

Ambient Air and Sound

Monthly Report

STONEY TRAIL AGGREGATE RESOURCE

BURNCO

LAFARGE



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Contracting Ltd.

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This report summarizes the ambient air quality, metrological data and sound data collected at the Stoney Trail Aggregate Resource (STAR) pit monitoring locations for the month.

Particulate and Metrological Data Results

Table 1 provides a summary of the particulate and metrological data during the month. STAR compares its data to Alberta's ambient air quality objectives (AAAQO) and guidelines (AAAQG) guidelines as well as to the Calgary Region Airshed Zone's (CRAZ) northwest particulate monitor data both which can be found in Appendix B.

Table 1: STAR data summary for particulate and metrological data

| Parameter | Monthly Average | CRAZ | 1-Hour Average | | 24-Hour Average | |
|---------------------------------------|-----------------|---------------|-----------------------|--------------------------|-----------------------|-----------------|
| | | PM2.5 Average | Maximum Concentration | Events vs AAAQO or AAAQG | Maximum Concentration | Events vs AAAQO |
| PM ₂₅ (ug/m ³) | 6.01 | 8.29 | 40.63 | 0 | 15.76 | 0 |
| TSP (ug/m ³) | 7.86 | | 186.7 | - | 40.22 | 0 |
| Wind Speed /Direction | 14.83/WSW | | 53.42/WNW | - | 31.2/NW | - |
| Precipitation(mm) | 5.1* | | - | | | - |

*Monthly total accumulation of precipitation (mm)

The wind rose (Figure 1) illustrates the frequency of wind speed and direction for the month. Figure 2 graphically illustrates the time series for hourly concentrations of PM_{2.5}, while Figure 3 and 4 shows daily average concentrations recorded during the month for particulate matter.

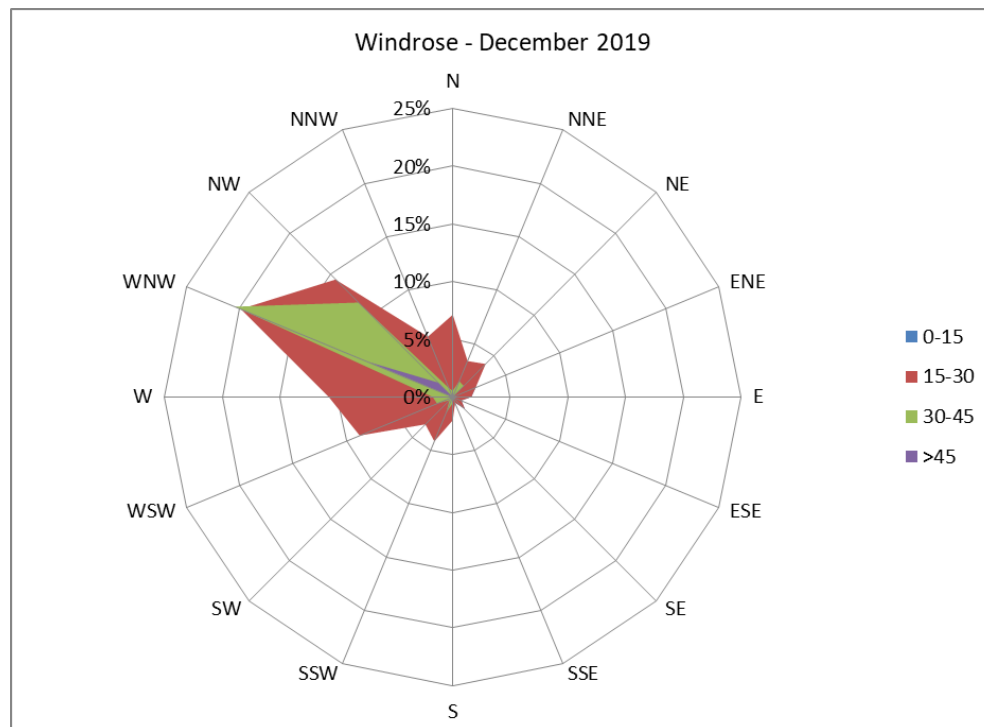


Figure 1: Monthly wind rose from the scale house station

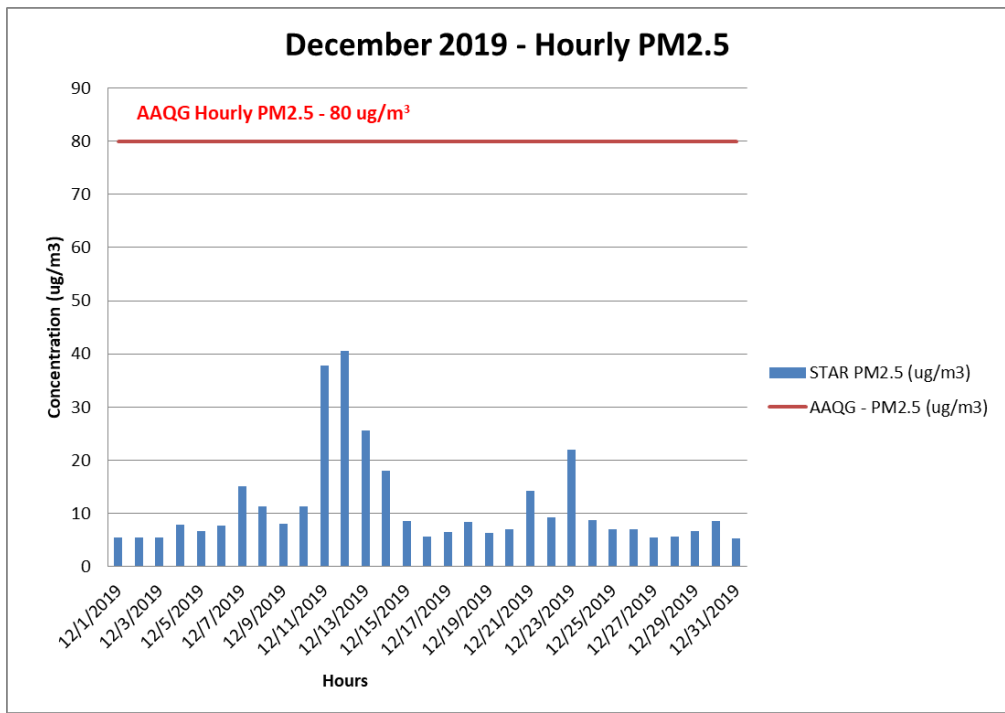


Figure 2: 1-hour concentrations of PM_{2.5} STAR

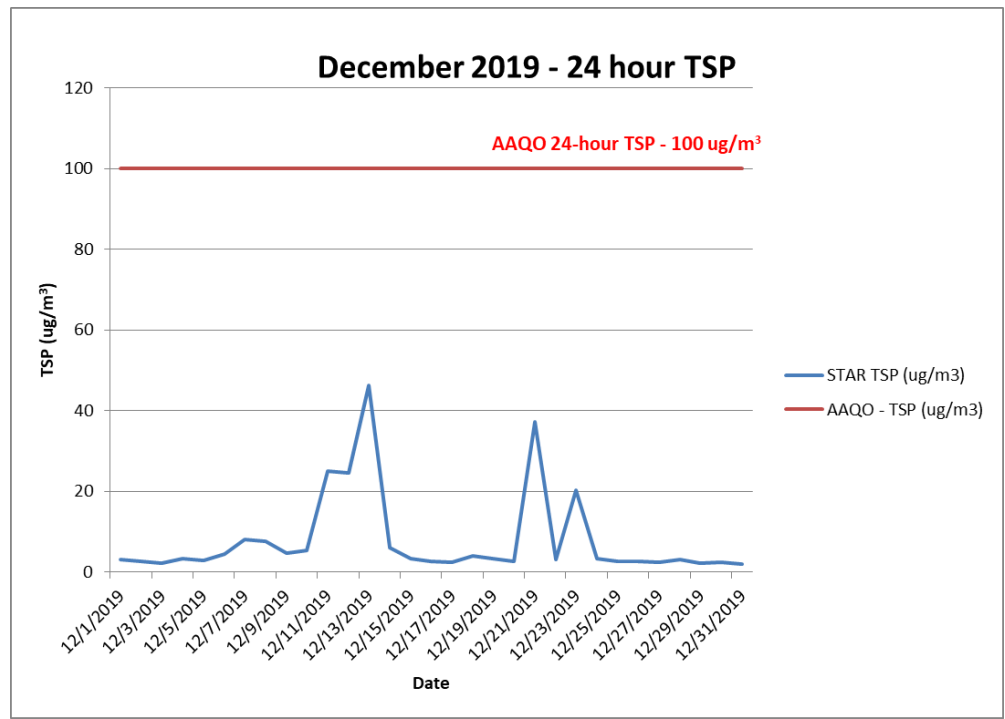


Figure 3: 24-hour concentrations of TSP at STAR

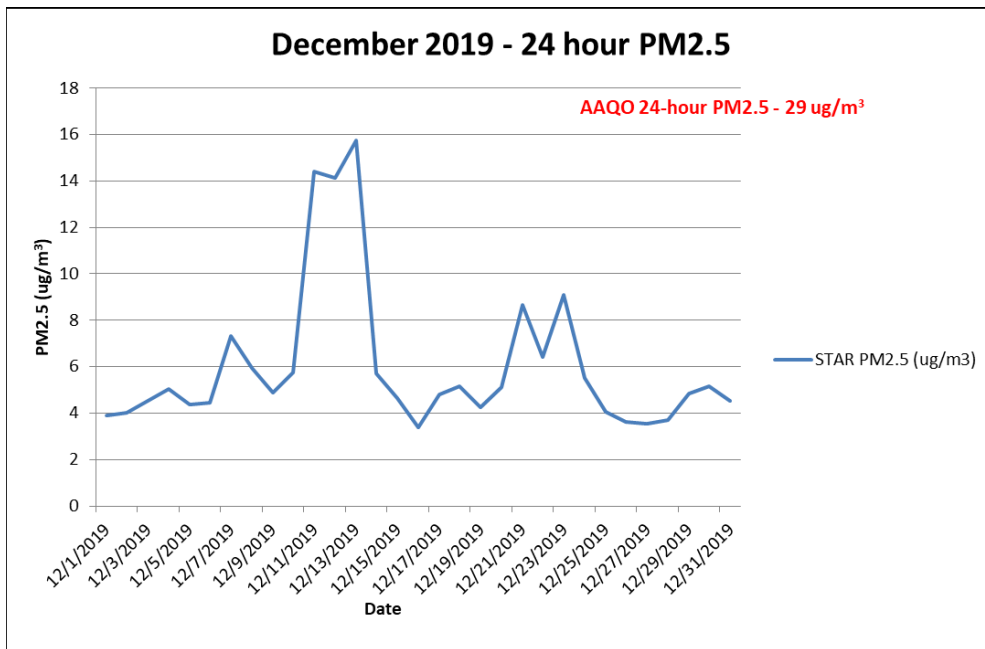


Figure 4: 24-hour concentrations of PM_{2.5} at STAR

The results from the STAR Pit and the CRAZ station for PM_{2.5} are shown graphically below (Figure 5).

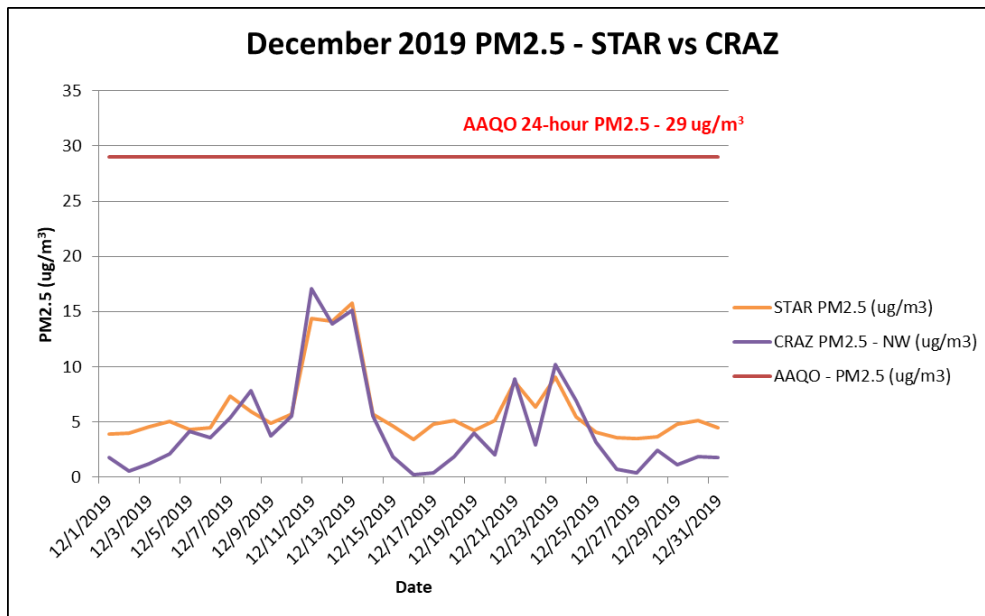


Figure 5: CRAZ and STAR Comparison for PM2.5

Sound Data

A summary of the sound data during the month can be found in Table 2. STAR compares its data to the City of Calgary guidelines for residential areas that can be found in Appendix C.

Table 2: STAR data summary for sound data

| Parameter | Monthly Average (dba) | Maximum 1-Hour Sound Level (dBA) | Events vs Guidelines |
|-----------------------|-----------------------|----------------------------------|----------------------|
| Sound Level Day Time | 46.46 | 52.38 | 0 |
| Sound Level Nighttime | 39.79 | 47.28 | 0 |

Figure 6 shows the graphical representation of hourly sound levels at the STAR pit. Figure 7 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.

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.

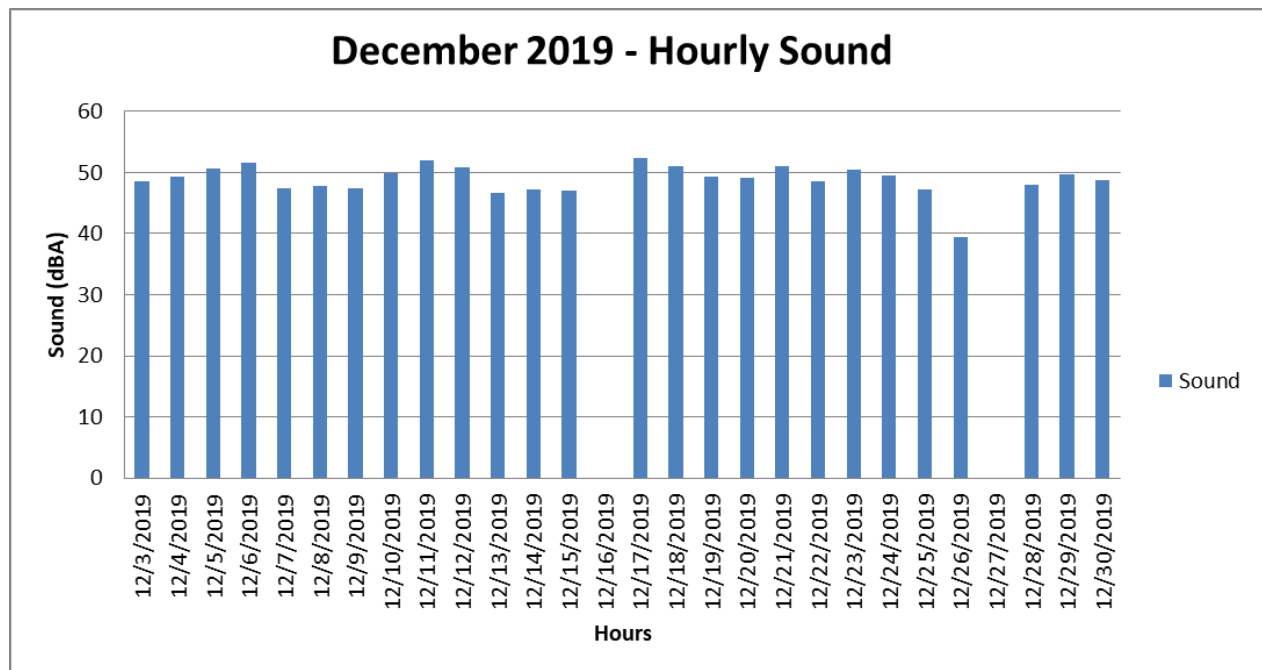


Figure 6: Hourly sound level at the STAR Pit

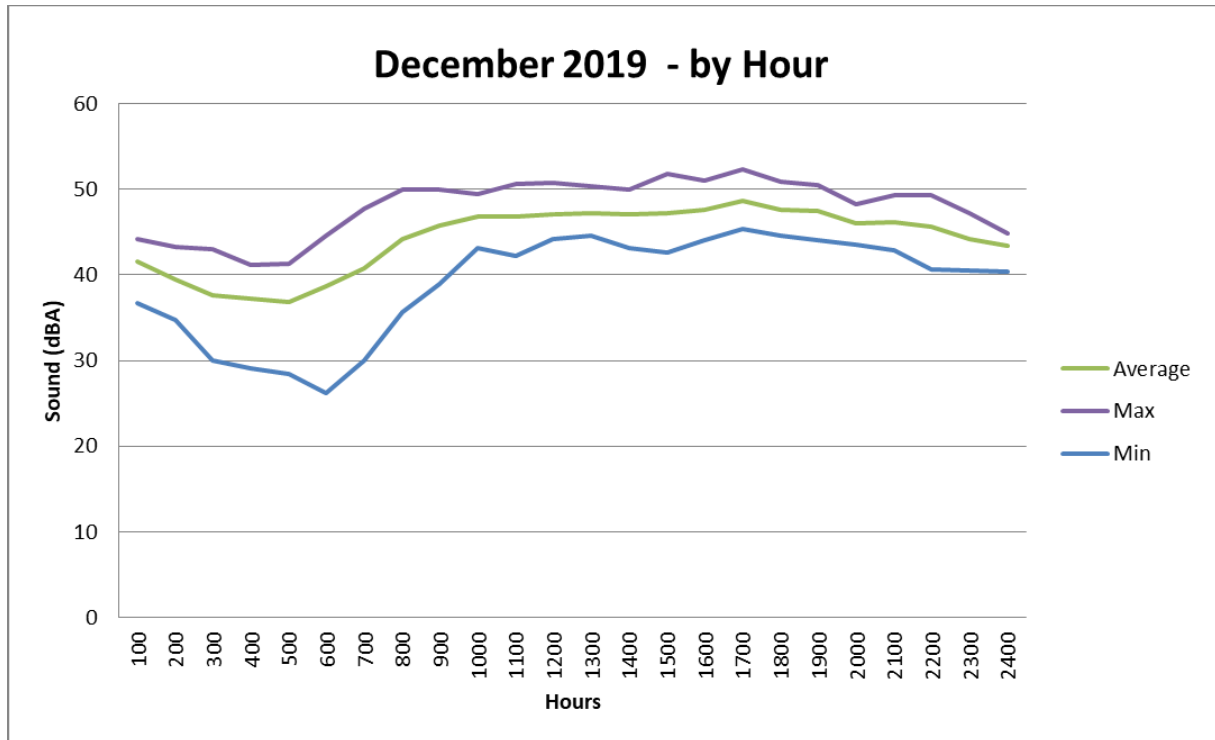


Figure 7: Month of Hours sound levels at the STAR Pit

Appendix A – Monitor Information

There are two monitoring stations at STAR, one is located inside 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 A2. The particulate and sound station has been at this location since 2014. 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. The location of the monitors can be found in Figure A1.

It is important to note that the monitoring stations are located inside the perimeter berms, adjacent to operations and not at site boundaries. Measurements are intended to help monitor the internal operations and are an indicator of offsite results.



Figure A1: Location of BLV Monitors

Table A provides a summary of the monitoring equipment for both stations.

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 A2: Picture of West Berm Station

Appendix B – Particulate Criteria and CRAZ Comparison

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 or less | 24-hour | 29 |

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 |

Calgary Region Airshed Zone (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 B1).

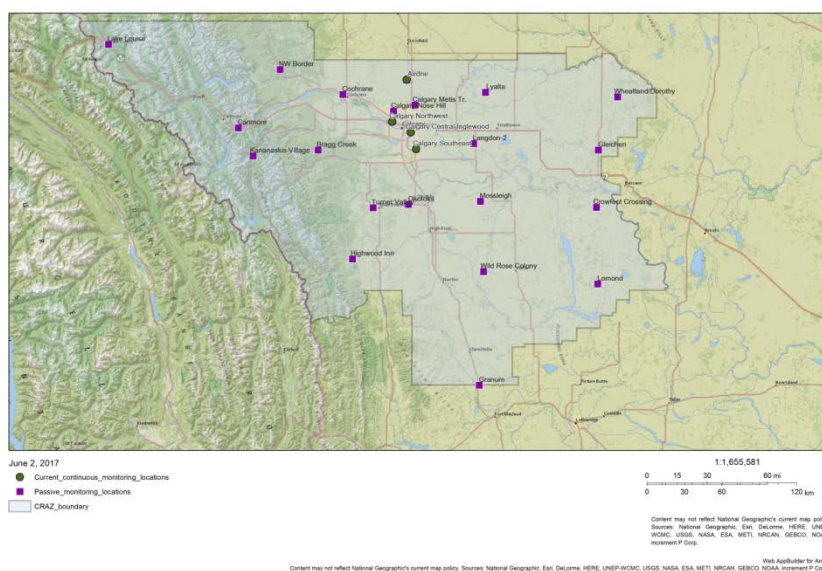


Figure B1: CRAZ boundary map

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 B2).

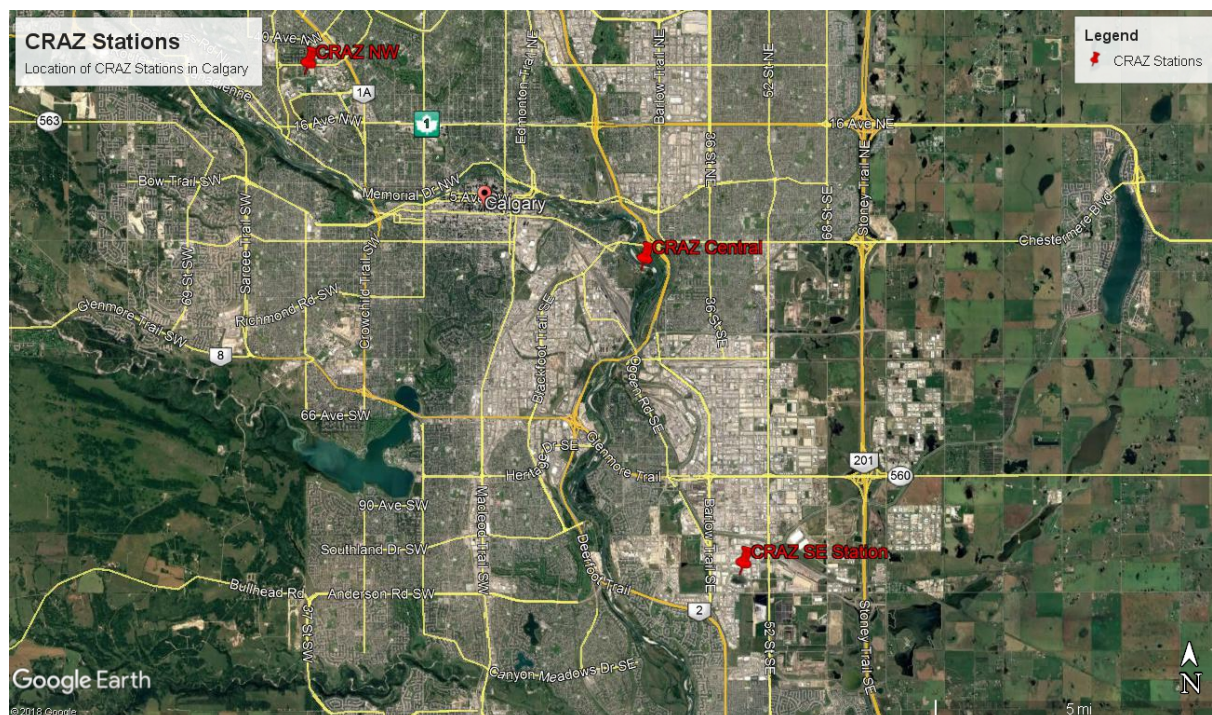


Figure B2: CRAZ Monitor Location

STAR's monitoring data is compared with the Calgary Region Airshed Zone's (CRAZ) northwest particulate monitor to provide context for STAR results with the greater airshed

Appendix C - Sound Criteria

At the STAR pit, there is one sound monitor located within the sound berms to document the outdoor sound levels and help project the sound impact of the site to the community. The monthly data can be an indicator how the facility compares 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. The STAR site is surrounded by constructed sound berms and crushing equipment is located in previously excavated and backfilled areas near the lowest part of the pit with orientations generally away from residents and towards product stockpiles.

On occasion STAR personnel and City of Calgary bylaw officers may monitor the sound at the perimeter of the site. To date no exceedances to the bylaw have been noted by the City of Calgary bylaw officer.

Sound 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. Although located in an industrial area the STAR pit compares to these limits as we are located near residential developments:

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.