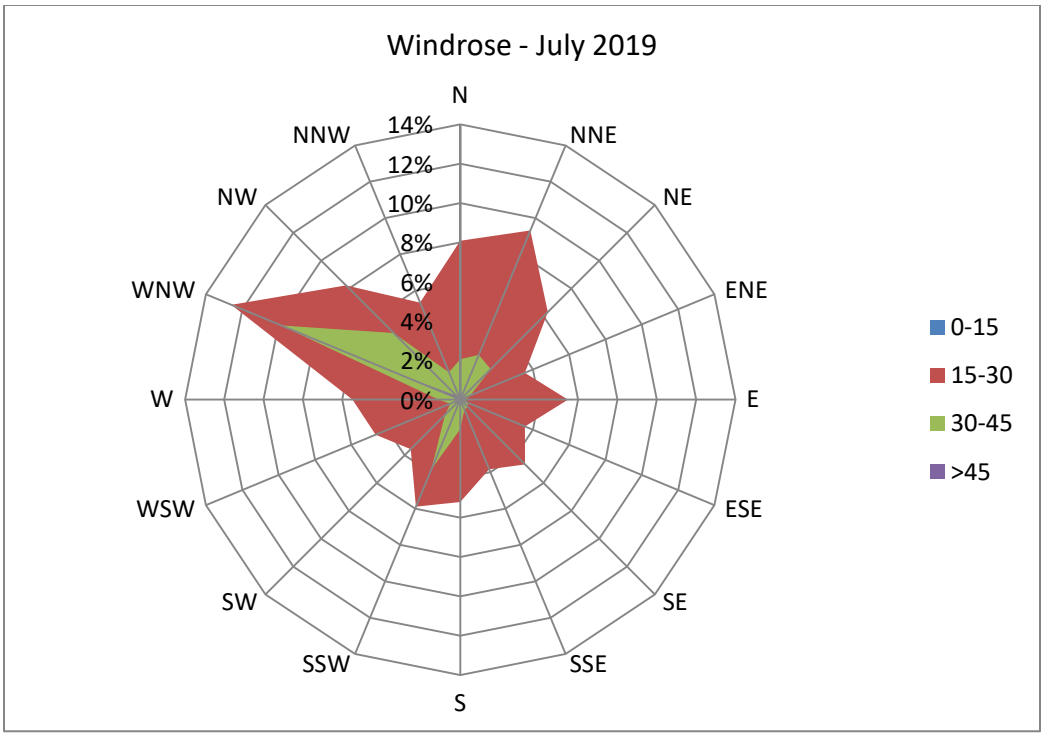

Figure B1: July 2019 wind rose from the scale house station

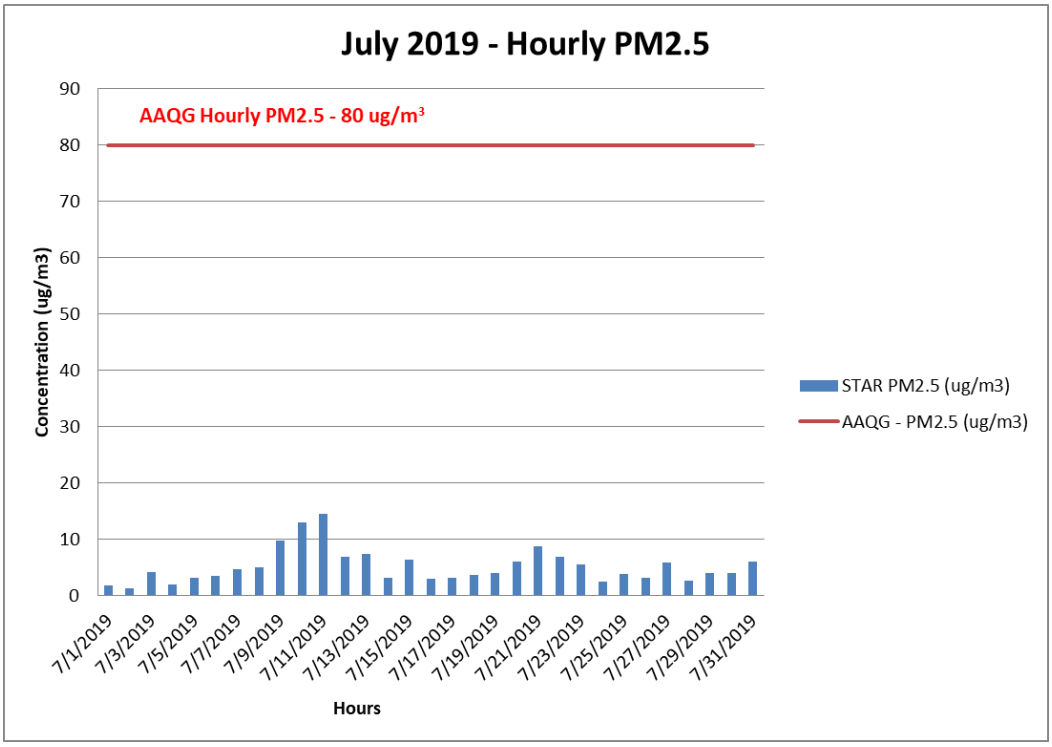

Figure B2: 1-hour concentrations of $PM_{2.5}$ STAR

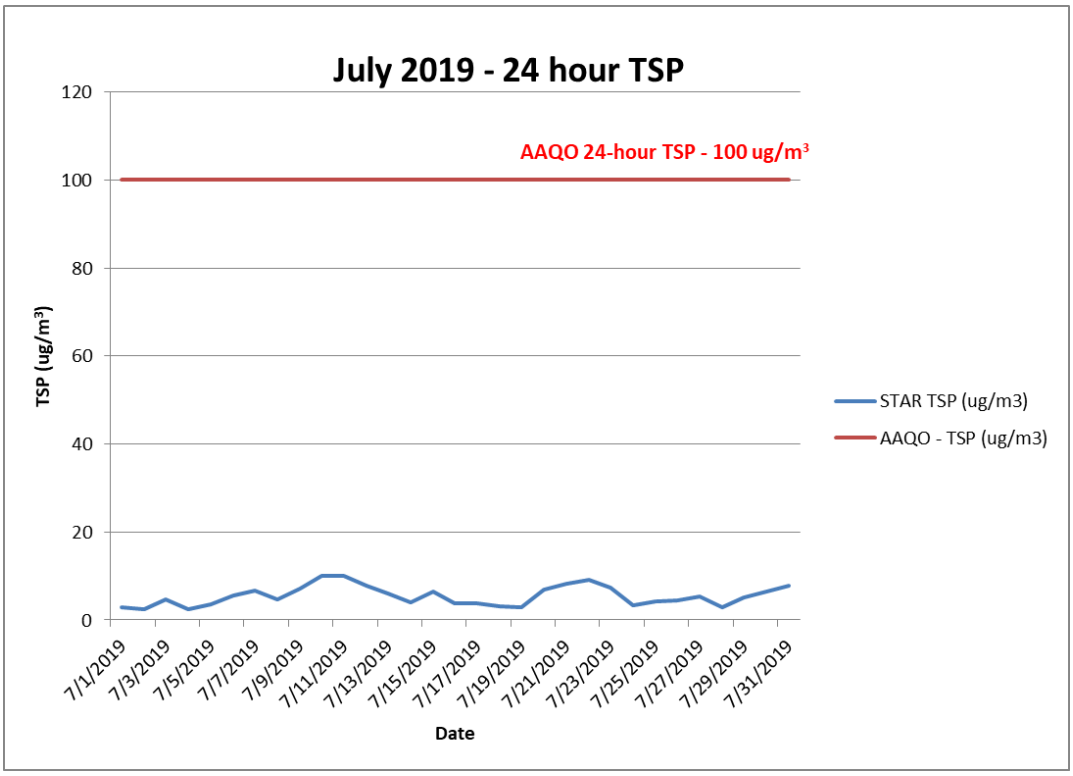

Figure B3: 24-hour concentrations of TSP at STAR

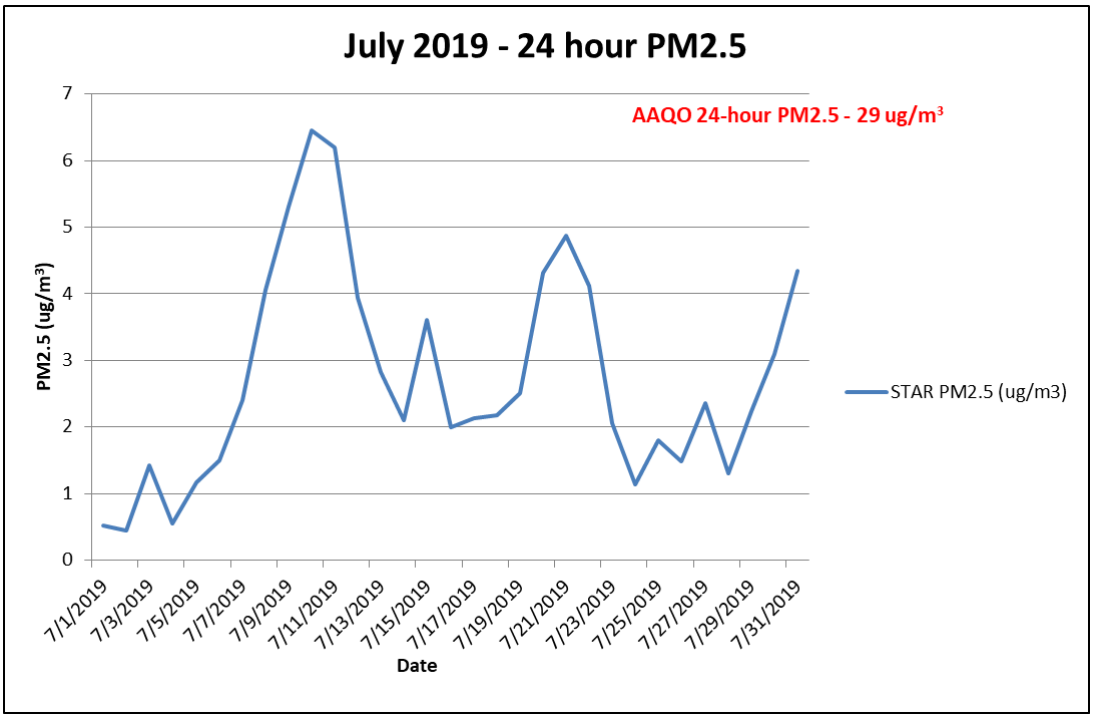

Figure B4: 24-hour concentrations of $PM_{2.5}$ at STAR

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).

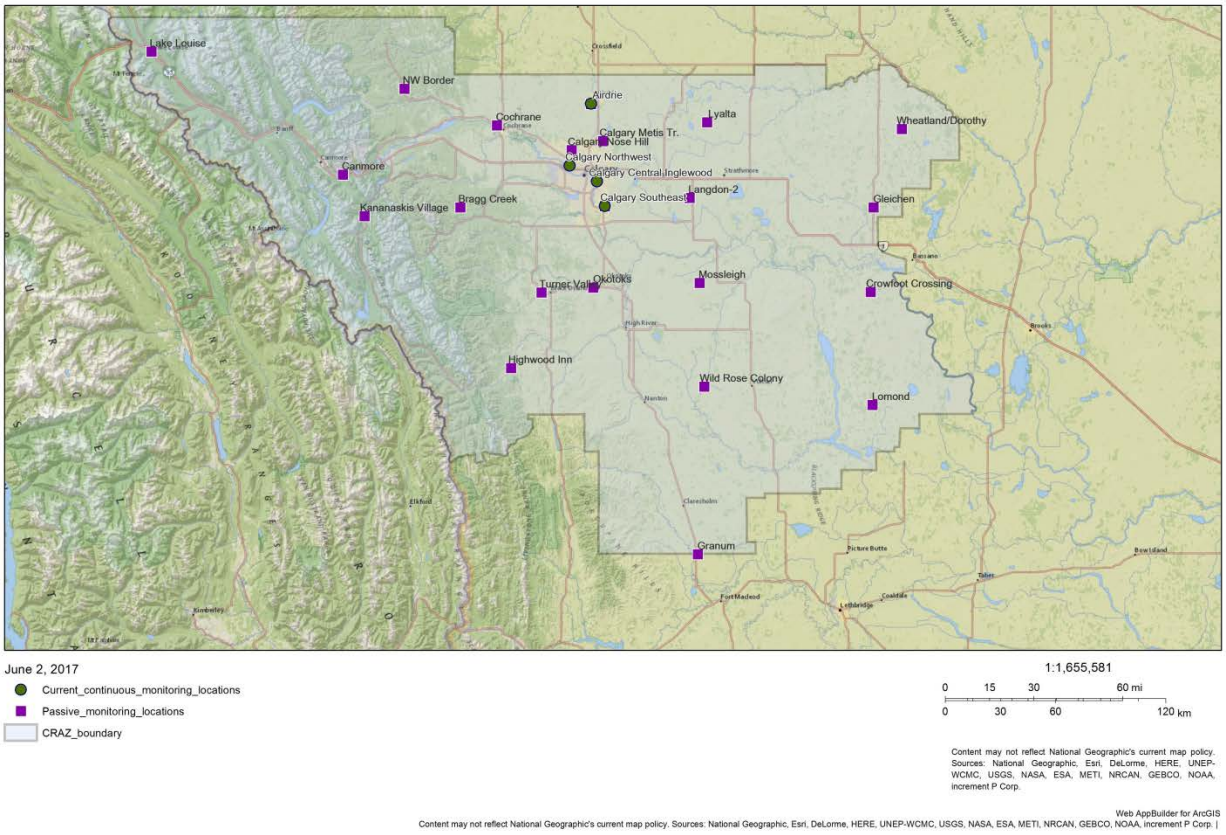

Figure C1: CRAZ boundary map

Within the City of Calgary, CRAZ stations analyze and provide information on air quality, and help 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).

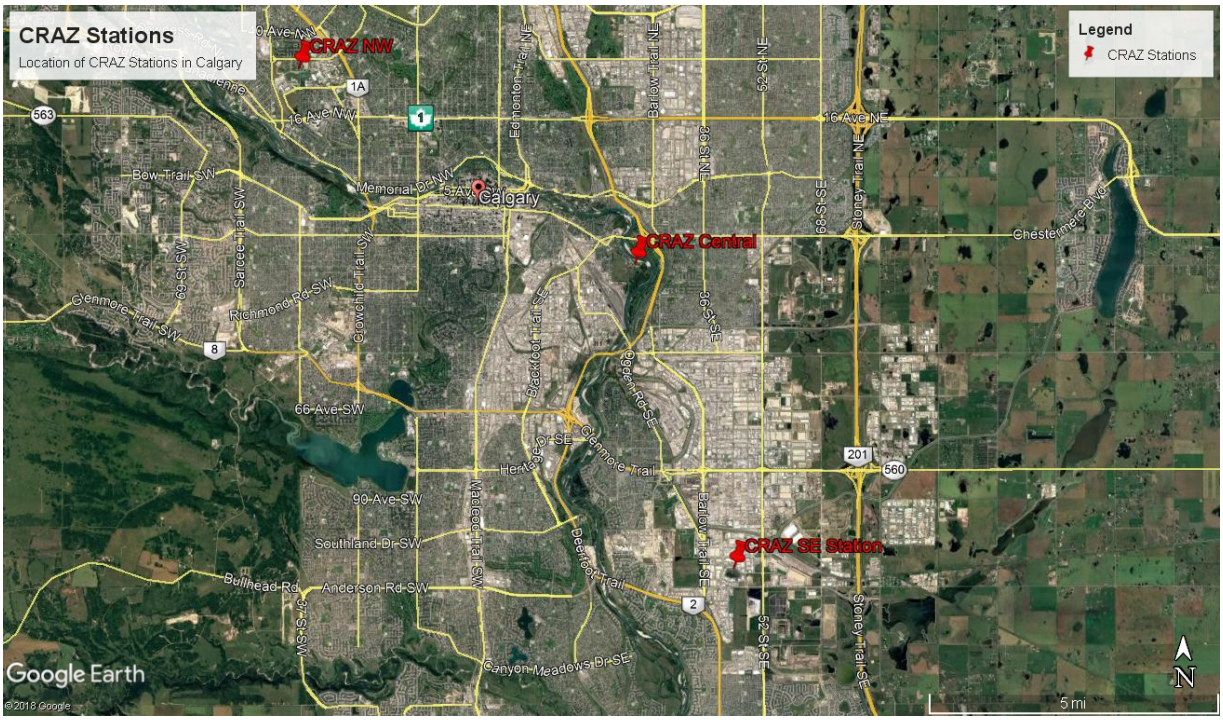

Figure C2: CRAZ Monitor Location

The results from BLV pit and the CRAZ NW station for $PM_{2.5}$ are shown graphically below (Figure C3). The monitors at STAR were below the AAAQO and the CRAZ NW monitor for the month of July.

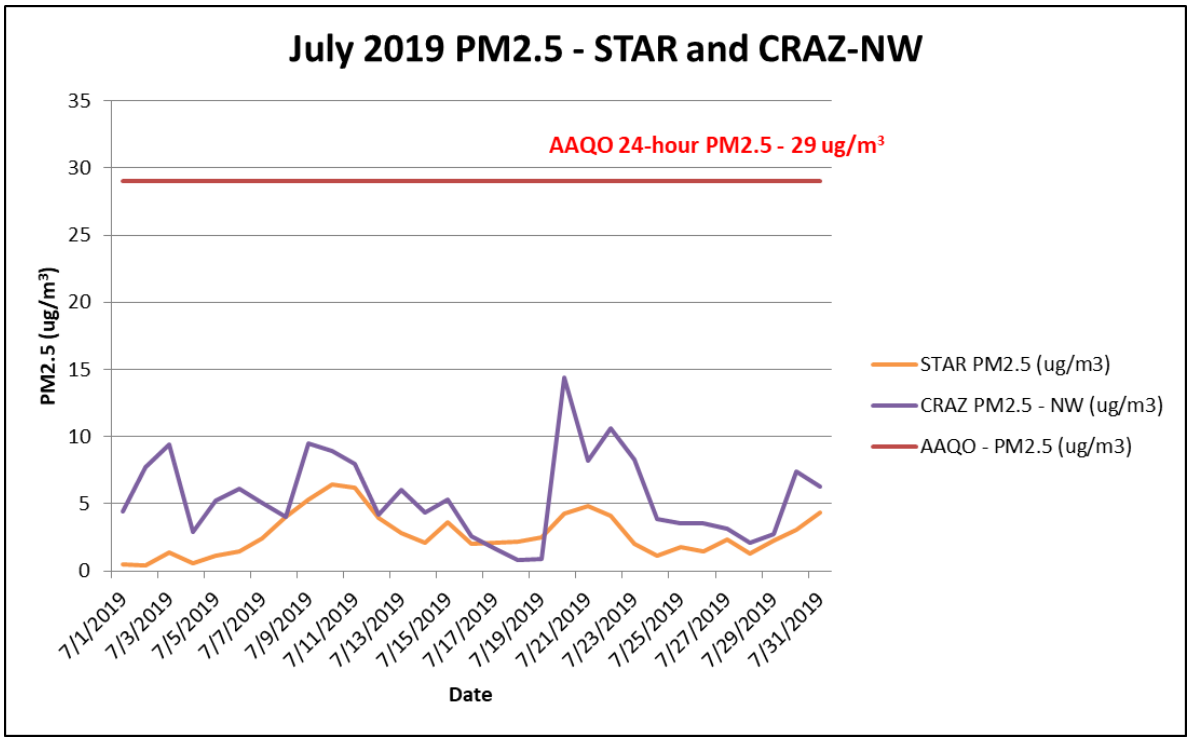

Figure C3: CRAZ and BLV Comparison for PM2.5

Appendix D - Noise Criteria and Results

At the BLV STAR 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 a depression near the lowest part of the pit, whereas 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. l-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. l-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 July 2019 there were two sound level exceedances according to the City of Calgary's *Community Standards Bylaw 5M2004*.

- There was one exceedance of the daytime 1-hour City of Calgary Community Standards Bylaw Sound Level (July 18 at 2100)
- There was sixteen exceedances of the nighttime 1-hour City of Calgary Community Standards Bylaw Sound Level

A check of site records concluded that production plants were running 24 hour shifts

As noise can be impacted by a variety of conditions, data is considered invalid if the wind speed is above 11.5 km/hour and rainfall is greater 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.

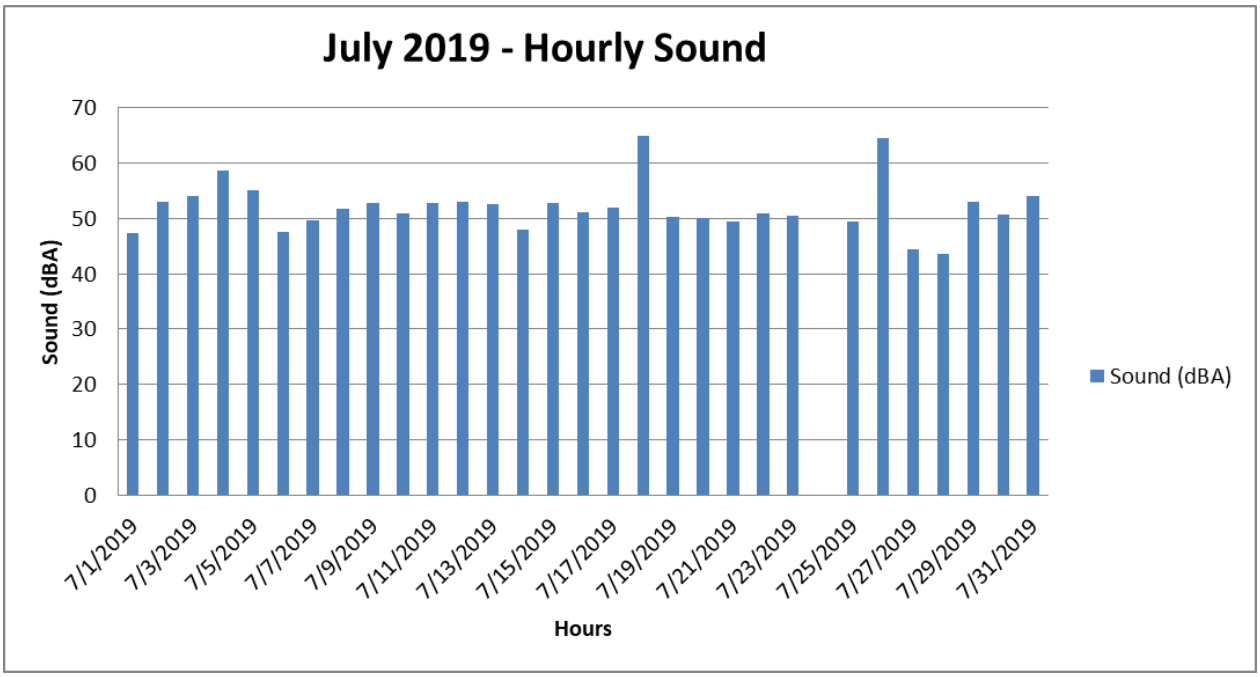

Figure D1: Hourly sound level at the STAR Pit

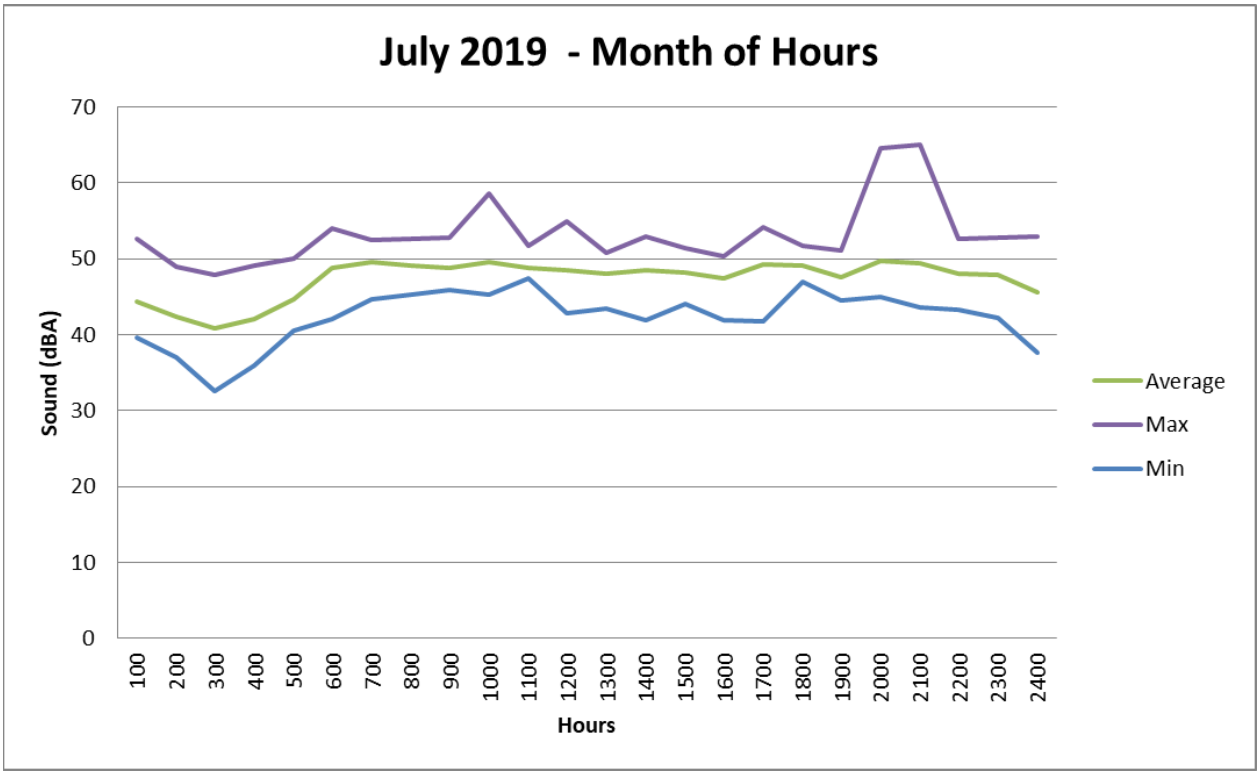

Figure D2: Month of Hours sound levels at the STAR Pit