

March 29, 2018

Re: Annual Summary Reports For Air, Noise, and Blasting and Vibrations Monitoring

Please find enclosed summary reports for air, noise, and blasting and vibrations monitoring throughout 2017 at Elkview Operations (Elkview). These summary reports and their content are required under Environmental Assessment Certificate M16-01 for the Baldy Ridge Extension Project (BRE). The complete Annual Air Report can be found at Teck.com.

If you have feedback on these reports, please contact Teck through the Teck Elk Valley Feedback Mechanism using one of the methods listed below.

- Phone: 1-855-806-6851
- Email: feedback.teckcoal@teck.com
- Online submission form: www.teck.com/contact
- Feedback Boxes located throughout the Elk Valley and the Crowsnest pass

Responses to feedback will be sent if contact information is given.

Sincerely,



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Teck Coal Limited – Elkview Operations

Community Engagement Plan Annual Report

March 29, 2018



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1 Introduction

Elkview Operations (EVO) has committed to annual summary reports on the follow management plans as part of the Community Engagement Plan.

- Noise
- Blasting and Vibration
- Air Quality and Dust Control

These management plans outline actions which EVO completes to mitigate impacts from the Baldy Ridge Extension Project (BRE). Below is a summary of the status of each of these plans monitoring actions, any changes to the planned actions, and feedback received from communities on those actions.

1.1 Project Status

BRE Construction began in December 2016 and Operations started in January 2017. Construction/operations started in Baldy Ridge 6 (BR6) pit and consisted of:

- placing a skid shack for power;
- adding a portable washroom;
- creating a lay-down area for storage;
- removal of a power line;
- road construction and upgrades;
- overland belt protection;
- spoiling of material; and
- blasting.

EVO paused activities in BR6 pit on September 19, 2017 and is currently not working within the BRE footprint. Activities in BR6 are expected to resume in 2019.

2 Noise

Activities at EVO include mining, processing, maintenance, coal storage and rail loading coal. All of these activities generate sound that may be audible beyond the mine site boundary and could become more noticeable as future mining activity progressively moves closer to residences and infrastructure. EVO is committed to working with the surrounding community to ensure that noise levels generated from EVO do not exceed recommended guidelines defined within the Noise Control Plan.

The primary objective of the Noise Control Plan is to ensure that noise levels do not exceed daytime (7:00 am to 10:00 pm) and nighttime guidelines. This will limit any potential noise nuisance to the local community and wildlife.

A critical separation distance for mining has been defined through the BRE project in order to understand when further modeling and mitigation work may be required at EVO. EVO's current noise model defines the critical separation distances as 1,000 m from the Baldy Ridge 3 Pit and 3,000 m from the Baldy Ridge 4 pit as measured from the nearest residences on Michel Creek Road. Outside of these distances, measured sound levels attributable to mining operations are not verifiable.

The scope of the Noise Control Plan is defined as activities that occur within the permitted active disturbance boundary of the operation or any construction activities that are directly associated with the operations that may exist outside of the disturbance boundary. The Plan encompasses all mining activities, except blasting, that have the potential to generate noise. Specifically, the Plan focuses on the following mine-activity related aspects; including but not limited to:

- site preparation and site access;
- operation of heavy equipment in active mining areas (pits, haul roads, waste rock spoils, hopper, raw coal conveyance and breaker); and
- process plant activities such as train loading.

Noise associated with blasting is addressed in the Blasting and Vibration Management Plan (Section 3).

2.1 Noise Monitoring

As outlined in the Noise Control Plan, once mining activity reaches critical distances, or if community feedback indicates noise concerns, a qualified professional will be hired to audit the Noise Control Plan, this will consist of the following:

- Third-party acquired to review the Noise Model created for BRE project assessment
- If the review of the model indicates a potential concern in exceeding the noise limits, the next step is required
- A QP will design and implement a noise monitoring program to further validate the model results. The monitoring program will include
 - the 6 receptor locations outlined in the Noise Control Plan as a minimum
 - outline other monitoring locations (if required)
 - frequency, duration of monitoring
 - reporting needs
- Should monitoring results from the noise monitoring program indicate a potential to exceed the noise limits, the next step is required
- Evaluate the results and as decided by the professional, immediately implement remedial actions. These could be installing noise attenuation technology or making changes to mine design to reduce noise to within the limits and to minimize the probability of repeat occurrences.

Road construction activities began within the critical separation distances in late 2017. A qualified professional has been scheduled to audit the Noise Control Plan in 2018 as a result. A qualified professional will also review the predictive noise model and modelling results in 2018 to determine if there are any additional concerns for exceeding noise limits (Table 1,) beyond what was originally modelled. If additional concerns are noted, a noise monitoring program will be designed and implemented to further validate model results. If required, additional monitoring and mitigation will be implemented.

Table 1: Modelling noise control limits at receptor locations

Receptor Location	Day Time (07:00 – 22:00) PSL	Night Time (22:00 – 07:00) PSL
R01– Michel Creek Road	55 dBA L _{EQ}	52 dBA L _{EQ}
R02 – Michel Creek Road	53 dBA L _{EQ}	43 dBA L _{EQ}
R03 – Cyprus Drive	58 dBA L _{EQ}	48 dBA L _{EQ}
R04 – Elk Valley Trailer Park	63 dBA L _{EQ}	58 dBA L _{EQ}
R05 – Alexander Creek North	50 dBA L _{EQ}	40 dBA L _{EQ}
R06 – Alexander Creek South	50 dBA L _{EQ}	40 dBA L _{EQ}

dBA = A-weighted decibel; L_{EQ} = equivalent continuous sound level; PSL = permissible sound level

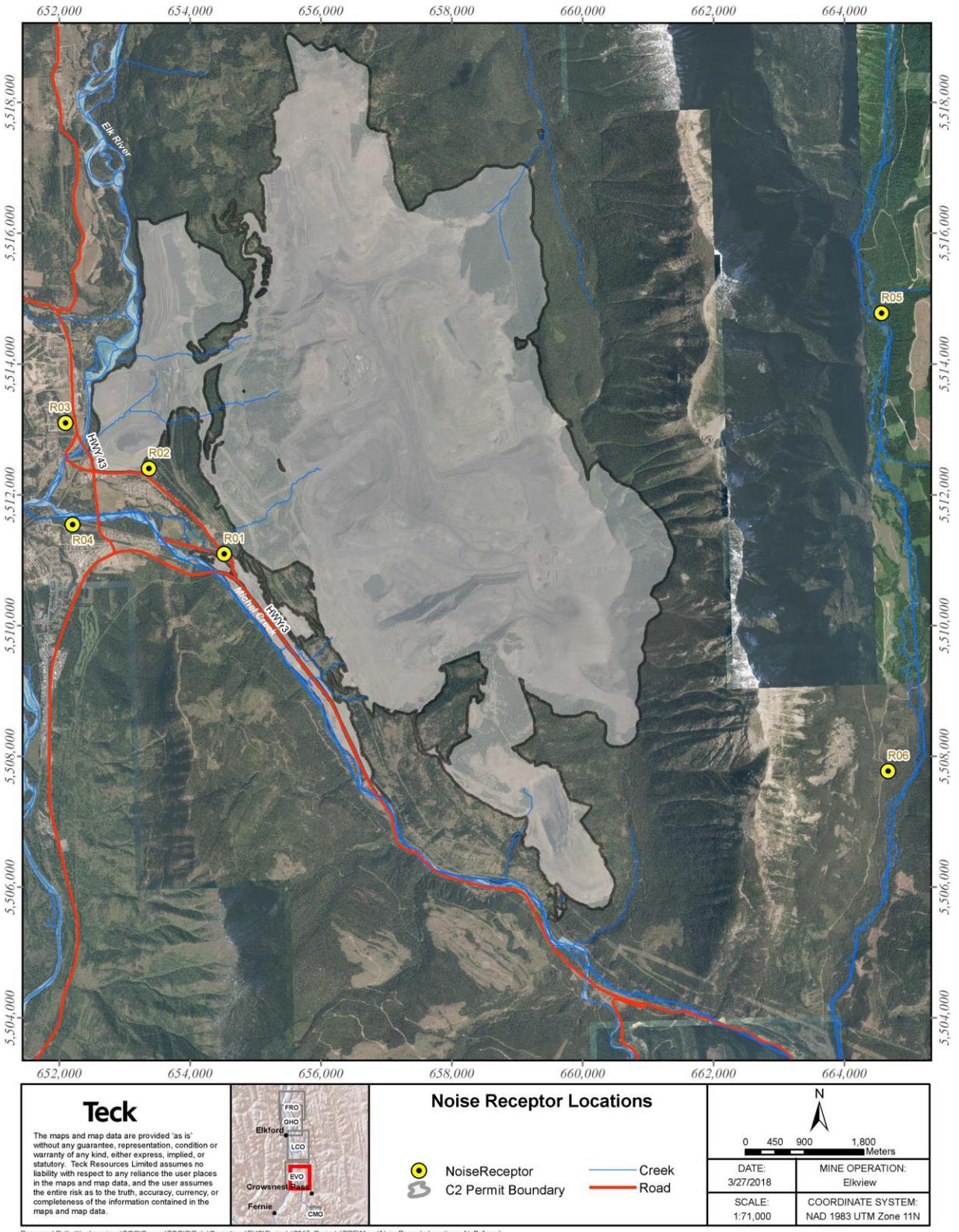


Figure 1 Noise receptor locations

2.2 Changes and Updates to the Plan

There were no changes or updates to the Noise Control Plan in 2017.

3 Blasting and Vibration

Mining activities at EVO require blasting of hard rock layers. Special consideration with respect to blast design and practice is required because of EVO's close proximity to the community of Sparwood. EVO understands that mining is progressing closer to the community and we are committed to ensuring the health and safety of the community is not compromised.

Blasting has many components that require management: fly rock, ground vibrations, air over pressure vibrations, blast fumes and dust. A general overview is provided below.

Fly rock is material that is ejected into the air during a blast. Fly rock can be managed through engineered blast design and processes with consideration of shot direction, material types, topography, borehole size, charge weight and proper burden/relief. Blast clearance zones are used to reduce the risk of injury to persons or wildlife and to limit damage to equipment and infrastructure from fly rock.

Blasting related vibrations have two components outlined below: ground vibration and air over pressure. Both can be managed through blasting practices and design.

- Ground vibration is the blast wave front that is carried through the ground. Ground vibration is measured as peak particle velocity (PPV) in millimetres per second (mm/s). While inaudible, ground vibration can be detected by humans and, if they are not controlled could cause damage to some infrastructure.
- Air over pressure, also known as air blast, is the blast wave front that travels through the atmosphere as sound waves. Air over pressure is measured as pressure or decibels (dBL) and can be generally felt further away from the source than ground vibrations. The rate at which air blast vibrations diminish is dependent on distance, atmospheric conditions and topography. When a blast is felt or heard it is generally due to the air blast and not ground vibration as ground vibrations diminish closer to the source.

To meet the management objectives EVO uses an adaptive management approach, making changes as site conditions and monitoring results dictate or as new technologies emerge. Through on-going blast monitoring our fly rock and blast vibration predictive models are updated. EVO is able to implement changes to blasting practices as mining progresses closer to residents and infrastructure to comply with the guidelines set in the Management Plan. Monitoring and regular review of the results are the core adaptive management activity that helps guide improvement.

EVO is not currently mining within BRE-approved areas or within the scoped area of the Blasting and Vibrations Management Plan. However, EVO was mining within the BRE project in BR6 pit earlier in 2017. The update below is part of EVO's adaptive management approach to gather data to update blasting models and understand required mitigations.

Three new monitoring stations were installed in May of 2017, in accordance with the *International Society of Explosives Engineers First Practice Guidelines for Blasting Seismographs 2015* and there are plans to install a fourth in 2018 (Figure 2). Monitors were initially set to trigger levels between 5.0 and 12.7 mm/s and 130 dBL. No events were detected at that trigger level; therefore, trigger levels were reduced to 0.5 mm/s for ground vibration and 127 dBL for over pressure.

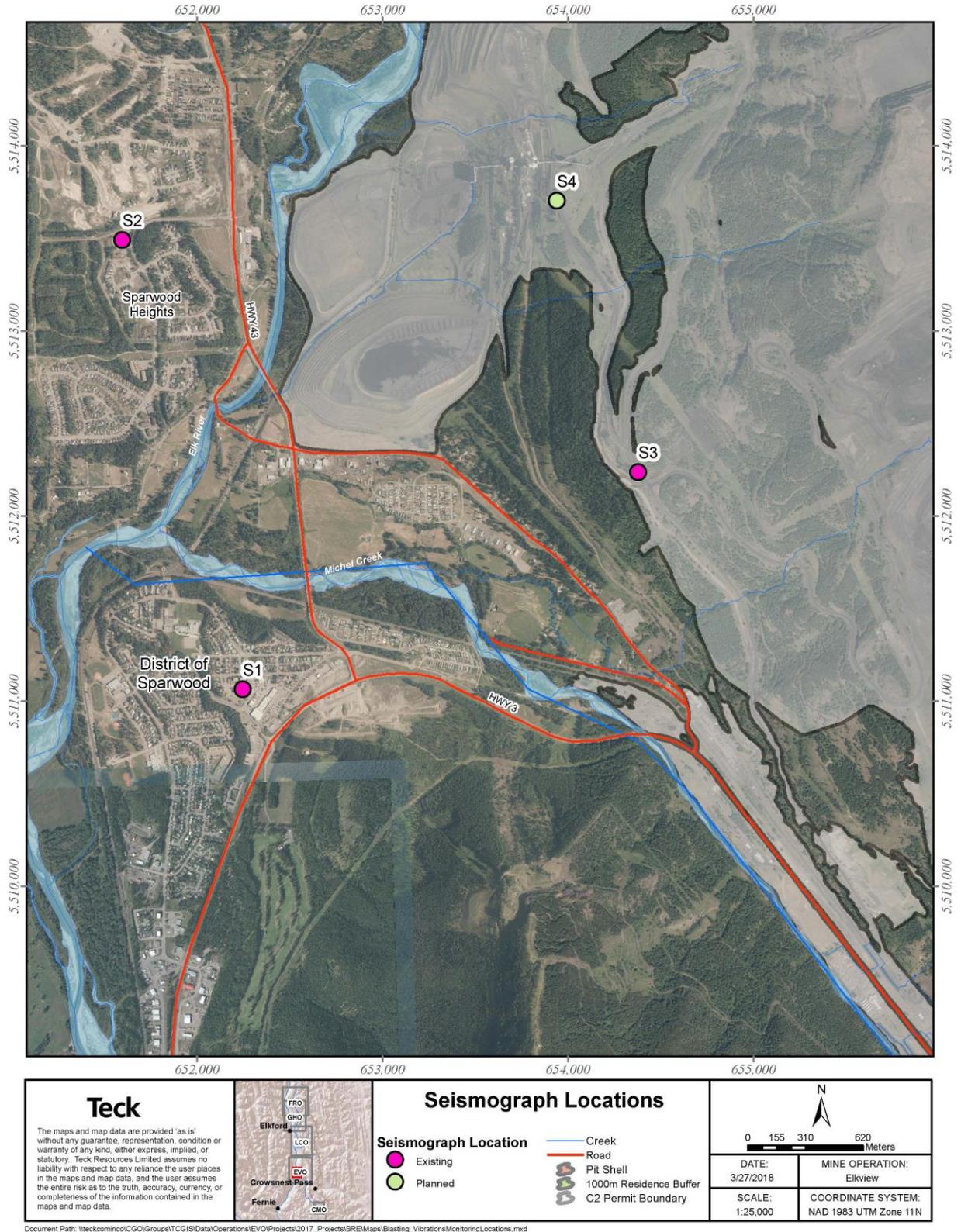


Figure 2 Seismograph Locations for Monitoring Blasting and Vibration at EVO

3.1 Air Over Pressure and Vibration Monitoring

EVO conducted two hundred and sixty blasts in 2017. The distribution of blasts are shown in Figure 3 below. BR6, indicated in green in the figure below, is within the BRE footprint.

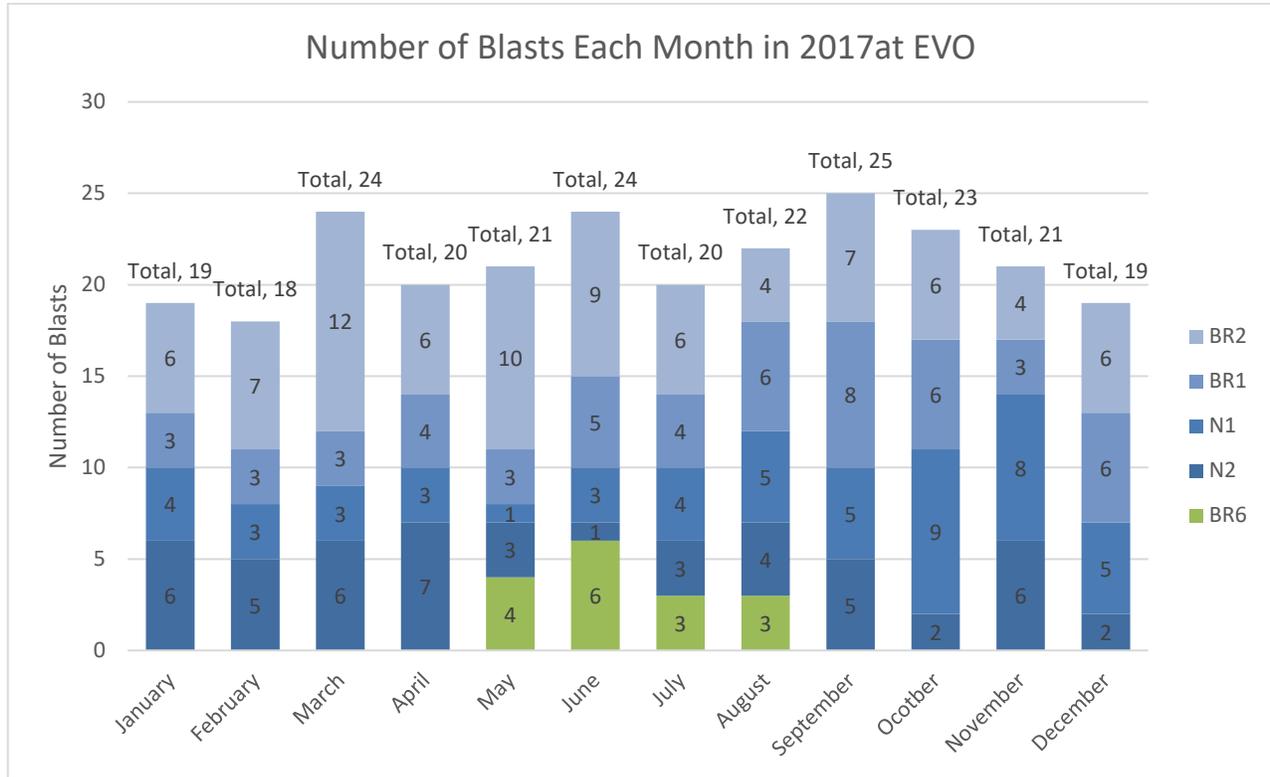


Figure 3: Number of Blasts at EVO for each month in 2017

1.2 Air Over Pressure and Vibration Monitoring Results

During 2017 no blasting events were recorded at the S2 monitoring location, and only two events were recorded at S1 (Figure 4). Thirty events were detected at the S3 monitoring location which is located on-site and used for proactive management of air over pressure and vibrations from blast at EVO.

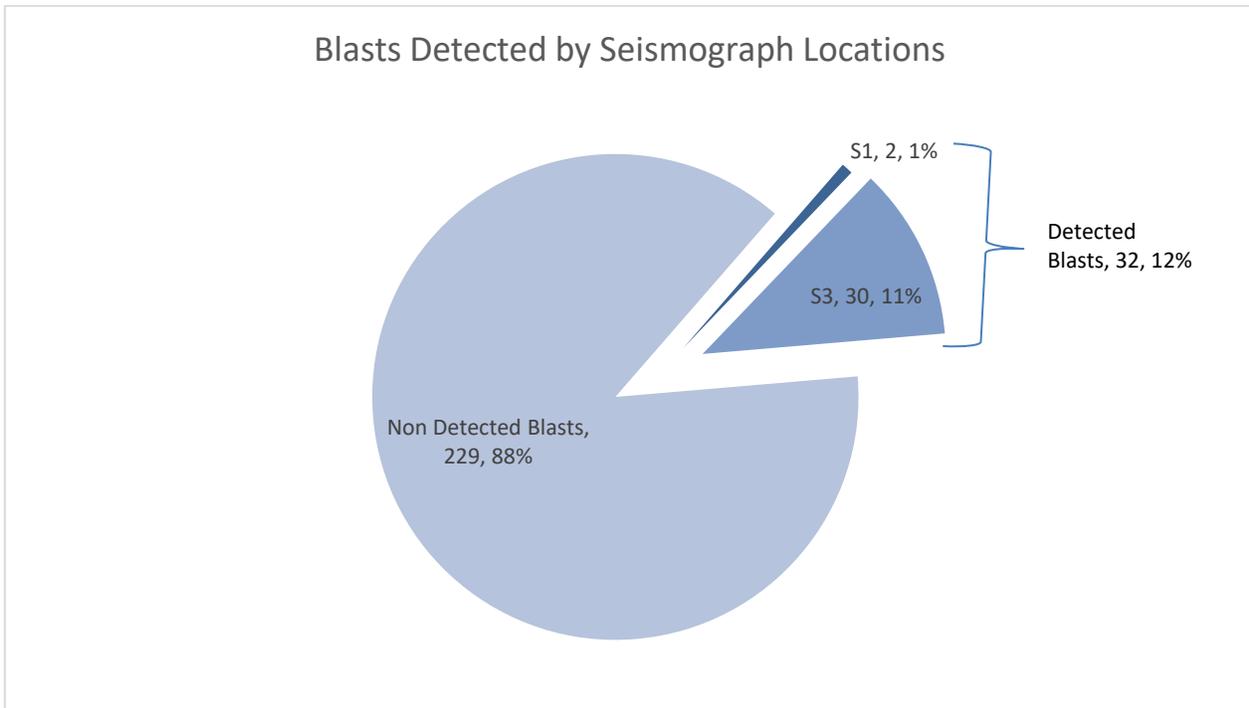


Figure 4: Number of blasts detected and non-detected at each seismograph location

All events recorded in 2017 were below the PPV limit (12.7 mm/s) for ground vibration (Figure 5) and 127 dB/L for air over pressure (Figure 6). As indicated above, trigger levels were lowered in the spring of 2017 to detect blasts; prior to this, blasts were not detected.

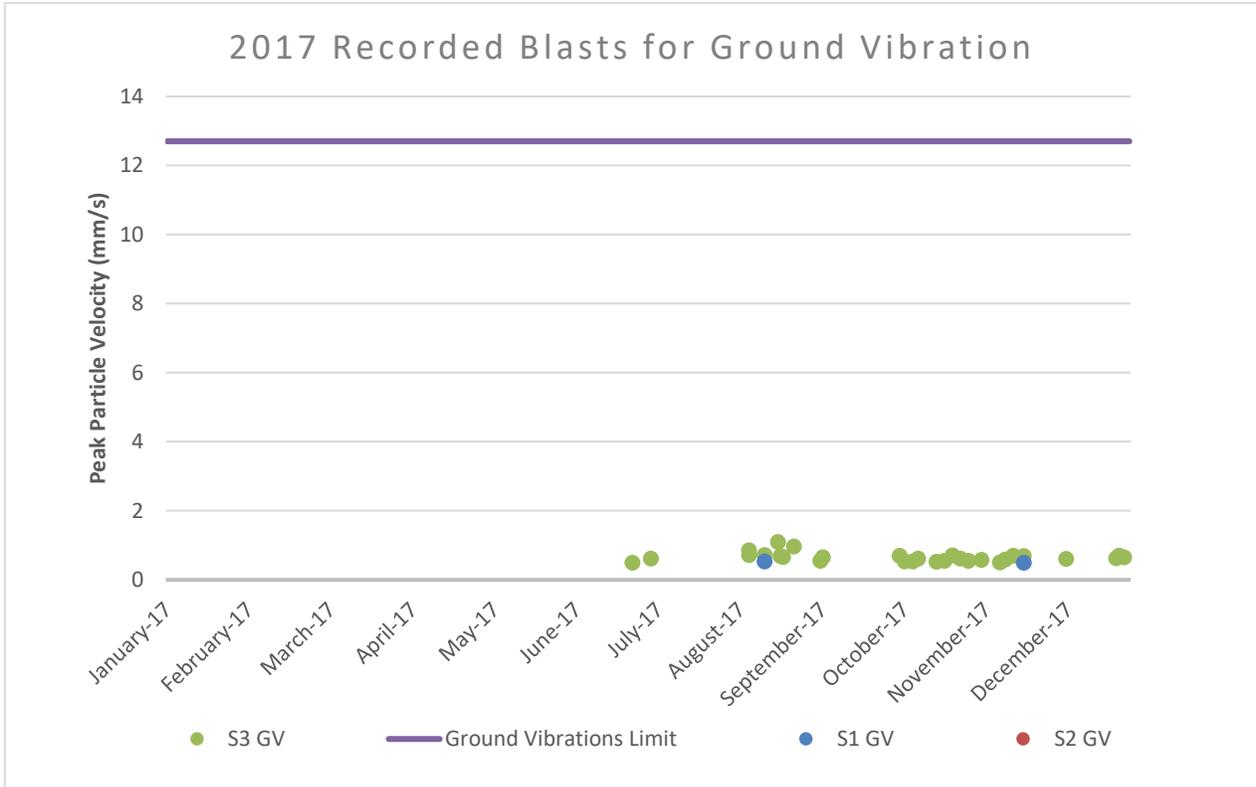


Figure 5: Recorded ground vibrations (GV) at each station in Q4 2017 compared to limits

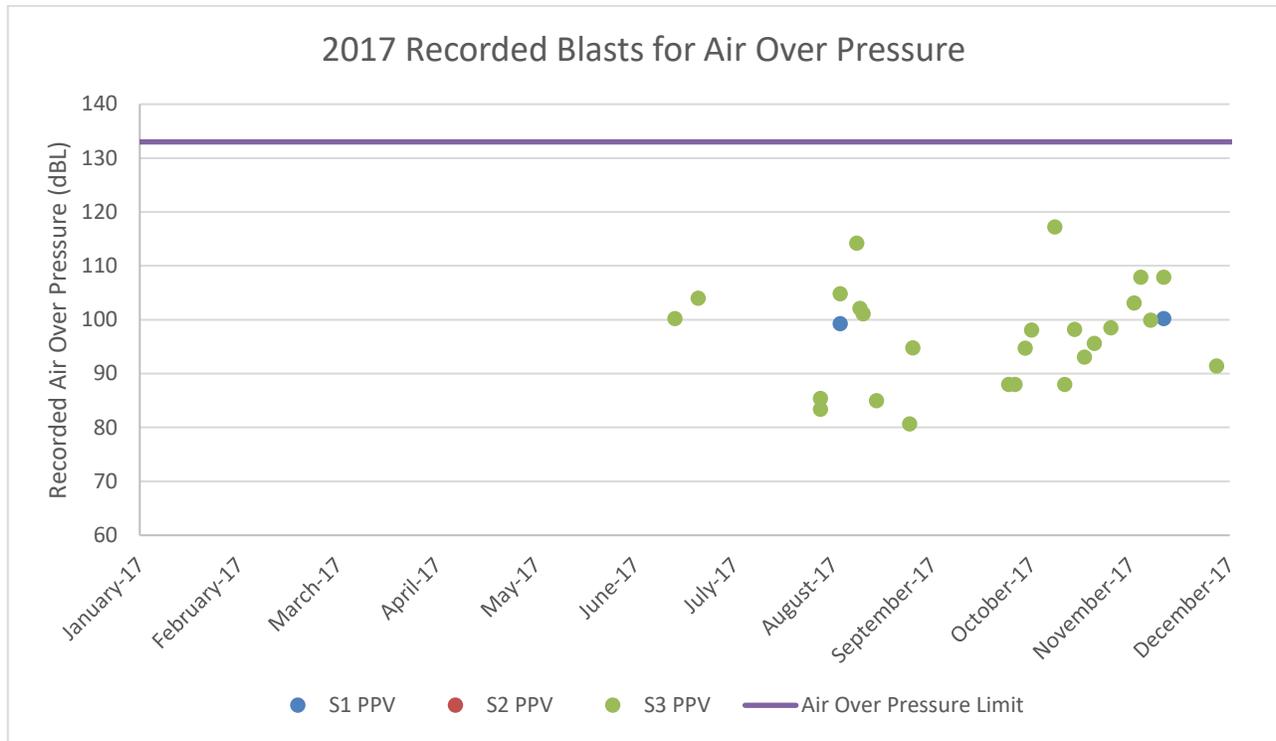


Figure 6: Recorded air over pressure (PPV) at each station in 2017 compared to limits

3.2 Changes and Updates to the Plan

There were no changes or updates to the Blasting and Vibration Management Plan in 2017.

4 Air Quality and Dust Control

4.1 Definitions

Below are definitions of terms as they relate to Section 4 of this report.

Greenhouse gas: any or all of carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride and any other substance prescribed by regulation.

Particulate matter: all solid and liquid particles suspended in air, can be measured based on the size of a particle or all particles (total particulate matter).

Source dust: dust emitted from a definable point source.

Fugitive dust: dust not emitted from a definable point source.

Ambient air monitoring: continuous assessment of the surrounding air quality as it relates to fugitive dust emissions.

4.2 Air Quality and Dust Control Management Plan

The primary objective of the Air Quality and Dust Control Management Plan is to manage site activities and mitigate effects on air quality related to particulate matter (fugitive and source) and greenhouse gases (GHG).

Primary sources of fugitive dust generated at EVO include the use of haul and light vehicle roads, spoiling of waste rock, blasting and stockpiling of materials. Source dust at EVO is primarily related to building

emissions. The primary source associated with GHG are from vehicle and mining equipment emissions while operating.

4.3 Air Quality Monitoring

During 2017, EVO monitored three ambient air quality stations in conjunction with meteorological stations adjacent to the mine site (Figure 7). Samples were collected continuously and monitored for particulate matter (PM) less than 10 µm diameter (PM₁₀) and less than 2.5 µm diameter (PM_{2.5}). Ambient air stations are used to assess air quality related to fugitive dust emissions.

Source locations, the Dryer Stacks and Breaker Stack (Figure 7), are sampled twice a year. Source sampling was conducted in Q2 2017 and again in Q4 2017. Source monitoring is used to assess the effectiveness of control measures on particulate and GHG release at a point or single source.



Figure 7: Air monitoring locations

4.3.1 Source Monitoring

Source monitoring occurs twice a year at the Coal Breaker Stack and the North and South Dryer Stacks. In 2017, this sampling occurred in the second and fourth quarter (Q2 and Q4).

Source emissions sampling in Q2 2017 occurred from May 30 to June 1 (Table 2). Results from Q2 Dryer Stacks sampling, conducted on May 30 and 31 were below permit limits. Results from Q2 Breaker Stack sampling, occurring on June 1, exceeded the total particulate matter (TPM) permit limit (150 mg/m³) with a result of 528 mg/m³. EVO received these results on July 21, 2017 and conducted a re-sample on July 13, 2017.

Root cause analysis determined that the Breaker Stack exceedance was a result of improper installation of filters in the dust collector and failure of the main compressor moving dust through the system resulting in dust build-up. To prevent future dust build-up, EVO increased its maintenance frequency of the Breaker Dust Collector and is providing more in-depth training on filter installation. The Breaker Stack was re-sampled July 13, 2017 and results were below permit limits (Table 2).

Source emissions sampling conducted in Q4 2017 occurred from October 12 to October 14 (Table 2). Results from Q4 Dryer Stacks and Breaker Stack sampling were below permit limits.

Table 2: Source Monitoring Results in 2017

Sample Date	Location	Average Flow Rate (m ³ /s)	Average Total Particulate Matter (mg/m ³)
June 1, 2017	Coal Breaker Stack	9.5	528
July 13, 2017		10.3	<4.9
October 12, 2017		11	55.8
Permit Limits		14	150
May 30-31, 2017	North Dryer Stack	-	24.5
	South Dryer Stack	-	22.4
	Combined Dryer Stacks	111.2	-
October 14-15, 2017	North Dryer Stack	-	41
	South Dryer Stack	-	38
	Combined Dryer Stacks	108	-
Permit Limits		133	85

4.3.2 Ambient Monitoring

EVO monitors ambient air quality at three monitoring locations: Downtown Sparwood Centennial Square (DTAM); Whispering Winds Trailer Park (WWTP); and the old Michel By-Products Plant (MBPP). Results of continuous air monitoring at these stations is compared to British Columbia Ambient Air Quality Objectives¹ (AAQO) for PM₁₀ (Figure 8) and PM_{2.5} (Figure 10).

During the Summer of 2017, the Elk Valley experienced dry conditions and hot temperatures as well as forest fires which may have impacted performance on dust mitigation activities. Figure 9 and Figure 11 illustrate the Hosmer Air Station which has little to no mining impact (is located approximately 16 km away from EVO and

¹ Available at <http://www.bcairquality.ca/reports/pdfs/aqotable.pdf>

in 2017 this station had a predominant wind direction of Southwest, towards EVO); showing similar trends. An increase in PM₁₀ and PM_{2.5} can be seen throughout the valley air monitoring stations not just at stations near EVO.

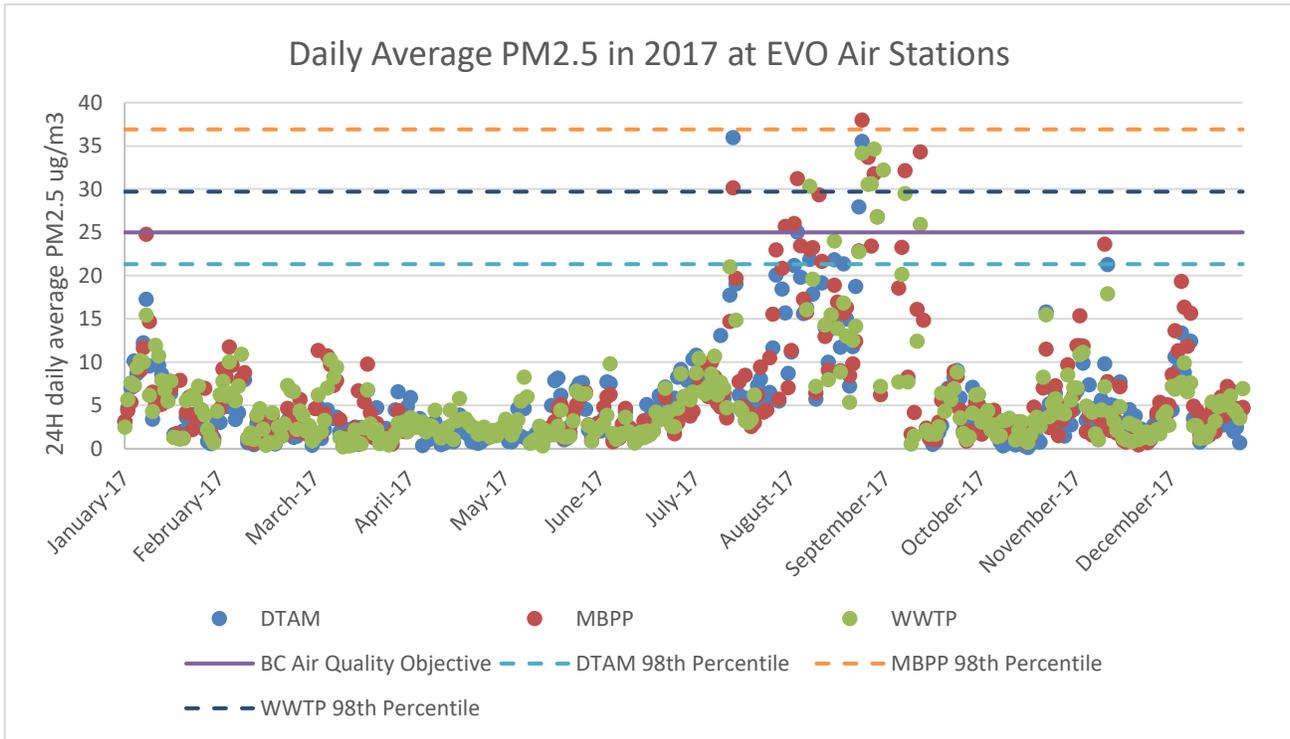
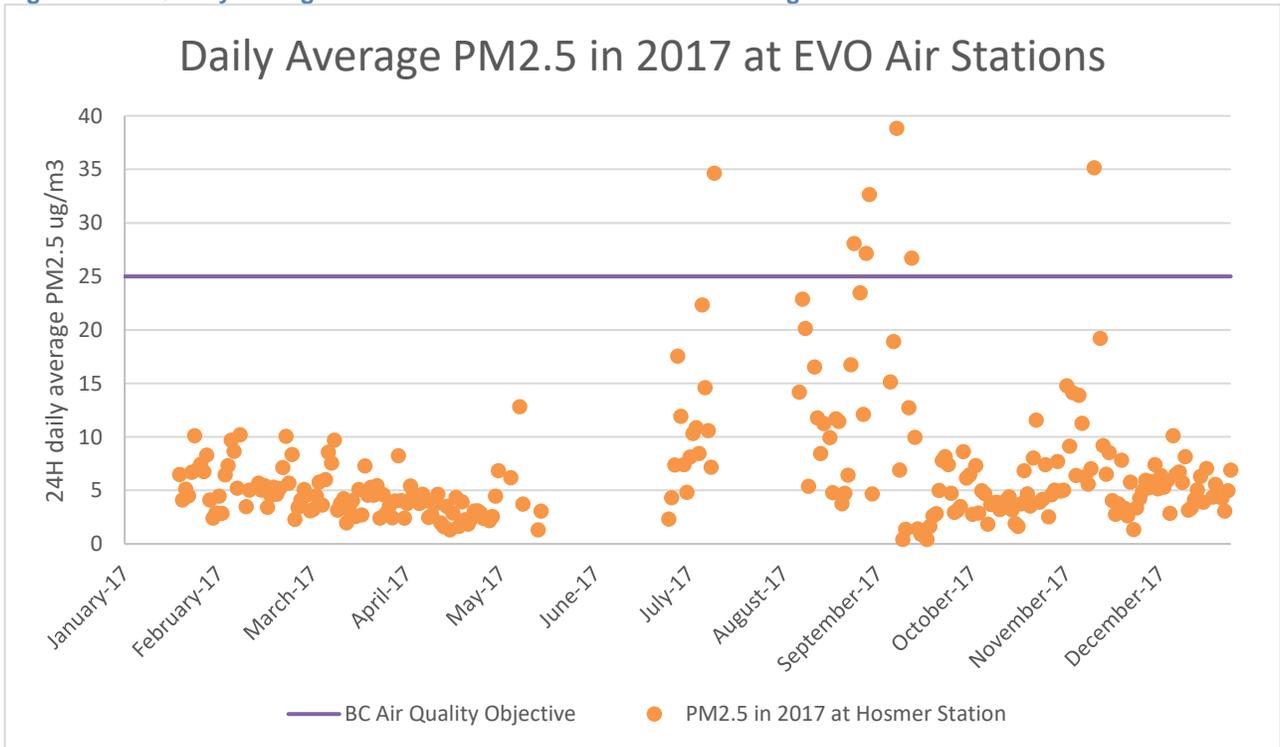


Figure 8: PM_{2.5} daily average results at EVO continuous air monitoring locations in 2017



Not all results are displayed on this figure, some results are higher than displayed, the y-axis has been set to be the same as Figure 8 for comparison purposes. These values range from 41ug/m³ on 8/30/17 to 194 ug/m³ on 9/8/17

Figure 9: PM 2.5 daily average results at Hosmer continuous air monitoring station in 2017

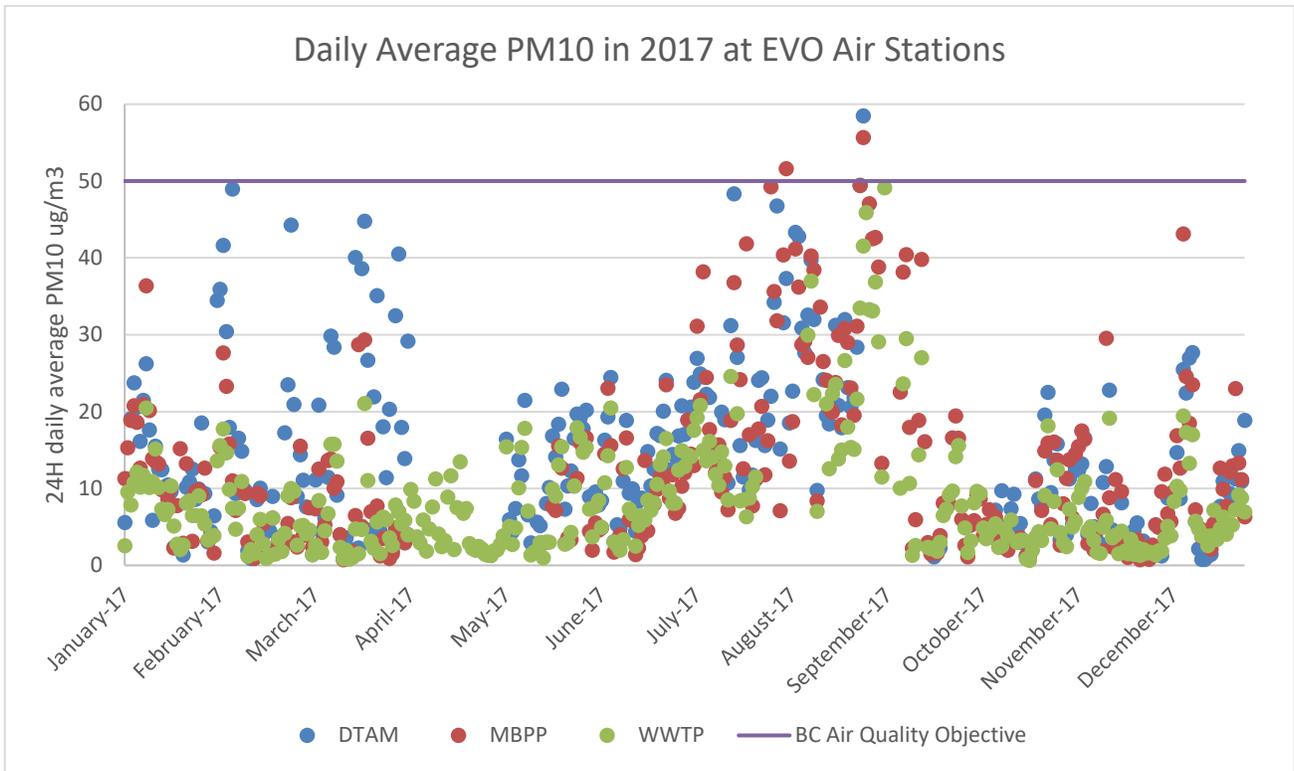


Figure 10: PM₁₀ daily average results at EVO continuous air monitoring locations in 2017

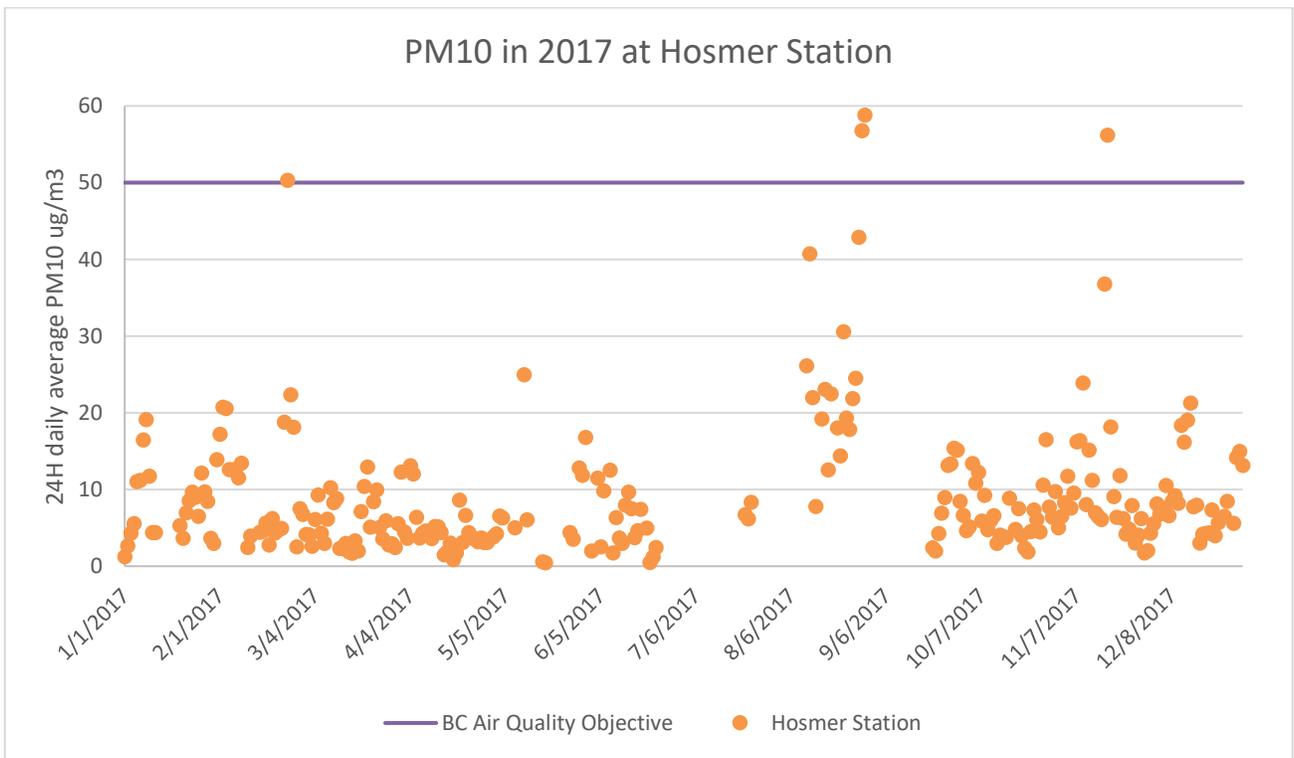


Figure 11: PM 10 daily average results at Hosmer continuous air monitoring station in 2017

For daily average PM₁₀ concentrations, the DTAM station observed concentrations above AAQO in 0.3% (1 day of the year) of its daily samples, WWTP air monitoring station did not have any concentrations above AAQO and MBPP air monitoring station observed concentrations above AAQO in 3% (8 days of the year) of its daily samples (Table 3). The 98th percentile of the daily average concentration over 365 days for WWTP and MBPP were over AAQO for PM_{2.5} (Table 3).

Table 3: Summary of results above BC Ambient Air Quality Objectives

Station	Date	Parameter	PM Concentration	BC AAQO
MBPP	2017	PM _{2.5} ²	36.90	25
	August 4, 2017	PM ₁₀	51.61	50
	August 20, 2017		55.65	
	August 30, 2017		67.68	
	September 5, 2017		61.37	
	September 6, 2017		134.41	
	September 7, 2017		127.12	
	September 8, 2017		146.22	
	September 9, 2017		79.88	
WWTP	2017	PM _{2.5} ²	29.70	25
DTAM	August 29, 2017	PM ₁₀	58.5	50

4.4 Changes and Updates to the Plan

A draft Air Quality and Dust Control Management Plan was submitted for review March 31, 2017. Some feedback on the plan has been received; the plan will be updated again based on third-party recommendations, ministry and community feedback. There were no finalized changes to the Air Quality and Dust Control Management Plan in 2017.

² PM_{2.5} objectives are based off the 98th percentile of the daily average PM_{2.5} concentration over 365 days

5 Feedback

In 2017, EVO Teck received 27 pieces of feedback from Sparwood residents regarding Elkview Operations. The majority of feedback was related to air quality and dust management (24), with instances of noise concerns (2) and one concern related to vibration from blasting. Table 4 summarizes all feedback received in 2017 regarding Elkview Operations and actions taken to address.

Table 4: Summary of Community Feedback Received by Teck regarding Elkview Operations in 2017

Topic and Number of Pieces of Feedback Received in 2017	Teck's response	Action taken at EVO on this topic
<p>Visual Dust Above EVO</p> <p>Number of Pieces of Feedback Related to this Topic: 17</p>	<p>Extended dry, hot weather conditions in 2017 created challenging conditions and we want to assure community members that we take this issue very seriously and are taking all practical measures to reduce dust at our operation.</p> <p>In addition to current practices, EVO is also working on innovative solutions to this issue including new strategies and new equipment to minimize dust generation on active waste rock dumping areas, which were the root cause of the majority of visual dust above EVO in 2017.</p>	<p>In 2017, EVO:</p> <ul style="list-style-type: none"> • Purchased a new and improved water truck that uses mister systems for improved dust management on spoils. This truck has a water tank capacity of 40,000 gallons and two misters that can each spray up to 90 gallons per minute • Purchased a second hydroseeder unit to improve dust control at our processing plant • Purchased and constructed a portable mister system for in-pit use on spoils and stockpiles • Prioritized water truck maintenance to ensure increased availability during dry and dusty conditions
<p>Dust in community</p> <p>Number of Pieces of Feedback Related to this Topic: 7</p>	<p>EVO has in place continuous monitoring equipment in and around Sparwood which monitors the level of dust particles that could potentially affect health. We welcome community feedback to help us understand if our mitigation is effective.</p>	<ul style="list-style-type: none"> • In 2017, Elkview hired a third-party has been hired to investigate monitoring and measurement methods to help understand the level and identify source dust • Based on the third-parties findings, dust management areas will be prioritized to address nuisance dust in the community.
<p>Noise</p> <p>Number of Pieces of Feedback Related to this Topic: 2</p>	<p>Bird cannons were being used as mining was progressing to deter birds from nesting; these cannons were echoing to neighbouring communities. New bird deterrents were ordered and while they were being delivered, the cannon timing and frequency was decreased as much as possible. Once the new deterrents were implemented, no additional feedback was received.</p>	<p>In 2017, Elkview:</p> <ul style="list-style-type: none"> • Switched to sonic bird deterrents to eliminate noise generated from the original deterrents
<p>Vibrations</p> <p>Number of Pieces of Feedback Related to this Topic: 1</p>	<p>A resident contacted Teck with concerns about ground vibrations at their home in Sparwood.</p>	<p>Shortly after the feedback was received, EVO installed a monitoring instrument at this location. All events detected were well below the regulatory limit (PPV= 12.7 mm/s); the highest detected was PPV= 2.908 mm/s. These results were discussed with the resident.</p>

Due to an increasing amount of feedback and concern from the community on dust management, the following additional measures were taken in 2017 to provide information on current dust management practices and continual improvement opportunities:

- Information newsletter mailed out to Sparwood residents
- A community information booth at Sparwood Mall and Sparwood Farmers Market, where we spoke to over 100 people
- Ongoing work with the District of Sparwood to respond to community concerns and jointly develop a Socio-Community and Economic Effects Management Plan
- Informational article in new Elk Valley-wide newsletter Community Connections in December 2018.

Teck appreciates the opportunity to hear the community's feedback and to talk about the work being undertaken to resolve issues and will continue to update the community on dust management work in future.

6 Summary and Conclusions

In 2017, the Noise Management Plan was triggered as work began within the critical setback distances defined in the plan. This means that EVO will acquire a qualified professional to review noise models and determine mitigations if required.

Blasting at EVO moved out of the BRE footprint area but blast monitoring continued through Q4 2017 to provide information for continual improvement in blasting practices.

Ambient air quality values collected in 2017 were elevated above AAQO for PM₁₀ and PM_{2.5} at various monitoring locations, most likely due to drier temperatures and forest fires in nearby areas resulting in air advisories for the East Kootenay in the summer months. Source sampling at Elkview was within permitted limits at the Dryer Stack for all of 2017. There was one exceedance at the Coal Breaker Stack in Q2 2017; EVO identified corrective maintenance actions and the re-sampling results were back below permit limits.

In Q4 2017, EVO and the District of Sparwood developed a draft Socio-Community and Economic Effects Monitoring Plan which outlines, among other things, the requirements for annual summary reports. Once this is finalized, EVO will follow the requirements for community reporting outlined in that plan

7 Providing Feedback and Additional Information

This report and a more detailed Annual Air Report is available at www.teck.com/elkview-reports for review. Due to the infancy of the Noise and Blasting and Vibrations Programs, more detailed reports on these topics are currently not required through their associated management plans.

If you have feedback on this report or on any Teck activities, please contact Teck through the Elk Valley Feedback Mechanism using one of the methods listed below.

- Phone: 1-855-806-6854
- Email: feedbackteckcoal@teck.com
- Online submission form: www.teck.com/contact
- Feedback boxes located throughout the Elk Valley and Crowsnest pass

Responses to feedback will be sent if contact information is given.

An Annual Meeting to discuss this report will be scheduled with the District of Sparwood between April 30 and May 31, once a date has been determined it will be relayed to the local community. Meeting minutes from the Annual Meeting will be displayed at the Sparwood Public Library, the Teck Social Responsibility Office in Sparwood and the Elkview Operations gatehouse 30 days after the meeting.