Newmont™

Brucejack Mine
PO Box 10, 2965 Tatlow Road
Smithers, BC, V0J2N0

P 778.653.7990
newmont.com

January 5, 2024

**RE: Newmont Brucejack - Air Discharge Permit 107025 (PA-107025) 2023 Amendment Application**

To whom it may concern,

Please find attached the following documents in support of the 2023 application by Pretium Resources Inc. (Pretium), now operating under Newmont Corporation (Newmont), to amend Air Discharge Permit 107025 (PA-107025):

1. Environmental Protection Notice
2. Brucejack Mine Air Discharge Permit 107025 2023 Amendment Application: Technical Assessment Report (Application)

The purpose of the application is to amend PA-107025 as follows:

| Site Reference Number | Site Description | Amendment Requested |
|---|---|---|
| E302590 | SAG mill surge bin reclaim dust collector | Change site name to "SAG mill surge bin reclaim wet scrubber." |
| E302590 | SAG mill surge bin reclaim dust collector | Increase the discharge blower rate from 8,500 $m^3/h$ to 14,000 $m^3/h$. |
| E302610 | Smelting Furnace | Correct discharge rate to from 3,000 $m^3/h$ to 5,200 $m^3/h$. |
| E302770 | Dust Collector, Fire Assay | Increase the authorized flow discharge rate from 17,000 $m^3/h$ to 34,000 $m^3/h$. |
| E302770 | Wet Scrubber | Increase the discharge rate from 9,000 $m^3/h$ to 17,000 $m^3/h$. |
| E311448 | Vent Raise VR5 | Correct the GPS location from 56.4676 N, 130.1883 W to 56.4697 N, 130.1901 W. |
| N/A | Core Saw Exhaust | New air discharge from mill core saw room dust collector with a rate of 1,700 $m^3/h$. |

Please do not hesitate to contact the undersigned if you require further information/clarification on this application. Communications regarding the PA-107025 Amendments Application should be directed to:

Sylvia Van Zalingen
*Manager, Permitting, Brucejack Mine*
PO Box 10, 2965 Tatlow Road
Smithers, BC, Canada, V0J2N0
Sylvia.VanZalingen@newmont.com
1-778-653-8049

Sincerely,

Sylvia VanZalingen

Sylvia Van Zalingen
*Manager, Permitting*

cc: Sean Masse, Torence Sandhals, Stephanie Thibeault, Greg Norton, Newmont

**ENVIRONMENTAL PROTECTION NOTICE**

Application for a Permit Amendment Under the Provisions of the *Environmental Management Act*

We, Pretium Resources Inc. (Pretium), operating under Newmont Corporation, PO Box 10, 2965 Tatlow Road, Smithers, BC, V0J 2N0, have submitted an application to the Director to amend Permit PA-107025, issued January 9, 2014 and last amended July 8, 2021, which authorizes the discharge of air emissions from the Brucejack Mine.

The land upon which the facility is situated, and the discharge occurs, is Mining Lease Tenure Number 1038598, located at 56.47N and 130.19 W, approximately 65 km north-northwest of Stewart BC within the Regional District of Kitimat-Stikine.

The amendment application requests that the following conditions be changed:

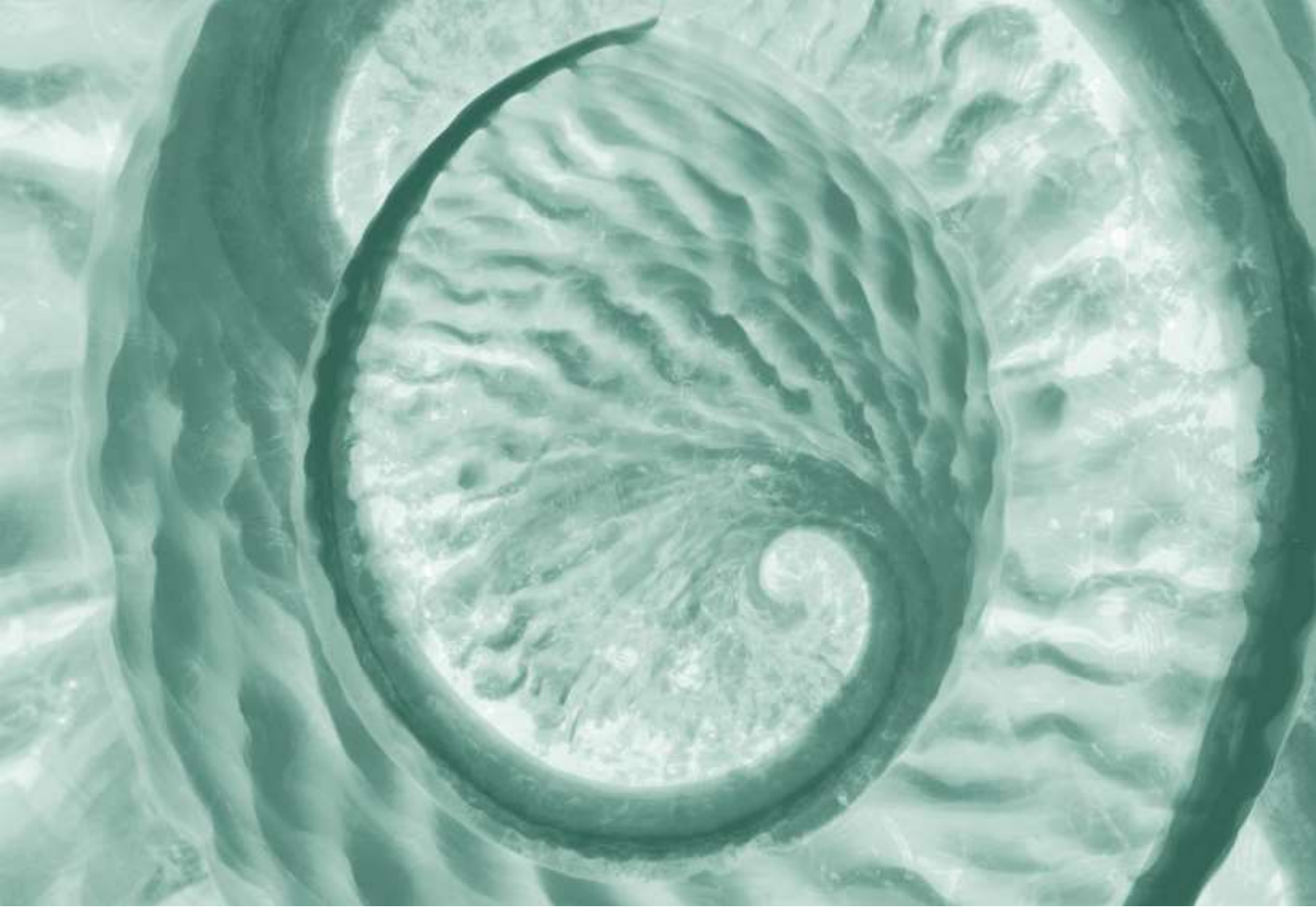
| Site Reference Number | Site Description | Amendment Requested |
|---|---|---|
| E302590 | SAG mill surge bin reclaim dust collector | Change site name to "SAG mill surge bin reclaim wet scrubber." |
| E302590 | SAG mill surge bin reclaim dust collector | Increase the discharge blower rate from 8,500 $m^3/h$ to 14,000 $m^3/h$. |
| E302610 | Smelting Furnace | Correct the discharge rate to from 3,000 $m^3/h$ to 5,200 $m^3/h$. |
| E302770 | Dust Collector, Fire Assay | Increase the authorized flow discharge rate from 17,000 $m^3/h$ to 34,000 $m^3/h$. |
| E302770 | Wet Scrubber | Increase the discharge rate from 9,000 $m^3/h$ to 17,000 $m^3/h$. |
| E311448 | Vent Raise VR5 | Correct the GPS location from 56.4676 N, 130.1883 W to 56.4697 N, 130.1901 W. |
| N/A | Core Saw Exhaust | New air discharge from mill core saw room dust collector at a rate of 1,700 $m^3/h$ and particulate matter concentration of 0.12 $mg/m^3$. |

A copy of the permit application, including supporting documentation, is available electronically at https://operations.newmont.com/north-america/brucejack-canada in the Reports and Documents section. Any person who may be adversely affected by the proposed amendment and wishes to provide relevant information may, within 30 days after the last date of posting, publishing, service or display, send written comments to the applicant, with a copy to the Regional Director, Environmental Protection at Ministry of Environment and Climate Change Strategy, Suite 325-1011 4th Avenue, Prince George, BC, V2L 3H9. The identity of any respondents and the contents of anything submitted in relation to this application will become part of the public record.

Dated this 5th day of January 2024.

Sylvia VanZalingen

Contact person: Sylvia Van Zalingen
Email address: Sylvia.VanZalingen@newmont.com
Phone: 1-778-653-8049



NEWCREST MINING LIMITED

# Brucejack Mine

## Air Discharge Permit 107025 2023 Amendment Application: Technical Assessment Report

October 2023

Project No.: 0697726-07

*The business of sustainability*

ERM

October 2023

# Brucejack Mine

## Air Discharge Permit 107025
## 2023 Amendment Application: Technical Assessment Report

**ERM Consultants Canada Ltd.**

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# EXECUTIVE SUMMARY

This document is the Technical Assessment Report (TAR) supporting Pretium Resources Inc., a member of the Newcrest Group of companies (Pretium), application to amend *Environmental Management Act* Air Discharge Permit 107025 for the Brucejack Mine (PA-107025; issued January 9, 2014 and latest amendment dated July 8, 2021). The amendment includes six requested changes to existing discharge sources, and one request for a new discharge source, as follows. The Information Requirements Table for Air Emissions (IRT) is included in the next section.

1. Site Reference number E302590 for the “SAG mill surge bin reclaim dust collector”. Change the name from “SAG mill surge bin reclaim dust collector” to “SAG mill surge bin reclaim wet scrubber” to accurately describe the treatment technology being used.
2. Site Reference number E302590 for the “SAG mill surge bin reclaim dust collector”. Increase the discharge blower rate from 8,500 cubic metres per hour ($m^3/h$) to 14,000 $m^3/h$, with no change to the mass loading of pollutants.
3. Site Reference number E302610 for the “Smelting Furnace”. The original permit and the amendment dated July 22, 2015 authorized the correct maximum designed discharge rate of 5,200 $m^3/h$ (~ 3,000 cubic feet per minute (CFM)). All subsequent permit amendments after the July 22, 2015 amendment have had an incorrect discharge rate of 3,000 $m^3/h$. It is believed that the wrong units were being used on these subsequent permits ($m^3/h$ vs. CFM). It is requested that the authorized flow rate be amended to the correct design and initial authorized flow rate of 5,200 $m^3/h$ (~3,000 CFM). There has been no change to the existing installed equipment and it currently operates at a discharge rate of 5,200 $m^3/h$.
4. Site Reference number E302770 for the “Dust Collector, Fire Assay”. In 2022, an additional makeup air unit was installed for the Fire Assay portion of the Assay Lab. During the re-balancing of the air flows, it was determined that the backup dust collector should be operated in parallel to the Fire Assay dust collector. As each dust collector has a design flow of 17,000 $m^3/h$, Pretium is requesting an increase in the authorized flow discharge rate for "Dust Collector, Fire Assay" to 34,000 $m^3/h$. The number of samples prepared per day in the Assay Lab on average will remain unchanged and therefore the net daily particulate matter and sulphur dioxide mass release will remain unchanged.
5. Site Reference number E302770 for the “Wet Scrubber”. Increasing the flow discharge rate from 9,000 to 17,000 $m^3/h$ to account for increased discharge flow rate associated with upgrading the wet scrubber from 5,200 to 8,500 $m^3/h$ (3,000 CFM to 5,000 CFM). The proposed discharge accounts for upgrading the second scrubber from 3,000 to 5,000 CFM in the future. In the permit, Site Reference E302770 includes the “Dust Collector, Fire Assay”, “Dust Collector, Sample Preparation” and “Wet Scrubber”. Each of these three has an individual discharge rate, but the permit uses a combined concentration limit for particulate matter and $SO_2$ for all three. No changes to particulate matter or $SO_2$ mass loading or concentrations are required for the Wet Scrubber since no parameters of concern are expected to discharge from the Wet Scrubbers.
6. Site Reference E311448 for vent raise VR5. The current permit has the VR5 location as GPS location 56.4676 N and 130.1883 W. Pretium is requesting that the GPS location be updated to reflect the updated location of the VR5 vent raise. The updated GPS location is 56.4697 N, 130.1901 W (approximately 260 m northwest of the original location). There are no other changes.
7. New air discharge from mill core saw room dust collector (core saw exhaust).

There are two existing automatic drill core cutting units, or core saws, installed in a room within the drill core logging area in the Mine mill. Fugitive dust emissions from the two core saws will be routed to new individual dust catchment enclosures and then flow will be combined and routed to one new dust collector. The filtered air then passes through a fan blower and exhausts out a horizontal stack on the southeast side of the mill, approximately 23 metres above the ground. The system would be continuously operated, 24 hours per day and 365 days per year. The discharge out of the stack would be 1,700 $Am^3/h$ (actual flow rate; 0.47 $Am^3$/second), 1.81 kg/year of particulate matter discharge with a resulting concentration of 0.098 mg/$Am^3$ (actual volume) or 0.12 mg/$Nm^3$ (normalized volume).

An emissions inventory comparison was conducted for all of the requested permit amendment changes. The only amendment item that would change the air pollution emissions was the dust control for the core saws. This was calculated as 1.81 kg/year of particulate matter discharge (0.00181 tonnes/year). This increase in emissions was then compared against the 2020, 2021, 2022 site-wide emissions inventory reported in the annual National Pollutant Release Inventory (NPRI), as well as the predicted emissions inventory as part of the Mine's 2014 environmental assessment application.

The new core saw exhaust will increase the Brucejack Mine total suspended particulate (TSP) emissions by +0.00181 tonnes/year, a +0.0002 to +0.001% increase depending on the comparison year. For the purpose of this emissions inventory, it is conservatively assumed (overestimated) that $PM_{10}$ and $PM_{2.5}$ core saw emissions are the same as TSP. Using this overestimate, the $PM_{10}$ emissions will increase by +0.00181 tonnes/year, a +0.0006 to +0.027% increase depending on the comparison year. $PM_{2.5}$ emissions will increase by +0.00181 tonnes/year, a +0.0035 to +0.013% increase depending on the comparison year.

Based on the site-wide emissions inventory changes, there are no negative impacts to the outdoor ambient air quality for any of the existing discharge sources because there is no change to the mass loading of pollutants. For changes involving an increase to the airflow rate, the resulting pollutant concentrations are expected to decrease and the exit velocity of the air will increase. Both of these promote pollutant dilution and dispersion, which can be beneficial for the ambient air quality.

The new core saw exhaust discharge source will slightly increase the site-wide emissions. Based on the change to the emissions inventory, the stack characteristics and the improvement to the air quality for the workers inside the core cutting room, the low negative impacts to the outdoor ambient air quality are not significant and there are positive impacts to the indoor air quality for the workers inside the core cutting room.

Ministry of Environment and Climate Change Strategy

# Information Requirements Table for Air Emissions

Application Tracking Number: 424920
Authorization Number: 107025
Pretium Resources Inc/Brucejack Mine

| Applicant Summary | |
|---|---|
| **Application Tracking #** | **424920** |
| **Authorization #** | **107025** |
| **Applicant / Facility Name:** | **Pretium Resources Inc/Brucejack Mine** |

| Ministry of Environment | |
|---|---|
| **Prepared by:** | **Breanne Hill** |
| **Title:** | **Environmental Protection Officer** |
| **Date:** | **June 13, 2023** |

The *Information Requirements Table (IRT) for Air Emissions* is a tool used by Ministry of Environment and Climate Change Strategy (ENV) staff to document specific guidance and instructions given to an applicant pursuing authorization to discharge under the *Environmental Management Act*.

Note: this document was developed to capture all the items and complexities concerning air emissions.

Accordingly, for any given application, not all the items will apply and not all required items will warrant detailed discussion of methods and other concerns.

As part of the Preliminary Application Phase, ENV will discuss with the applicant the items listed in this table to determine what will be required in support of their final application. A tick mark in the "Required" box of the "Requirements" Column in the table indicates an information item to be included into the application package as agreed to by both parties or as directed by ENV. Should it be determined that specific methods will be used to derive this information, this will be specified with a tick mark in the "Methods" box and specific details in the Comments column. In cases where complex impact assessments are to be undertaken, agreement on the methods used will be required. For simple methods, the methods used could be discussed with the applicant in a meeting and noted in the "Comments" column as agreed to in the table. For more complex methods, the applicant may be required to submit a "Methods Package" by an agreed date for ENV review, comment and acceptance. Once methods are accepted by ENV they should be either described in the "Comments" column and/or a reference made to the document describing the Methods Package.

If an IRT is required, the Final IRT will form part of an Application Instruction Document (AID) which documents application submission requirements for the applicant. The AID is issued by the Director after a preliminary application meeting has occurred. The AID will also include specific instructions related to the signoff of Qualified Professionals for Declaration of Competency and Conflict of interest.

When submitting the final application, please ensure the IRT is also submitted with the "Location" Column filled out to identify where each of the required items is located in the final application for all information requirements identified.

The ENV will be screening and assessing this application against this table and it is expected that the applicant does the same prior to any preliminary meetings and/or prior to any final submissions. The Ministry will be screening the final received application against the requirements noted in the Final AID to ensure it is complete before resources are dedicated to a full, detailed review.

Ministry of Environment and Climate Change Strategy

# Information Requirements Table for Air Emissions

Application Tracking Number: 424920
Authorization Number: 107025
Pretium Resources Inc/Brucejack Mine

| Information | Requirements | Comments | Location in Final Application |
|---|---|---|---|
| **1 PROJECT DESCRIPTION** | | | |
| 1.1 Describe the project including the proposed facilities and processes, an existing facility overview and describe the products | Required ☒ | | Section 1.1, 2.1, 2.2 and Appendix C and D |
| 1.2 Describe the project permitting history and list related reports | Required ☒ | | Section 1.2 and 4.1 |
| 1.3 Provide a location map of the facility and surrounding areas and include scale. Identify the project location including site and surrounding land uses and other industrial facilities in the area | Required ☒ | Facility location of GPS coordinates must be in decimal degrees and to the fourth decimal place.<br><br>Ministry template:<br><br>https://www2.gov.bc.ca/assets/gov/environment/waste-management/waste-discharge-authorization/guides/forms/epd-ema-08_location_map_form.pdf | Figures 1-1, 1.1-1, 1.1-2 and 2.2-4 |
| 1.4 List of Qualified Professionals and signed Conflict of Interest & Declaration of Competency | Required ☒ | Must have a combination of suitable education, training, experience acceptable to the Director and both forms signed | Section 1.3 and Appendix A and B |
| **2 ENVIRONMENTAL SETTING – METEOROLOGY** | | | |
| 2.1 Provide a detailed map showing the location of all site-specific and regional meteorological stations in relation to project facilities | Required ☒ | | Figures 1.1-1 and 1.1-2 |
| 2.2 Baseline meteorological study | Required ☐ | | |
| **3 AIR DISCHARGES AND TREATMENT** | | | |
| 3.1 Provide a description of pollution control works and treatment efficiencies based on manufacturer specifications for pollution control works or an engineering assessment | Required ☒ | Engineering assessment prepared by a QP | Section 2.1 and 2.2, and Appendix C |
| 3.2 Provide an emissions inventory that includes for each contaminant and source (point and non-point sources)<br>• % change (if an amendment)<br>• Maximum and average discharge rate (g/s) and concentration ($mg/m^3$) for each contaminant<br>• Maximum and average flow rate<br>• Operating durations (i.e. hours per day, days per year) and frequency<br>• Discharge location in decimal degrees, to the fourth decimal place<br>• Clarify methods used to determine emissions summary | Required ☒ | | Section 2.2.2, Table 2.2-1 and Appendix C. |

Ministry of Environment and Climate Change Strategy

# Information Requirements Table for Air Emissions

Application Tracking Number: 424920
Authorization Number: 107025
Pretium Resources Inc/Brucejack Mine

| | Information | Requirements | Comments | Location in Final Application |
|---|---|---|---|---|
| 3.3 | For each point-source discharge provide:<br>• Stack height (m)<br>• Stack top inside diameter (m)<br>• Elevation of stack base (m above sea level)<br>• Stack gas exit velocity (m/s)<br>• Stack gas discharge temperature | Required ☒ | | Section 2.2.2, Table 2.2-1 and Appendix C. |
| 3.4 | Best Achievable Technology Assessment by QP and/or assessment of Best Practices | Required ☐ | Prepared by a QP | |
| 3.5 | Describe emissions offsets (if applicable) | Required ☐ | | |
| 3.6 | Provide process flow diagrams for waste streams | Required ☐ | | |
| 3.7 | Detailed site plan that includes locations and coordinates (as appropriate) for each point and non-point discharge<br><br>Coordinates must be in decimal degrees and to the fourth decimal place | Required ☒ | Prepared by a QP<br>https://www2.gov.bc.ca/assets/gov/environment/waste-management/waste-discharge-authorization/guides/forms/epd-ema-09_site_plan_form.pdf | Section 2.2.3, Figures 2.2-4, 2.2-6 and 1.1-1 |
| **4** | **IMPACT ASSESSMENT** | | | |
| 4.1 | Provide a plain language summary of the impacts and risks based on technical assessment | Required ☒ | | Section 3 |
| 4.2 | Baseline meteorological and air quality monitoring report | Required ☐ | Prepared by a QP | |
| 4.3 | Provide a summary of previous stack tests which may include a Continuous Emissions Monitoring Systems (CEMS) data summary and interpretation | Required ☐ | (For existing facilities) Provide data summary in digital format. | |
| 4.4 | Dispersion modelling plan and report (dispersion modeling plan must be approved by an ENV Air Quality Meteorologist) | Required ☐ | Prepared by a QP<br><br>http://www.bcairquality.ca/assessment/dispersion-modelling.html | |
| **5** | **MONITORING PLANS** | | | |
| 5.1 | Provide a discharge monitoring (point source) plan for all proposed emissions | Required ☐ | | |
| 5.2 | Provide a Baseline Ambient Monitoring (pre-permitting) plan | Required ☐ | | |
| 5.3 | Provide an Ambient Monitoring (post-permitting) plan | Required ☐ | | |
| 5.4 | Continuous Emissions Monitoring, /Process Monitoring Systems (i.e., pressure drop in baghouses, opacity monitoring etc.) | Required ☐ | | |

Ministry of Environment and Climate Change Strategy

# Information Requirements Table for Air Emissions

Application Tracking Number: 424920
Authorization Number: 107025
Pretium Resources Inc/Brucejack Mine

| Information | Requirements | Comments | Location in Final Application |
|---|---|---|---|
| **6 MANAGEMENT PLANS** | | | |
| 6.1 Maintenance Start-up and Shutdown Plan<br>• Outline procedures to reduce air emissions during start-up and shutdown periods | Required ☐ | | |
| 6.2 Air Episode Management Plan<br>• Outline procedures to reduce air emissions during air quality advisories | Required ☐ | | |
| 6.3 Fugitive Dust Management Plan<br>• Specify facility areas with high risk of fugitive dust generation<br>• Facility inspection and monitoring schedule<br>• Fugitive dust mitigation measures and documentation<br>• Record keeping and data submission requirements | Required ☒ | **ENV Comment:** An update is required to the Air Quality Management Plan. The plan must include information on the management of fugitive dust at the site. | Section 4.1 and Appendix E |
| 6.4 Treatment Residuals Management Plan | Required ☐ | | |
| 6.5 Odour Management Plan | Required ☐ | | |

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| °C | degrees Celsius |
| µm | micrometre |
| $Am^3$ | cubic metres, using actual conditions |
| BC ENV | The British Columbia Ministry of Environment and Climate Change Strategy |
| CFM | cubic feet per minute |
| ECCC | Environment and Climate Change Canada |
| ERM | ERM Consultants Canada Ltd. |
| $ft^2$ | square feet |
| h | hour |
| kg | kilogram |
| km | kilometres |
| m | metres |
| m/s | metres per second |
| $m^3$ | cubic metres |
| MERV | minimum efficiency reporting value |
| mg | milligram |
| $Nm^3$ | cubic metres, using normalized conditions |
| NPRI | National Pollutant Release Inventory |
| $PM_{10}$ | particulate matter less than 10 micrometres in diameter |
| $PM_{2.5}$ | particulate matter less than 2.5 micrometres in diameter |
| Pretium | Pretium Resources Inc., a member of the Newcrest Group of companies |
| QP | Qualified Professional |
| s | seconds |
| $Sm^3$ | cubic metres, using standard conditions |
| TSP | total suspended particulate |
| VOK | Valley of the Kings deposit |

# 1. PROJECT DESCRIPTION

The following technical assessment report has been prepared in support of Pretium Resources Inc., a member of the Newcrest Group of companies (Pretium), application to amend *Environmental Management Act* Air Discharge Permit 107025 (PA-107025, issued January 9, 2014 and latest amendment dated July 8, 2021) for the Brucejack Mine (the Mine). The changes include changes to existing airflow discharge rates, adding one new discharge source and make changes to discharge name labels and units. Each change is described in Sections 1.1.1 to 1.1.5.

The Brucejack Mine is located at 56°27'59.626"N latitude by 130°11'11.491" W longitude, which is approximately 950 km northwest of Vancouver, and 65 km north-northwest of Stewart (Figure 1-1). Vehicle access is via the Brucejack Access Road from Highway 37.

Following issuance of authorizations required for mine construction and operations during 2015, construction of the Brucejack Mine commenced in September 2015. Commercial production was declared on July 3, 2017. EA Certificate M15-01 authorizes production of up to 18.5 Mt of ore over the life-of-mine. MA Permit M-243 authorizes a mining rate of 1,387,000 tonnes on a calendar year basis (average 3,800 tonnes per day). *Environmental Management Act* Permits PE-107835 and PA-107025 regulate mine effluent and air discharges respectively. See Section 1.2 for a summary of air discharge permit PA-107025 amendments.

Newcrest Mining Limited acquired Pretium and the Brucejack operation on March 9, 2022.

## 1.1 Permit Amendments

Permit amendment items are outlined in Table 1.1-1 and described in the subsections below.

Figures 1.1-1 and 1.1-2 show the existing permitted air discharges, as well as those discharges proposed for update in this permit amendment application. Figure 1.1-1 depicts the Mill area (the majority of PA-107025 air discharge points) and Figure 1.1-2 shows the full mine site along with all of the Brucejack meteorological stations. Canadian regional meteorological stations within 100 km of Brucejack and with 2023 publicly available data are also included in Figure 1.1-2.

### *1.1.1 Site Reference E302590: SAG Mill Surge Bin Reclaim Dust Collector / SAG Mill Surge Bin Reclaim Wet Scrubber*

#### *1.1.1.1 Name Change*

In the existing permit, Site Reference E302590 has Facility name "SAG mill surge bin reclaim dust collector". The SAG mill surge bin reclaim facility has been incorrectly labelled as a dust collector since its inclusion in the permit. The label name of this facility should be changed to "**SAG mill surge bin reclaim wet scrubber**" to accurately describe the treatment technology.

#### *1.1.1.2 Discharge Rate Change*

Pretium is requesting authorization of increased discharge blower rate at Site Reference E302590 from 8,500 $m^3$/h to 14,000 $m^3$/h (maximum discharge rate). The mass loading of particulate matter will remain unchanged (0.14 kg/h) and the concentration of the particulate matter discharge will therefore decrease.

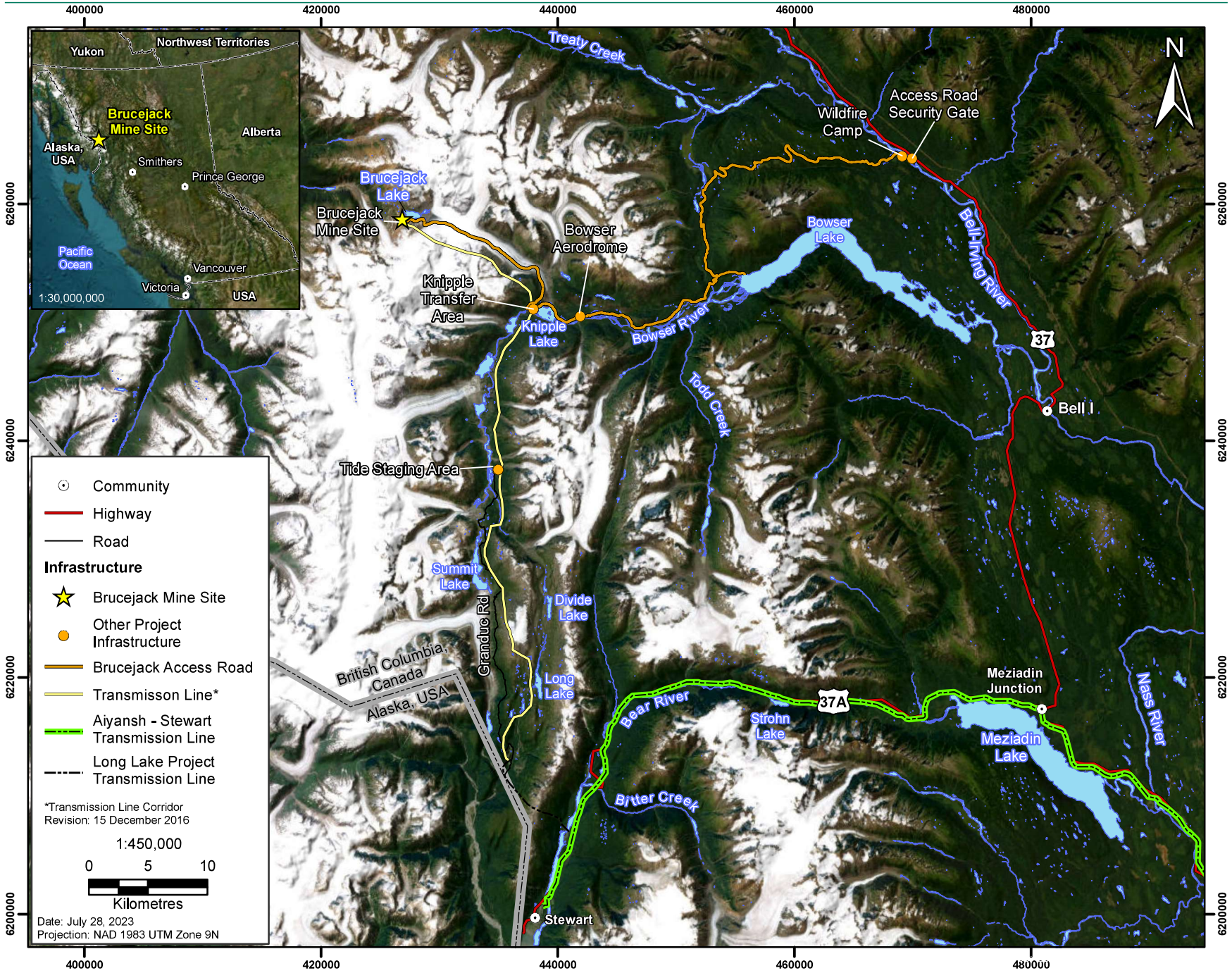



**Figure 1-1: Brucejack Location and Major Components Map**


**Figure 1.1-1: Brucejack Mine Site, Existing Permitted Emissions and Amended Emissions Near the Mill**

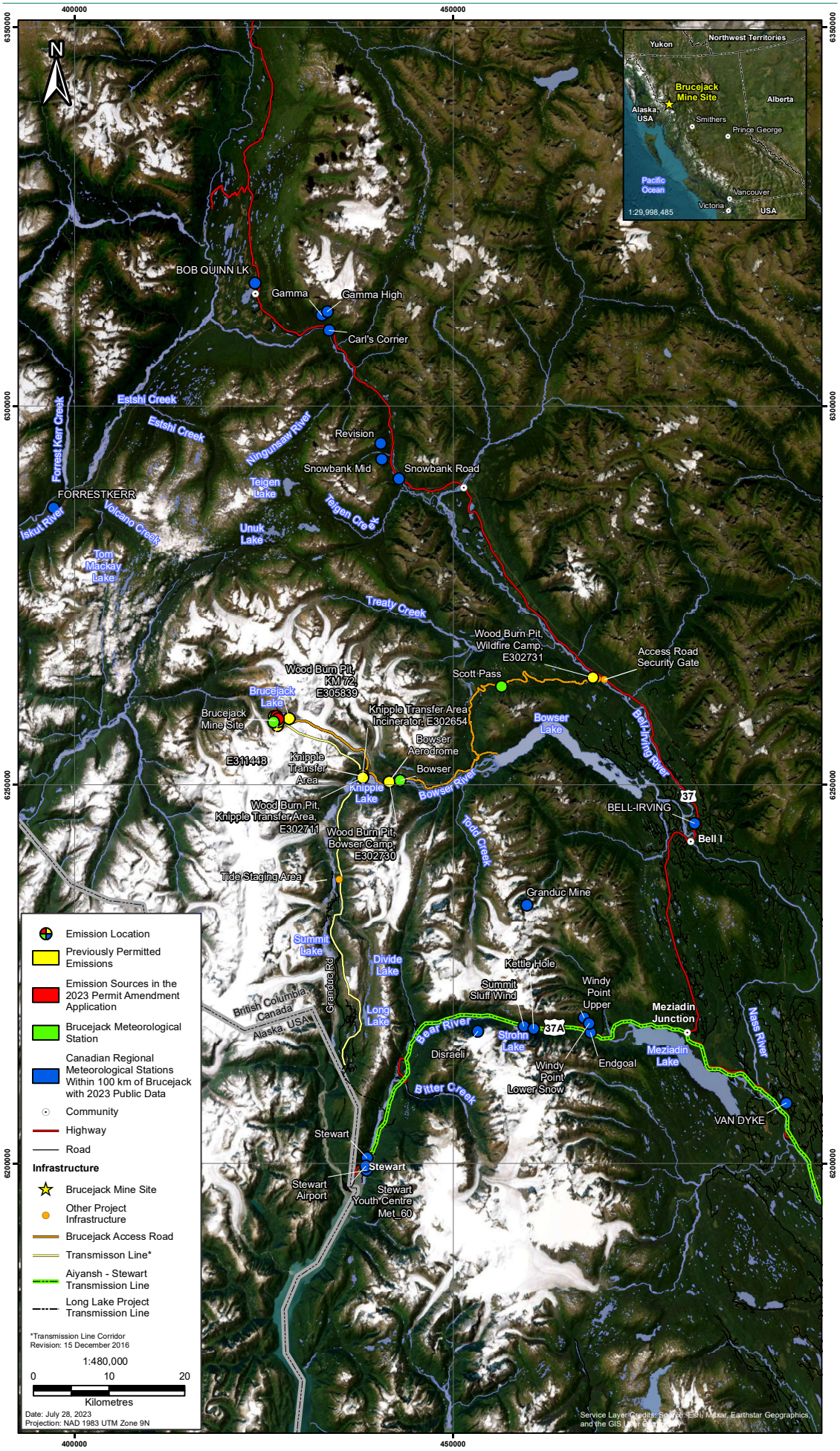



**Figure 1.1-2: Brucejack Mine Site, Site-Wide Existing Permitted Emissions and Amended Emissions, and Meteorological Stations**

## Table 1.1-1: Permit Amendment Items

| New Emission or Change to Existing Emission | Discharge/Clause | Permit Site Reference Number | Summary of Changes |
|---|---|---|---|
| Change | SAG mill surge bin reclaim dust collector / SAG mill surge bin reclaim wet scrubber | E302590 | ■ Change the current name description to “SAG mill surge bin reclaim wet scrubber”.<br>■ Increase the discharge blower rate from 8,500 $m^3$/h to 14,000 $m^3$/h, but no change to mass loading of particulate matter. |
| Change | Smelting furnace | E302610 | ■ Correct the discharge rate unit typo in the permit to the originally authorized and actual flow rate of 5,200 $m^3$/h. |
| Change | Assay lab: dust collector, fire assay | E302770 | ■ Increase the discharge blower rate from 17,000 $m^3$/h to 34,000 $m^3$/h, but no change to mass loading of particulate matter or sulphur dioxide. |
| Change | Assay lab: wet scrubber | E302770 | ■ Increase the discharge blower rate from 9,000 $m^3$/h to 17,000 $m^3$/h, but no change to mass loading of particulate matter or sulphur dioxide. |
| Change | Vent raise: VR5 | E311448 | ■ Change the GPS location to 56.4697°N, 130.1901°W. |
| New | Core saw exhaust | Not assigned | ■ New discharge for dust collection system for core saw dust:<br>o Discharge flow: 1,700 $Am^3$/h (actual flow rate); and<br>o Discharge quality: 0.098 mg/$Am^3$ of particulate matter.<br>■ Operating time: 24 hours day, 365 days per year. |

### 1.1.2 Site Reference E302610: Smelting Furnace

For the Smelting Furnace – Site Reference E302610, the original permit and the amendment dated July 22, 2015 authorized the correct maximum designed discharge rate of 5,200 $m^3/h$ (~ 3,000 cubic feet per minute (CFM)). All subsequent permit amendments after the July 22, 2015 amendment have had an incorrect discharge rate of 3,000 $m^3/h$. It is believed that the wrong units were being used on these subsequent permits ($m^3/h$ vs. CFM). It is requested that the authorized flow rate be amended to the correct design and initial authorized discharge rate of 5,200 $m^3/h$ (~3,000 CFM). There has been no change to the existing installed equipment and it currently operates at a discharge rate of 5,200 $m^3/h$.

### 1.1.3 Site Reference E302770: Assay Lab

#### 1.1.3.1 Fire Assay Dust Collectors

In 2022, an additional makeup air unit was installed for the Fire Assay portion of the Assay Lab – Site Reference E302770 (named "Dust Collector, Fire Assay" in permit 107025). During the re-balancing of the air flows, it was determined that the backup dust collector should be operated in parallel to the Fire Assay dust collector in operation. As each dust collector has a design flow of 17,000 $m^3/h$, Pretium is requesting an increase in the authorized flow discharge rate for "Dust Collector, Fire Assay" to 34,000 $m^3/h$ (maximum discharge rate).

The number of samples prepared per day in the Assay Lab on average will remain unchanged. This is the main factor influencing discharge quality. Therefore, the net daily particulate matter and sulphur dioxide mass release will remain unchanged and the resulting concentration will decrease with the increase in air flow discharge.

#### 1.1.3.2 Assay Lab Wet Scrubber

Pretium is requesting an increase in the authorized flow discharge rate for the Wet Scrubber portion of the Assay Lab – Site Reference E302770 (named “Wet Scrubber” in permit 107025) from 9,000 to 17,000 $m^3/h$ (maximum discharge rate) to account for increased discharge flow rate associated with upgrading the wet scrubber from 5,200 to 8,500 $m^3/h$ (3,000 CFM to 5,000 CFM). The proposed discharge is greater than required to account for upgrading the second scrubber from 3,000 to 5,000 CFM in the future.

In the permit, Site Reference E302770 includes the “Dust Collector, Fire Assay”, “Dust Collector, Sample Preparation” and “Wet Scrubber”. Each of these three has an individual discharge rate, but the permit uses a combined concentration limit for particulate matter and $SO_2$ for all three. No changes to particulate matter or $SO_2$ mass loading or concentrations are required for the Wet Scrubber since there are no parameters of concern that are expected to discharge from the Wet Scrubbers.

### 1.1.4 Site Reference E311448: Vent Raise VR5

Pretium is requesting that the current PA-107025 GPS location 56.4676 N and 130.1883 W for vent raise 5 (VR5; Site Reference E311448) be changed to 56.4697 N, 130.1901 W. The requested location is approximately 260 m northwest of the originally planned location; see Figure 1.1-1. This is the only requested change for VR5.

### 1.1.5 New Discharge: Core Saw Exhaust

There are two automatic drill core cutting units, or core saws, installed in a room within the drill core logging area in the mill. There is an existing air supply system comprising 1,529 $m^3/h$ (900 CFM) located between the two core saw machines.

As part of the Pretium 2021 Workplace Monitoring Program, industrial hygiene sampling was conducted throughout the year for noise, silica, respirable dust, and metals. The primary source of fugitive dust in the core logging and core cutting facility was identified as coming from the drill core cutting room, especially at the areas where the core cutting machines are located. The Ministry of Energy, Mines and Low Carbon Innovation (EMLI) has ordered improved ventilation and suspended particulate matter reduction within the core processing area located in the mill below the assay lab (Order 179164-S3-O5).

Pretium plans to install a new dust collection system for the core saws. The proposed system will include a hood and enclosure for each core saw, individual demisters, a new central dust collector and a new horizontal discharge stack. This would be operated for 24 hours per day, and 365 days per year. The discharge out of the stack would be 1,700 $Am^3/h$ (actual flow rate; 0.47 $Am^3$/second), 1.81 kg/year of particulate matter discharge with a resulting concentration of 0.098 mg/$Am^3$ (actual volume) or 0.12 mg/$Nm^3$ (normalized volume).

The core room needs to be set to a slightly negative air pressure to help prevent dust from travelling to adjacent rooms. The maximum supply air into the core room is 1,530 $m^3/h$ and the exhaust system will be constrained to a maximum of 1,700 $m^3/h$.

The new discharge for core saw exhaust is discussed in more detail in Section 2.2 and Appendix C.

## 1.2 Permitting History

Air Discharge Permit 107025 was originally issued under the provisions of the *Environmental Management Act* (SBC 2003, c.53) on January 9, 2014, for exploration related air discharges. The permit was amended in 2015 for mine construction and operations, with the assay lab to be located in the mill following the construction phase. A temporary assay lab was also authorized for use at the Knipple Transfer Area at this time, with an approved location at the mine site retained to allow post-construction relocation of the lab to the mine. Mine construction began in September 2015, and the mine reached commercial operations status on July 1, 2017. Table 1.2-1 provides an overview of the permitting history of PA-107025.

**Table 1.2-1: Permitting History of Air Discharge Permit 107025**

| Year Issued | Permit | Comment |
|---|---|---|
| 2014 | Air Discharge Permit 107025, issued | ■ Initial permit issued for exploration air discharges |
| 2015 | Air Discharge Permit 107025, amendment | ■ Major amendment to authorize air discharges for construction and operations of the Brucejack Mine and its associated access road camps. Operation of an assay lab. The assay lab was located at Bowser Camp and Knipple Transfer Area during Construction (2015-2017), and to be relocated to the mill during Operations (post-2017) |
| 2016 | Air Discharge Permit 107025, amendment | ■ Amendment to include changes to assay lab discharge rates; no change to location |
| 2018 | Air Discharge Permit 107025, amendment | ■ Amendment to change the authorized mine assay lab location from the mill to the VOK portal building, and other minor discharge changes |
| 2021 | Air Discharge Permit 107025, amendment | ■ Amendment to change the authorized mine assay lab location back to the mill, with revised discharge locations and rates |

The current application to amend the permit for air emissions from the new core saw exhaust discharge, and changes to other discharges was initiated in early 2023. A preliminary application meeting between Pretium, ERM and ENV was held on June 22, 2023 to present a project description, and to review the preliminary application form content and draft Information Requirements Table (IRT) prepared by Pretium. The final IRT and Application Instruction Document (AID) was issued by ENV to Pretium on June 26, 2023.

## 1.3 Qualified Professionals

Mr. Daniel Casanova is a Senior Consultant and atmospheric scientist at ERM with over 12 years experience as a professional atmospheric scientist. Mr. Casanova is a registered Environmental Professional with Air Quality Specialization (registration number 20990) and a Qualified Professional (QP) and Qualified Person in BC (BC ENV 2023a and 2023b).

Mr. Casanova was the primary author for this technical assessment report, along with Appendices A and B. Appendices C, D and E were provided as-is by Pretium and provide information upon which the TAR is based. Appendix C was prepared by Tetra Tech for Pretium (Tetra Tech 2023). Appendix D was prepared by VETS Sheet Metal for Pretium (VETS Sheet Metal 2022).

Mr. Casanova formally declares an absence from conflict of interest in the outcome of this PA-107025 Amendment Application (Appendix A), and declares his competency as a QP (Appendix B). Appendices A and B include signed Conflict of Interest and Declaration of Competency forms.

As a QP, Mr. Casanova has signed-off on this Application on behalf of Pretium.

Mr. Casanova visited the Brucejack Mine site in 2011, 2012, 2013, 2015, 2016 and 2017.

# 2. AIR DISCHARGES AND TREATMENT

## 2.1 Changes to Existing Discharges

The requested permit amendment changes to existing discharge site references E302590, E302610, E302770 and E311448 (described in Sections 1.1.1 to 1.1.4) will not have changes to their pollutant mass loading of their discharges and therefore the amount of pollution will not increase.

### *2.1.1 Site Reference E302590: SAG Mill Surge Bin Reclaim Dust Collector / SAG Mill Surge Bin Reclaim Wet Scrubber*

For site reference E302590, the requested change includes a name description change, and increasing the discharge blower airflow rate from 8,500 $m^3$/h to 14,000 $m^3$/h, but no change to mass loading of particulate matter, and therefore particulate matter concentration would decrease. There is no change to the emissions inventory as a result.

Increasing the airflow speed out of the stack would also not negatively impact the resulting ambient air quality because increasing the airflow rate out of the existing stack allows for a faster exit velocity out the stack, improving pollutant dilution and dispersion in the ambient air.

### *2.1.1 Site Reference E302610: Smelting Furnace*

For site reference E302610, the requested change is to fix a discharge rate typo in permit amendments after the July 22, 2015 amendment. There has been no change to the existing installed equipment and it historically and currently still operates at a discharge rate of 5,200 $m^3$/h as described in the original permit and the July 22, 2015 amendment. There is no change to the emissions inventory as a result.

### *2.1.2 Site Reference E302770: Assay Lab*

For site reference E302770 and the fire assay dust collector component, the requested change is to increase the airflow rate from 17,000 $m^3$/h to 34,000 $m^3$/h, but there is no change to the mass loading of particulate matter, and therefore particulate matter concentration would decrease. There is no change to the emissions inventory as a result.

Increasing the airflow speed out of the stacks would also not negatively impact the resulting ambient air quality because increasing the airflow rate out of the existing stack allows for a faster exit velocity out the stack, improving pollutant dilution and dispersion in the ambient air.

For site reference E302770 and the assay lab wet scrubber component, the requested change is to increase the airflow rate from 9,000 to 17,000 $m^3$/h. This this discharge source does not have any existing air pollutant parameters of concern (zero mass loading of pollutants), and therefore changing the airflow rate makes no difference to the emission quality. There is no change to the emissions inventory as a result.

### *2.1.3 Site Reference E311448: Vent Raise VR5*

For site reference E311448's vent raise VR5, the requested change is to change the location the VR5 location to be approximately 260 m northwest of the original permitted location. There are no other changes to the flow rate, mass loading of pollutants nor the resulting pollutant concentration. There is no change to the emissions inventory as a result.

Based on the local topography and building locations of the existing permitted VR5 location compared to the requested new location, the revised VR5 location is further away from the mill and camp accommodation buildings and in an area with more open ambient airflow that can help improve pollutant dilution and dispersion in the ambient air.

## 2.2 New Discharge Source: Core Saw Exhaust

Introductory information about the new requested discharge source for core saw exhaust is included in Section 1.1.5.

The engineering details for a new dust control system and emission source are included in the *Technical Memo: Dust Control_Drill Core Cutting Area_Brucejack Mine* in Appendix D (Tetra Tech 2023) and the proposal for the fabrication and installation of the dust collection system is included in the document *Pretium – Core Saw Exhaust* in Appendix E (VETS Sheet Metal 2022). The specifications for this system are designed for a maximum continuous operation of 80% of the day (19.2 hours per day) and 365 days per year. For the purpose of this air discharge permit amendment, Pretium is assuming that the system will be operated 100% of the time (24 hours per day and 365 days per year), and emission rates have been scaled up to account for this.

In order to operate 100% of the time, the actual dust control system details may need to be changed compared to the equipment details included in Appendix D and E. The subsections below are based on the information from these Appendices, with notes about where equipment changes may occur.

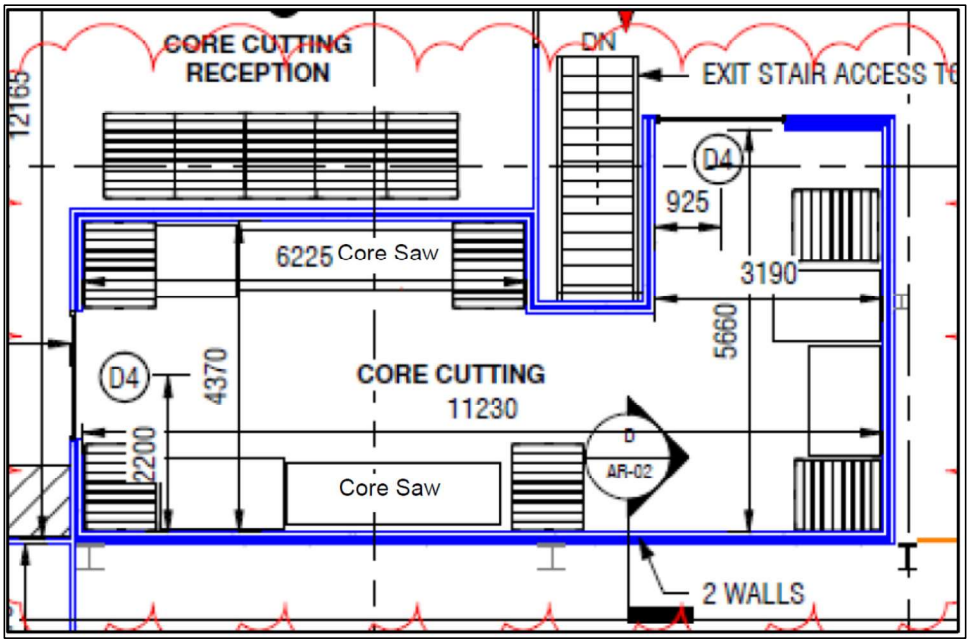
### *2.2.1 Air Emissions Pollution Control works for the Core Saw Exhaust*

Fugitive dust emissions from the two core saws (inside the mill's core room; Figure 2.2-1) will be routed to individual dust catchment enclosures (Figures 2.2-2 and 2.2-3). Each dust catchment enclosure contains baffle plates to reduce moisture (Figure 2.2-3). The dust-laden air from each dust catchment is then combined into one pipe (Figure 2.2-4) and is routed to one LGB 3-13 cartridge dust collector (Figure 2.2-4 and Figure 2.2-5), or similar dust collector. The filtered air then passes through a fan blower and exhausts out a horizontal stack on the southeast side of the mill (Figure 2.2-6).

The dust catchment enclosures will have hinged opening at the bottom for access to the core catcher for cleaning and maintenance. They will also have an access door to the baffle plates to allow for maintenance and cleaning of the baffle plates.

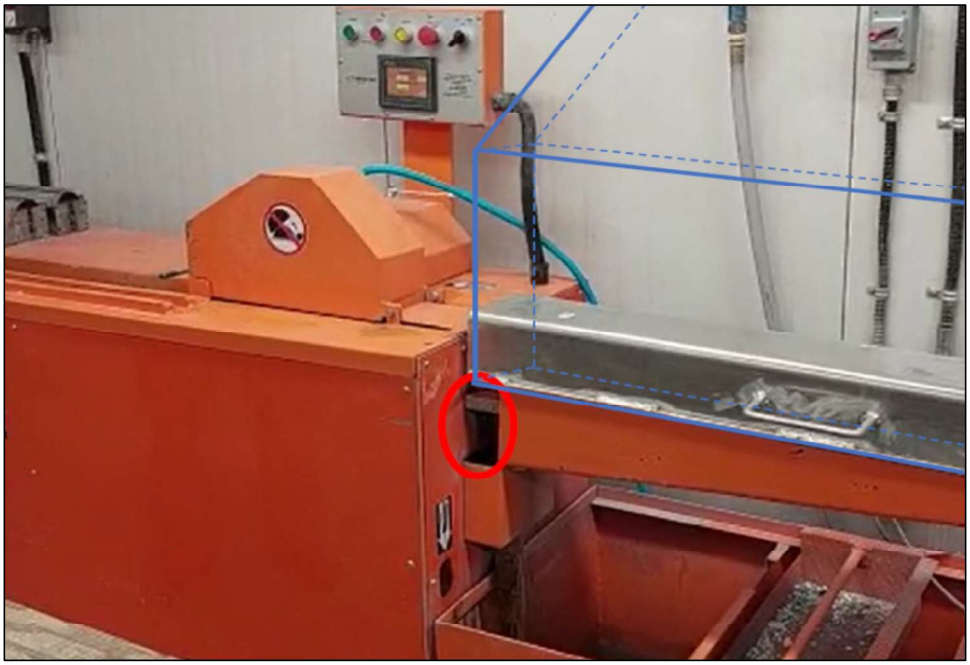
The dust collector will be the same or similar to a LGB 3-12 cartridge collector fabricated by AirPlus Industrial with polyester filtration area of 1,214 $ft^2$. The proposed filter media is PE201 – 100% synthetic polyester filter media laminate, rated as MERV 18 equivalent which is expected to capture the high-humidity air/dust and collect more than 99% of larger than 0.3 µm dust. (Tetra Tech 2023; see Appendix C).

The core room has an air supply of 1,530 $m^3/h$ (900 CFM). The core saw exhaust system will pull 1,700 $m^3/h$ (1,000 CFM), so that there is a negative pressure inside the room to help keep fugitive dust from escaping the room.



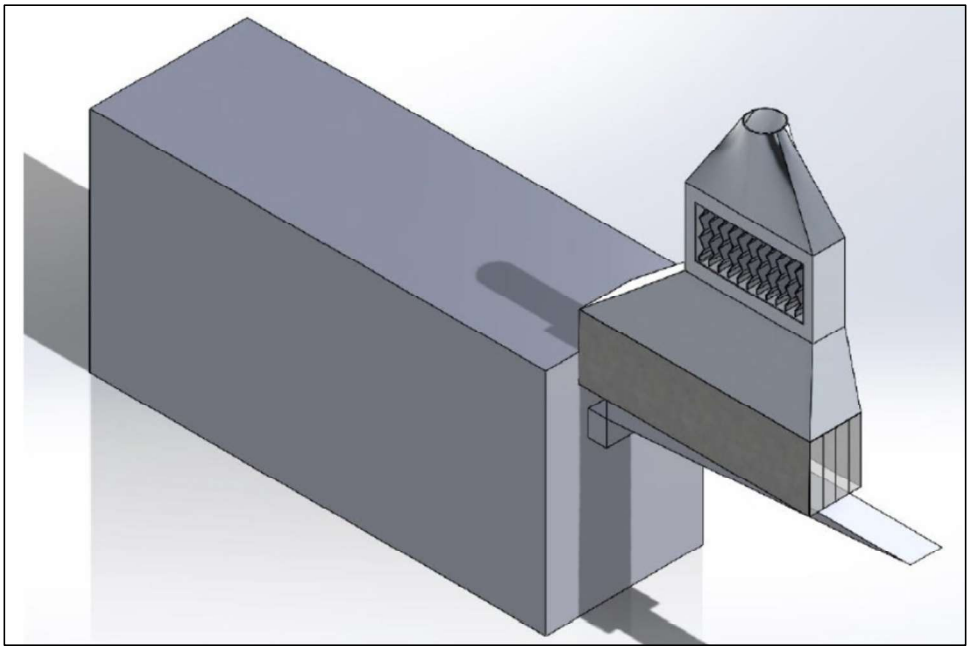

*From Tetra Tech (2023), see Appendix C.*

**Figure 2.2-1: Plan View of the Current Drill Core Cutting Room Arrangement**



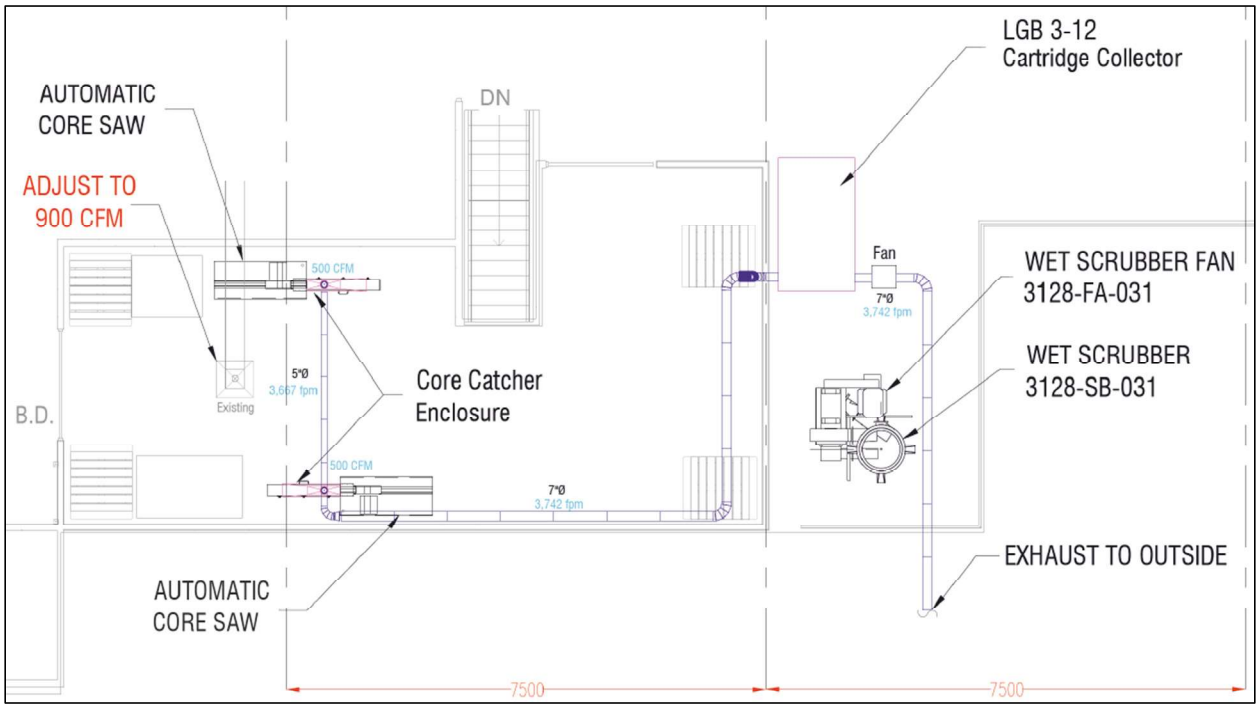
*The Location where most of the fugitive dust escapes is circled in red.*
*The blue lines show the approximate location the proposed dust catching enclosure would be placed.*
*From Tetra Tech (2023; see Appendix C) and VETS Sheet Metal (2022; see Appendix D).*

**Figure 2.2-2: Core Saw (orange)**



*From Tetra Tech (2023; see Appendix C) and VETS Sheet Metal (2022; see Appendix D).*

**Figure 2.2-3: Design Model of the Proposed Dust Catching Enclosure on the Core Saw**

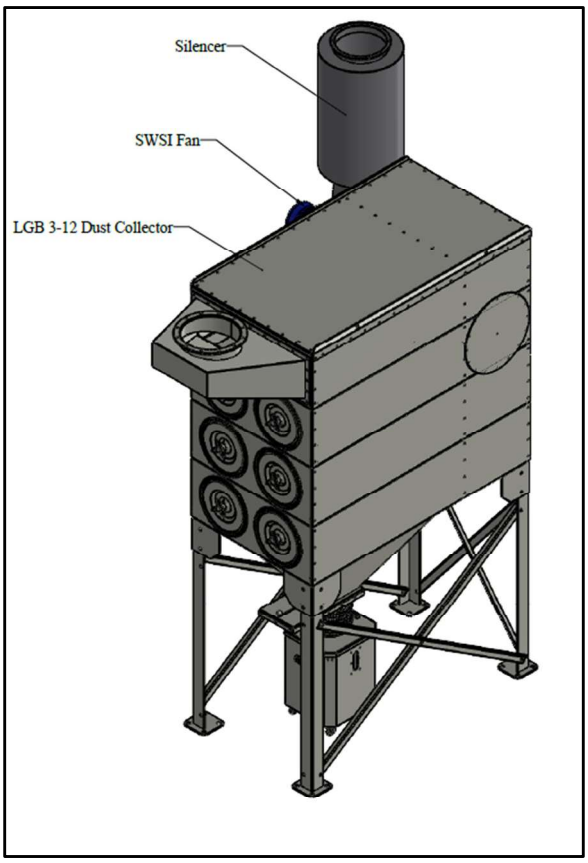



*The figure Includes the two dust catching enclosures, the LGB 3-12 dust collector, blower fan and exhaust to the outside using a horizontal stack.*

*The wet scrubber components are not part of this dust control system.*

*From Tetra Tech (2023; see Appendix C) and VETS Sheet Metal (2022; see Appendix D).*

**Figure 2.2-4: General Arrangement of the Dust Control System for the Core Saw Room**




*From VETS Sheet Metal (2022; see Appendix D).*

**Figure 2.2-5: Example LGB 3-12 Cartridge Dust Collector**


**Figure 2.2-6: The Proposed Discharge Location for the Core Saw Exhaust, on the Southeast Side of the Mill**

### 2.2.2 Core Saw Exhaust Emissions Inventory and Stack Characteristics

Table 2.2-1 summarizes the core saw exhaust emissions inventory and stack characteristics for continuous operation of 100% of the time, 19.2 hours per day and 365 days per year. The information in Table 2.2-1 comes from the Tetra Tech technical memo (2023; see Appendix C) and Pretium.
The emissions were calculated by Tetra Tech using the VETS' design (VETS Sheet Metal 2022; Appendix D) and estimated average dust concentrations with dust collection based on the core saw usage. Operating time and annual total emissions were then scaled up to account for changing the continuous operation from the designed 80% (19.2 hours per day) to 100% of the time (24 hours per day).

**Table 2.2-1: Core Saw Exhaust Emissions Inventory and Stack Characteristics**

| Parameter | Units | Value |
|---|---|---|
| Operating hours per day | hours per day | 24 (100% of the day) |
| Operating days per year | days per year | 365 |
| Operating hours per year | hours per year | 8,760 |
| Stack orientation | - | Horizontal stack |
| Stack discharge location | Latitude and longitude in decimal degrees | 56.4669°N 130.1869°W |
| Stack discharge height above ground | m | Approximately 23 |
| Stack discharge elevation (average) | metres above sea level | Approximately 1,430 |
| Elevation of Mill | metres above sea level | 1,407 |
| Stack diameter | m | 0.18 |
| Stack discharge velocity | m/s | 1.14 |
| Temperature of emissions out of the stack | °C | 0 to 30 |
| Exhaust stack, flow rate (average and maximum) | $Am^3/s$ (actual flow) | 0.47 |
| Exhaust stack, flow rate (average and maximum) | $Sm^3/s$ (standardized flow) | 0.47 |
| Stack emissions: particulate matter concentration | $mg/Nm^3$ (normalized volume) | 0.12 |
| Stack emissions: particulate matter concentration | $mg/Am^3$ (actual volume) | 0.098 |
| Total particulate emission rate, per hour | kg/h | 0.00021 |
| Total particulate emission rate, per year | kg/year | 1.81 |
| Type of emissions | - | Only particulate matter emissions.<br>No diesel particulate matter, unburned hydro-carbons, nitrogen oxides, carbon monoxide, carbon dioxide, etc. |

### 2.2.3 Site Plan

Figure 2.2-4 illustrates the site plan for the core cutting room and dust collector system. Figures 2.2-6 and 1.1-1 show the discharge location relative to the outside of the mill. Table 2.2-1 includes the GPS position of the proposed core saw exhaust stack (56.4669°N 130.1869°W).

## 2.3 Site-Wide Emissions Inventory

A site-wide emissions inventory was conducted to evaluate the emission changes for this permit amendment. Brucejack emissions reported in the 2020, 2021 and 2022 NPRI (ECCC 2023) are included in Table 2.3-1. The estimated emissions from the mine's 2014 environmental assessment application are also included in Table 2.3-1 (ERM Rescan 2014). These were estimated emissions from mine operations, based on the information available at the time.

**Table 2.3-1: 2020 to 2021 NPRI Emissions, and EA Emissions**

| Substance | NPRI Year or EA | Emission Category (tonnes/year) | | | |
|---|---|---|---|---|---|
| | | Stack/Point | Fugitive | Road Dust | Total |
| Carbon monoxide | 2020 | 0.0 | 137.9 | 0.0 | 137.9 |
| | 2021 | 15.6 | 41.6 | 0.0 | 57.2 |
| | 2022 | 24.7 | 46.4 | 0.0 | 71.1 |
| | EA | - | - | - | 68.0 |
| Nitrogen oxides | 2020 | 0.0 | 458.5 | 0.0 | 458.5 |
| | 2021 | 58.5 | 10.1 | 0.0 | 68.6 |
| | 2022 | 90.0 | 11.3 | 0.0 | 101.3 |
| | EA | - | - | - | 103.0 |
| Sulphur dioxide | 2020 | 0.0 | 29.2 | 0.0 | 29.2 |
| | 2021 | Not reported | Not reported | Not reported | Not reported |
| | 2022 | Not reported | Not reported | Not reported | Not reported |
| | EA | - | - | - | 5.0 |
| Total particulate matter (TSP) | 2020 | 0.0 | 33.9 | 349.6 | 383.5 |
| | 2021 | 1.9 | 104.4 | 975.2 | 1,081.5 |
| | 2022 | 1.9 | 2.1 | 417.7 | 421.6 |
| | EA | 27.0 | 24.8 | 137.0 | 188.8 |
| Particulate Matter <= 10 Micrometers ($PM_{10}$) | 2020 | 0.0 | 32.5 | 99.4 | 131.9 |
| | 2021 | 1.7 | 46.5 | 277.3 | 325.5 |
| | 2022 | 1.5 | 1.0 | 118.8 | 121.2 |
| | EA | 19.0 | 10.0 | 38.0 | 67.0 |
| Particulate Matter <= 2.5 Micrometers ($PM_{2.5}$) | 2020 | 0.0 | 31.6 | 9.9 | 41.5 |
| | 2021 | 1.7 | 22.9 | 27.7 | 52.2 |
| | 2022 | 1.5 | 0.2 | 11.9 | 13.5 |
| | EA | 16.0 | 4.3 | 3.8 | 24.1 |

Changes to emission sources that are part of this 2023 permit amendment request are summarized in Table 2.3-2. The only emission source that will create additional air contaminants is the core saw exhaust (new discharge). All of the other permit amendment items (Section 2.1) have the same mass loading of pollutants. The $PM_{10}$ and $PM_{2.5}$ components of the core saw exhaust are not known and emissions were calculated as total particulate matter (Tetra Tech 2023, Appendix C). For the purpose of this emissions inventory, it is conservatively assumed (overestimated) that $PM_{10}$ and $PM_{2.5}$ emissions are the same as TSP.

**Table 2.3-2: Permit Amendment Changes to Emissions**

| Substance | Permit Amendment Item | Change to Emissions (tonnes/year) |
|---|---|---|
| Carbon monoxide | New discharge: core saw exhaust | 0 |
| | Site Reference E302590: SAG mill surge bin reclaim dust collector / SAG Mill Surge Bin Reclaim Wet Scrubber | 0 |
| | Site Reference E302610: Smelting Furnace | 0 |
| | Site Reference E302770: Fire Assay Dust Collectors | 0 |
| | Site Reference E302770: Assay Lab Wet Scrubber | 0 |
| | Site Reference E311448: Vent Raise VR5 | 0 |
| Nitrogen oxides | New discharge: core saw exhaust | 0 |
| | Site Reference E302590: SAG mill surge bin reclaim dust collector / SAG Mill Surge Bin Reclaim Wet Scrubber | 0 |
| | Site Reference E302610: Smelting Furnace | 0 |
| | Site Reference E302770: Fire Assay Dust Collectors | 0 |
| | Site Reference E302770: Assay Lab Wet Scrubber | 0 |
| | Site Reference E311448: Vent Raise VR5 | 0 |
| Sulphur dioxide | New discharge: core saw exhaust | 0 |
| | Site Reference E302590: SAG mill surge bin reclaim dust collector / SAG Mill Surge Bin Reclaim Wet Scrubber | 0 |
| | Site Reference E302610: Smelting Furnace | 0 |
| | Site Reference E302770: Fire Assay Dust Collectors | 0 |
| | Site Reference E302770: Assay Lab Wet Scrubber | 0 |
| | Site Reference E311448: Vent Raise VR5 | 0 |
| Total particulate matter (TSP) | New discharge: core saw exhaust | +0.00181 |
| | Site Reference E302590: SAG mill surge bin reclaim dust collector / SAG Mill Surge Bin Reclaim Wet Scrubber | 0 |
| | Site Reference E302610: Smelting Furnace | 0 |
| | Site Reference E302770: Fire Assay Dust Collectors | 0 |
| | Site Reference E302770: Assay Lab Wet Scrubber | 0 |
| | Site Reference E311448: Vent Raise VR5 | 0 |

| Substance | Permit Amendment Item | Change to Emissions (tonnes/year) |
|---|---|---|
| Particulate Matter <= 10 Micrometers ($PM_{10}$) | New discharge: core saw exhaust | +0.00181[a] |
| | Site Reference E302590: SAG mill surge bin reclaim dust collector / SAG Mill Surge Bin Reclaim Wet Scrubber | 0 |
| | Site Reference E302610: Smelting Furnace | 0 |
| | Site Reference E302770: Fire Assay Dust Collectors | 0 |
| | Site Reference E302770: Assay Lab Wet Scrubber | 0 |
| | Site Reference E311448: Vent Raise VR5 | 0 |
| Particulate Matter <= 2.5 Micrometers ($PM_{2.5}$) | New discharge: core saw exhaust | +0.00181[a] |
| | Site Reference E302590: SAG mill surge bin reclaim dust collector / SAG Mill Surge Bin Reclaim Wet Scrubber | 0 |
| | Site Reference E302610: Smelting Furnace | 0 |
| | Site Reference E302770: Fire Assay Dust Collectors | 0 |
| | Site Reference E302770: Assay Lab Wet Scrubber | 0 |
| | Site Reference E311448: Vent Raise VR5 | 0 |

*Footnotes:*

*There are no emission inventory changes to any of the permit amendment items, except for the new discharge source of the core saw exhaust.*

*[a] The $PM_{10}$ and $PM_{2.5}$ components of the core saw exhaust are not known and emissions were calculated as total particulate matter (Tetra Tech 2023, Appendix C). For the purpose of this emissions inventory, it is conservatively assumed (overestimated) that $PM_{10}$ and $PM_{2.5}$ emissions are the same as TSP.*

A percent change comparison of Brucejack emissions after including the 2023 permit amendment emissions are included in Table 2.3-3. The new core saw exhaust will increase Brucejack TSP emissions by +0.00181 tonnes/year, a +0.0002 to +0.001% increase depending on the comparison year. $PM_{10}$ emissions will increase by +0.00181 tonnes/year, a +0.0006 to +0.027% increase depending on the comparison year. $PM_{2.5}$ emissions will increase by +0.00181 tonnes/year, a +0.0035 to +0.013% increase depending on the comparison year.

## Table 2.3-3: Permit Amendment Emission Changes and Proportion of Total Emissions

| Substance | NPRI Year or EA | NPRI or EA Inventory (tonnes/year) | New Discharge: Core Saw Exhaust (tonnes/year) | % Change With New Discharge Included |
|---|---|---|---|---|
| | | Total of Emission Categories | | |
| Total particulate matter (TSP) | 2020 | 383.5 | 0.00181 | +0.0005 |
| | 2021 | 1,081.5 | | +0.0002 |
| | 2022 | 421.6 | | +0.0004 |
| | EA | 188.8 | | +0.0010 |
| Particulate Matter <= 10 Micrometers ($PM_{10}$) | 2020 | 131.9 | 0.00181 | +0.0014 |
| | 2021 | 325.5 | | +0.0006 |
| | 2022 | 121.2 | | +0.0015 |
| | EA | 67.0 | | +0.0027 |
| Particulate Matter <= 2.5 Micrometers ($PM_{2.5}$) | 2020 | 41.5 | 0.00181 | +0.0044 |
| | 2021 | 52.2 | | +0.0035 |
| | 2022 | 13.5 | | +0.013 |
| | EA | 24.1 | | +0.0075 |

# 3. IMPACTS AND RISKS

Impacts and risks are evaluated for each amendment item in the subsections below.

## 3.1 Site Reference E302590: SAG Mill Surge Bin Reclaim Dust Collector / SAG Mill Surge Bin Reclaim Wet Scrubber

The discharge blower rate will increase, but the mass loading of particulate matter will remain unchanged. This will result in a decrease to the discharged concentration of particulate matter which is beneficial to the ambient air quality. Increasing the airflow speed out of the stack would also not negatively impact the resulting ambient air quality because increasing the airflow rate out of the existing stack allows for a faster exit velocity out the stack, improving pollutant dilution and dispersion in the ambient air.

Therefore, compared to the equipment's current operating conditions, the resulting impact from this requested change does not have a negative impact and there are no increased risks to the ambient air quality.

There are no impacts or risks associated with the emission source name change request.

## 3.2 Site Reference E302610: Smelting Furnace

There are no changes to impacts or risks to the ambient air quality associated with fixing the permit amendment typo. This is because the equipment is currently operating at its original discharge rate and specifications as described in the original permit.

## 3.3 Site Reference E302770: Assay Lab

For both the fire assay dust collector and assay lab wet scrubber, the discharge blower rates will increase, but the mass loading of pollutants will remain unchanged. This will result in a decrease to the discharged concentration of pollutants which is beneficial to the ambient air quality. Increasing the airflow speed out of the stack would also not negatively impact the resulting ambient air quality because increasing the airflow rate out of the existing stack allows for a faster exit velocity out the stack, improving pollutant dilution and dispersion in the ambient air.

Therefore, compared to the equipment's current operating conditions, the resulting impact from the two requested changes does not have a negative impact and there are no increased risks to the ambient air quality.

## 3.4 Site Reference E311448: Vent Raise VR5

Updating the GPS location for VR5 will not change the flow rate, mass loading of pollutants nor the resulting pollutant concentration or emissions inventory. Based on the local topography and building locations of the existing permitted VR5 location compared to the requested new location, the revised VR5 location is further away from the mill and camp accommodation buildings and in an area with more open ambient airflow that can help improve pollutant dilution and dispersion in the ambient air.

Therefore, compared to the equipment's current GPS locations stated in the existing permit, the resulting location change does not have a negative impact and there are no increased risks to the ambient air quality.

## 3.5 New Discharge: Core Saw Exhaust

The new core saw exhaust will be a new emissions discharge point at the mill. The proposed stack location and specifications are appropriate for the low amount of particulate matter emissions that will be generated out of the stack (1.81 kg/year, after the dust collector). By the most conservative (overestimated) approach, the new emission source will add less than 0.013% of emissions to the overall mine emissions if it is assumed that all the core saw exhaust emissions have the same TSP, $PM_{10}$ and $PM_{2.5}$ emission. If evaluating just TSP, the new emission source will add less than 0.001% of emissions to the overall mine's TSP emissions.

The purpose of the new core saw exhaust is to capture dust in the core cutting room, which will improve the air quality inside this room for the core saw workers.

Based on the change to the emissions inventory, the stack characteristics and the improvement to the air quality for the workers inside the core cutting room, the low negative impacts to the outdoor ambient air quality are not significant and there are positive impacts to the indoor air quality for the workers inside the core cutting room.

# 4. MANAGEMENT PLANS

## 4.1 Air Quality Management Plan

Pretium's updated Air Quality Management Plan is included in Appendix E. The update includes the addition of the core saw exhaust.

Any BC ENV required changes to the plan identified during the permit amendment review process will be incorporated into the plan following completion of the permitting process, if the amendment request is approved. The updated plan will be included in the next *Mines Act/Environmental Management Act Annual Report*.

# 5. REFERENCES

2003. *Environmental Management Act,* SBC 2003. C.53.

BC EMA. 2014. Air Discharge Permit 107025, as amended.

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# APPENDIX A CONFLICT OF INTEREST DISCLOSURE STATEMENT

Ministry of Environment and Climate Change Strategy

# Conflict of Interest Disclosure Statement

A qualified professional [1] providing services to either the Ministry of Environment and Climate Change Strategy ("ministry"), or to a regulated person for the purpose of obtaining an authorization from the ministry, or pursuant to a requirement imposed under the *Environmental Management Act,* the *Integrated Pest Management Act* or the *Park Act* has a real or perceived conflict of interest when the qualified professional, or their relatives, close associates or personal friends have a financial or other interest in the outcome of the work being performed.

A real or perceived conflict of interest occurs when a qualified professional has

a) an ownership interest in the regulated person's business;

b) an opportunity to influence a decision that leads to financial benefits from the regulated person or their business other than a standard fee for service (e.g. bonuses, stock options, other profit sharing arrangements);

c) a personal or professional interest in a specific outcome;

d) the promise of a long term or ongoing business relationship with the regulated person, that is contingent upon a specific outcome of work;

e) a spouse or other family member who will benefit from a specific outcome; or

f) any other interest that could be perceived as a threat to the independence or objectivity of the qualified professional in performing a duty or function.

Qualified professionals who work under ministry legislation must take care in the conduct of their work that potential conflicts of interest within their control are avoided or mitigated. Precise rules in conflict of interest are not possible and professionals must rely on guidance of their professional associations, their common sense, conscience and sense of personal integrity.

## Declaration

I Daniel Casanova, as a member of ECO Canada
Print name of Professional Association
declare

***Select one of the following:***

☑ Absence from conflict of interest

Other than the standard fee I will receive for my professional services, I have no financial or other interest in the outcome of this Air Discharge Permit 107025 2023 Amendment Application: Technical Assessment Report
application/project/work/etc.
I further declare that should a conflict of interest arise in the future during the course of this work, I will fully disclose the circumstances in writing and without delay to Breanne Hill, erring on the side of caution.
Insert Client Contact Name

☐ Real or perceived conflict of interest

Description and nature of conflict(s):

_____

_____

_____

I will maintain my objectivity, conducting my work in accordance with my Code of Ethics and standards of practice.

In addition, I will take the following steps to mitigate the real or perceived conflict(s) I have disclosed, to ensure the public interest remains paramount:

_____

_____

_____

Further, I acknowledge that this disclosure may be interpreted as a threat to my independence and will be considered by the statutory decision maker accordingly.

This conflict of interest disclosure statement is collected under section 26(c) of the *Freedom of Information and Protection of Privacy Act* for the purposes of increasing government transparency and ensuring professional ethics and accountability. By signing and submitting this statement you consent to its publication and its disclosure outside of Canada. This consent is valid from the date submitted and cannot be revoked. If you have any questions about the collection, use or disclosure of your personal information please contact the Ministry of Environment and Climate Change Strategy Headquarters Office at 1-800-663-7867.

Signature:

**X** _____

Print name: Daniel Casanova

Witnessed by:

**X** _____

Print name: Andres Soux

Date: October 23, 2023

[1]*Qualified Professional, in relation to a duty or function under ministry legislation, means an individual who*

*a) is registered in British Columbia with a professional association, is acting under that organization's code of ethics, and is subject to disciplinary action by that association, and*

b) *through suitable education, experience, accreditation and knowledge, may reasonably be relied on to provide advice within his or her area of expertise, which area of expertise is applicable to the duty or function.*

# APPENDIX B DECLARATION OF COMPETENCY

Ministry of Environment and Climate Change Strategy

# Declaration of Competency

The Ministry of Environment and Climate Change Strategy relies on the work, advice, recommendations and in some cases decision making of qualified professionals[1], under government's professional reliance regime. With this comes an assumption that professionals who undertake work in relation to ministry legislation, regulations and codes of practice have the knowledge, experience and objectivity necessary to fulfill this role.

1. Name of Qualified Professional: Daniel Casanova

   Title: Managing Technical Consultant

2. Are you a registered member of a professional association in B.C.? ☑ Yes ☐ No

   Name of Association: ECO Canada Registration #: 20990

   EP, Air Quality Specialization

3. Brief description of professional services:

   Air quality and meteorological consulting services

This declaration of competency is collected under section 26(c) of the *Freedom of Information and Protection of Privacy Act* for the purposes of increasing government transparency and ensuring professional ethics and accountability. By signing and submitting this statement you consent to its publication and its disclosure outside of Canada. This consent is valid from the date submitted and cannot be revoked. If you have any questions about the collection, use or disclosure of your personal information please contact the Ministry of Environment and Climate Change Strategy Headquarters Office at 1-800-663-7867.

# Declaration

I am a qualified professional with the knowledge, skills and experience to provide expert information, advice and/or recommendations in relation to the specific work described above.

Signature: Witnessed by:

**X** _____ **X** _____

Print Name: Daniel Casanova Print Name: Andres Soux

Date signed: October 23, 2023

[1] *Qualified Professional, in relation to a duty or function under ministry legislation, means an individual who*

*a) is registered in British Columbia with a professional association, is acting under that organization's code of ethics, and is subject to disciplinary action by that association, and*

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# APPENDIX C TETRA TECH TECHNICAL MEMO: DUST CONTROL_DRILL CORE CUTTING AREA_BRUCEJACK MINE

TETRA TECH

# TECHNICAL MEMO

ISSUED FOR USE

| | | | |
|---|---|---|---|
| **To:** | Sylvia Van Zalingen<br>Director, Environment and Regulatory Affairs Pretium Exploration Inc. | **Date:** | March 3, 2023 |
| **c:** | Rick Yokome<br>Sr. Manager, Engineering | **Memo No.:** | 719-22214.00-MEM-P0002-00 |
| **From:** | Jianhui (John) Huang, Ph.D., P.Eng. | **File:** | 719-22214.00 |
| **Subject:** | **Dust Control _ Drill Core Cutting Area _ Brucejack Mine** | | |

## 1.0 INTRODUCTION

This memorandum provides the dust control system upgrading plan for the drill core cutting room, especially drill core cutting areas, for Brucejack Mine. The upgrading was proposed by Brucejack Mine, Newcrest Mining Limited.

As part of the Pretium 2021 Workplace Monitoring Program, industrial hygiene sampling was conducted throughout the year for noise, silica, respirable dust, and metals. Allison Buchhorn and Jamie Tersago, Industrial Hygiene Advisors, issued two memos separately on September 23, 2021, and November 27, 2021, to report industrial hygiene sampling results collected in core logging and core cutting facility on July 31, September 8, and October 31, 2021. The main fugitive dust was identified mainly from the drill core cutting room, especially at the areas where the cutting machines are located.

To mitigate the effect of the fugitive dust generated during drill core cutting and sampling on the working environment, Brucejack Mine engaged Vets Sheet Metal Ltd. (VETS) to design a dust collection system for the drill core cutting room to mitigate fugitive dust hazards on worker health.

## 2.0 DRILL CORE CUTTING FACILITY

There are two automatic drill core cutting units, or core saws, installed in a room within the drill core logging area in the Brucejack Mine mill building. The automatic drill core cutting units were manufactured by Sandvik. There is an existing air supply system (900 cfm [cubic feet per minute]) located between the two core saw machines. The plan view for the drill core cutting room is shown in Figure 1.

Tetra Tech Canada Inc.
Suite 1000 – 10th Floor, 885 Dunsmuir Street
Vancouver, BC V6C 1N5 CANADA
Tel 604.685.0275 Fax 604.684.6241

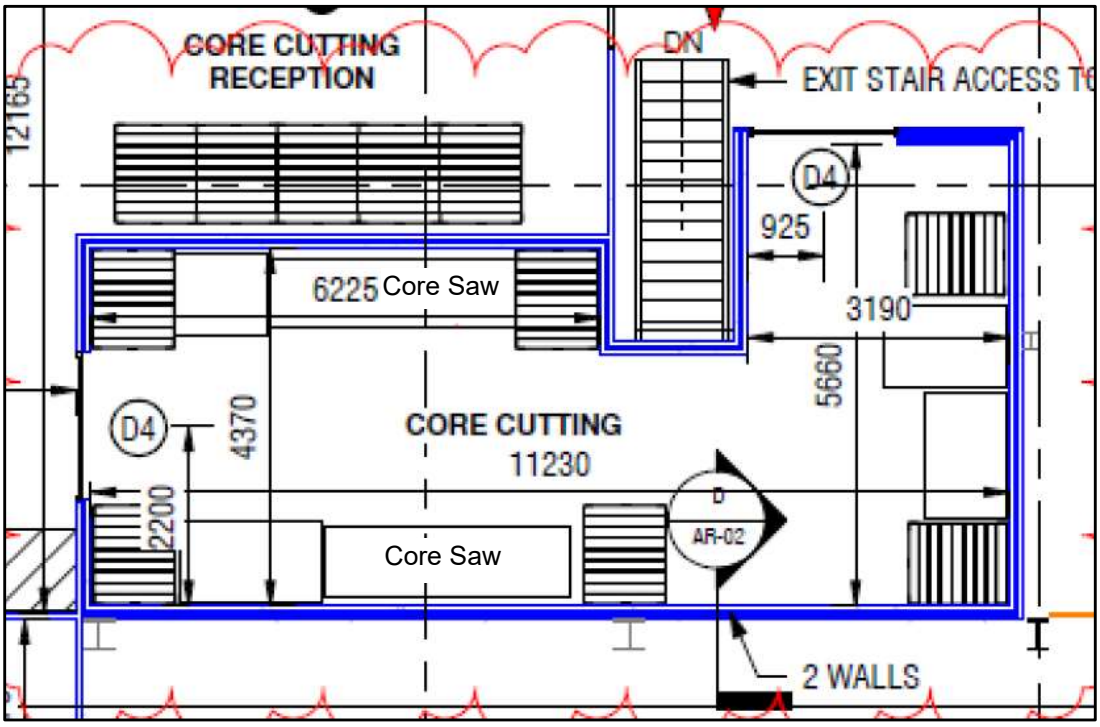



**Figure 1: Drill Core Cutting Room Arrangement (after Jamie Tersago)**

On average, the operating time for the cutting machines is estimated to be approximately 25 hours per week. As reported, the main source of fugitive dust escaping from the core saw machines was found from an opening under the core catcher circled in red in Figure 2.

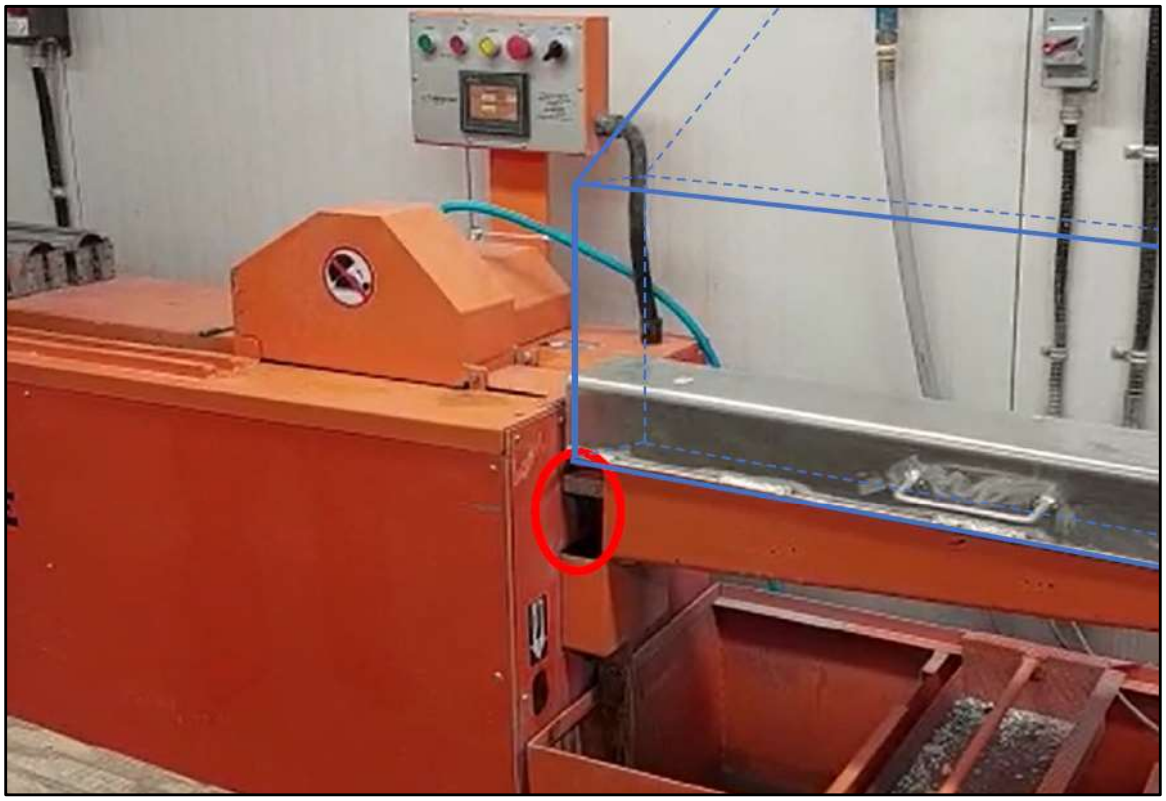


**Figure 2: Main Fugitive Dust Escaping Location (after VETS)**

The Pretium 2021 Workplace Monitoring Program took samples from various different locations in the core shack areas (as baseline) and core cutting room for determining silica concentrations and respirable dust concentrations. The sampling results were compared to the 12-hour occupational exposure limit (OEL). In general, most of the silica concentrations in the core cutting room significantly exceed the 12-hour OEL, ranging from 128% to 686% higher than the OEL value, excluding two samples collected at the locations far away from the cutting saws. The sampling results also indicate that although most of the respirable dust concentrations collected are lower than the 12-hour OEL value (excluding two samples), the data are at the moderate high or high level range. The sampling results are shown in Appendix A. Both Allison Buchhorn and Jamie Tersago, Industrial Hygiene Advisors, recommended the following mitigation actions (after Jamie Tersago's memo):

- Local exhaust ventilation should be placed over the core cutting saws to capture the dust being generated. After observing the saws in operation, it was determined that the majority of the dust is being released as the piece of core comes out the other side of the saw once it's been cut in half. This is where a dust collection system needs to be installed/placed.

- The cutting saws must be regularly maintained to prevent any blockage where the water comes out while cutting. The saw closest to the office was significantly more dusty and appeared to be blocked where the water was being generated inside of it. The saw on the other side of the room had much larger holes where the water came out from and was generally more effective at mitigating the dust being generated.

- In the interim until effective ventilation is installed, the cut shack should be deemed a "respirator-required" area. Workers must wear a half-face respirator with P100 filters at all times in this room, even when the saws are no longer running. All workers required to wear a respirator must be clean shaven.

- The bay door leading from the cutting area into the logging area should be kept closed as much as possible to prevent dust from entering into the logging area.

- The fan in the core cutting area should continue to be placed such that it blows out into the mill and not into the core logging area.
- The core cutting and core logging areas must be cleaned regularly to reduce the amount of dust and debris building up in those locations. No dry sweeping is permitted. Always wet the area first before sweeping or use a mop.
- Silica sampling will be done on a regular basis to monitor exposure levels within the entire core facility.

To reduce the fugitive dust and silica concentrations in the core saw room, it is necessary to capture the escaped dust from the core saw machines.

# 3.0 FUGITIVE DUST CONTROL/MANAGEMENT

According to the current observations on the main dust escaping locations, VETS proposes a dust collection system that will consist of a centralized collector and fan servicing the two core saws respectively. The system design has taken into consideration the water vapour present within the collection area. A slightly negative air pressure in the core cutting room is proposed to ensure air contaminants do not travel from the core cutting room into the adjacent rooms of the facility. The exhaust system will have a maximum off-gas flowrate of 1,000 cfm, which is slightly higher than the air supply system of 900 cfm. The opening at the core catcher area will be sealed by a piece of sheet steel and each of the core catcher area will be enclosed with a custom designed hood and enclosure as outlined in blue in Figure 2.

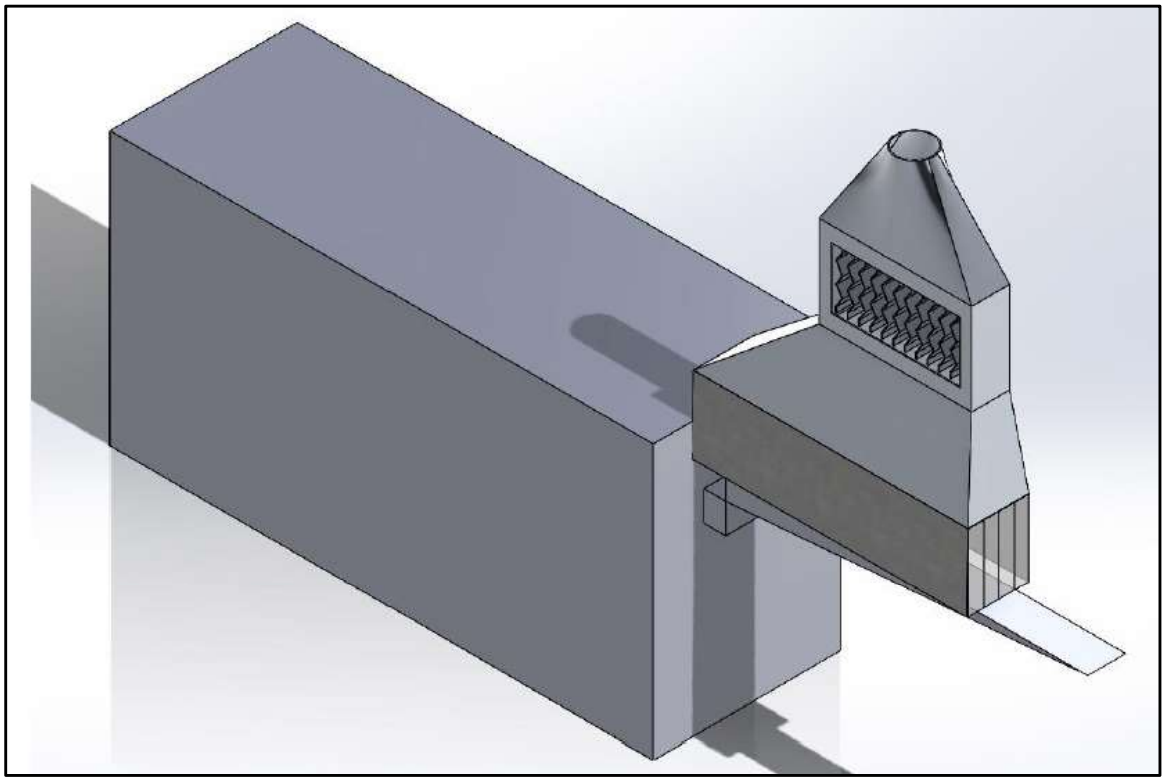


**Figure 3: Illustration of Dust Catching Enclosure at Core Catcher Area (after VETS)**

The pickup air will convey the fugitive dust via the enclosure to the collection system while allowing for any water vapour to drop from the air stream. Baffle plates are designed in the enclosure which will allow for the dust to

coalesce and further reduce the moisture content present within the collection system. An access door will be available to allow for the maintenance and cleaning of the baffle plates. The enclosure will also have a hinged opening for access to core catcher for cleaning and maintenance.

The dust collector will be a LGB 3-12 cartridge collector fabricated by AirPlus Industrial with polyester filtration area of 1,214 ft$^2$. The proposed filter media is PE201 – 100% synthetic polyester filter media laminate, rated as MERV 18 which is expected to capture the high-humidity air/dust and collect more than 99% of larger than 0.3 µm dust.

The general arrangement for the dust control and management system is shown in Figure 4 and Appendix B.

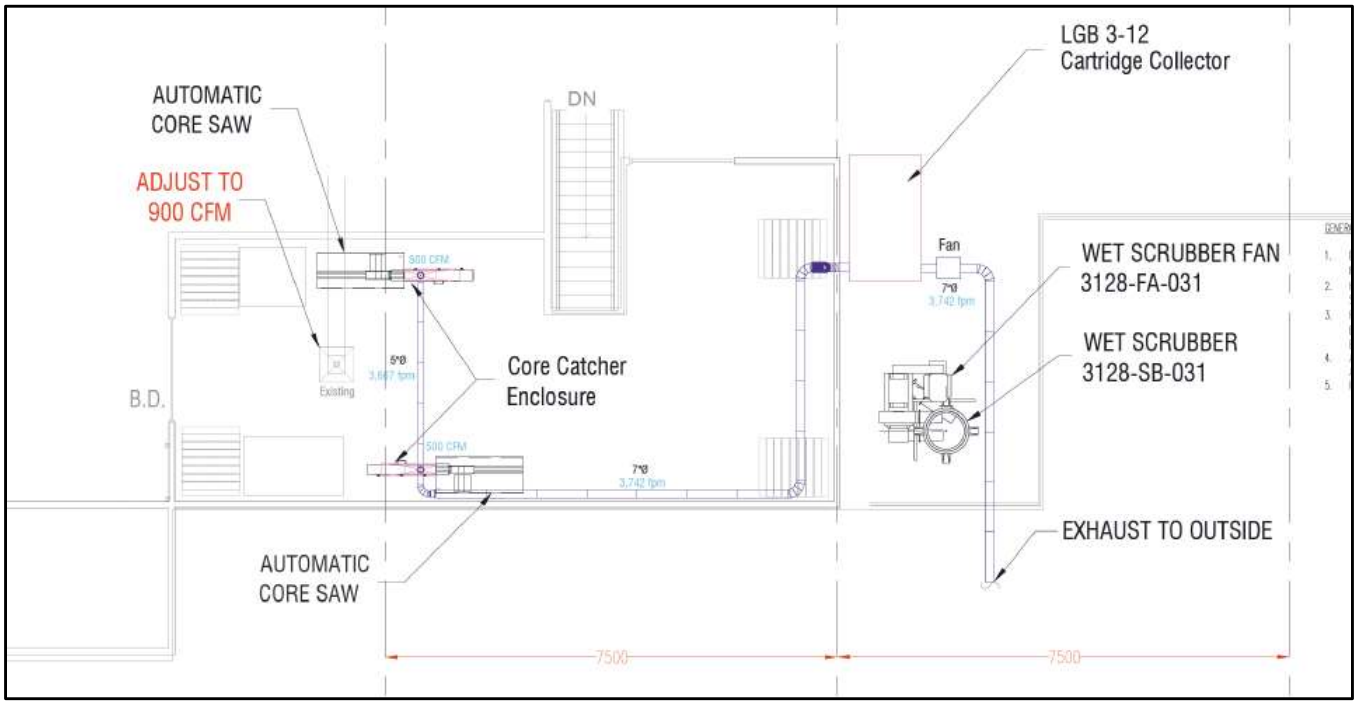



**Figure 4: General Arrangement – Dust Control and Management System – Core Saw Room (after VETS)**

# 4.0 GENERAL DISCUSSION

It is the author's opinion that with the installation of the dust control and management system, the excessive silica and respirable dust levels should reduce substantially and should be lower than the silica and respirable dust OEL levels.

However, silica and respirable dust sampling should be conducted after the dust collection and control system is installed. Also, regular monitoring for silica and respirable dust levels should be conducted on a regular basis to monitor exposure levels within the entire core facility.

Before Industrial Hygiene Advisors inspect the facility and issue updated recommendations, the recommended actions outlined in the memo issued by Jamie Tersago, Industrial Hygiene Advisor, on November 27, 2021, to mitigate the silica and respirable dust hazards should stay in place.

Using VETS' design, estimated average dust concentrations with dust collection, and operating hours, the annual dust generation amounts are provided in Table 1. The parameters related to the off-gas flowrate and dust control system are also shown in Table 1.

Two operation scenarios were estimated and are shown in Table 1:

1. Current operation, in which the cutting will be conducted 25 hours per week.
2. Potential expansion to continuous operation, which will operate 19.2 hours per day (80% of the day), 365 days per year.

### Table 1: Annual Dust Emission Estimates

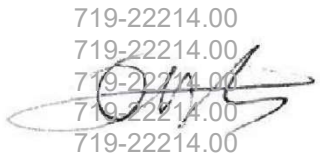
| Item # | 25 Hours per Week | Continuous Operation |
|---|---|---|
| Ventilation # | MVxx | MVxx |
| Primary Location on Site | Core Saw Cutting Room | Core Saw Cutting Room |
| Equipment Name | Core Saw Cutting Dust Collector Fan | Core Saw Cutting Dust Collector Fan |
| Source/Control | Core Saw Cutter Room | Core Saw Cutter Room |
| Flow Rate Through Stack ($Am^3/s$) | 0.47 | 0.47 |
| Discharge Velocity (m/s) | 1.14 | 1.14 |
| Diameter Of Stack (m) | 0.18 | 0.18 |
| Stack Discharge Elevation (average) (m) | ~1,430 | ~1,430 |
| Stack Configuration | Horizontal | Horizontal |
| Temperature of Air Emissions (°C) | 0–30 | 0–30 |
| Stack Emissions – Particulate ($mg/Nm^3$) | 0.12 | 0.12 |
| Flow Rate Through Stack ($Sm^3/s$) | 0.47 | 0.47 |
| Operating Hours per Year | 1,304 | 7,008 |
| Total Particulate Emissions (kg/hour) | 0.00021 | 0.00021 |
| Total Diesel Particulate Matter (DPM) Emissions (kg/hour) | - | - |
| Total Unburned Hydro-Carbons Emissions (kg/hour) | - | - |
| Total NOX Emissions (kg/hour) | - | - |
| Total Carbon Monoxide (CO) Emissions (kg/hour) | - | - |
| Total Carbon Dioxide ($CO_2$) Emissions (kg/hour) | | |
| Total Particulate Emissions (kg/year) | 0.27 | 1.45 |
| Total Unburned Hydro-Carbons Emissions (kg/year) | - | - |
| Total NOX Emissions (kg/year) | - | - |
| Total Carbon Monoxide (CO) Emissions (kg/year) | - | - |
| Total Carbon Dioxide ($CO_2$) Emissions (kg/year) | - | - |
| Total Diesel Particulate Matter (DPM) Emissions (kg/year) | - | - |

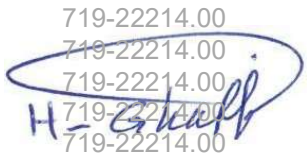
| Item # | 25 Hours per Week | Continuous Operation |
|---|---|---|
| Total Ch4 Emissions (kg/year) | - | - |
| Total Sulphur Dioxide ($SO_2$) Emissions (kg/year) | - | - |
| Grand Total Emissions per Year (kg/year) | 0.27 | 1.45 |
| Dust Collector Efficiency | >99% at 0.3 micron or larger | >99% at 0.3 micron or larger |
| Manufacturer and Model Number of Equipment | AirPlus Industrial LGB 3-12 cartridge collector with MERV 18 equivalent membranes | AirPlus Industrial LGB 3-12 cartridge collector with MERV 18 equivalent membranes |
| Others | Based on VETS' design | Based on VETS' design |
| Note 1 | 25 hours in operation per week | Operate 80% of the time per day, 365 days per year |

## 5.0 CLOSURE

We trust this technical memo meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.

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PERMIT TO PRACTICE
TETRA TECH CANADA INC.
PERMIT NUMBER: 1001972

# APPENDIX A

## MEMO ISSUED BY INDUSTRIAL HYGIENE ADVISORS

November 27, 2021

Attention: Joel Ashburner/Matt McManus

**Re: 2021 Industrial Hygiene Sampling Results – Core Facility Sampling Results**

## Introduction

As part of the Pretium 2021 Workplace Monitoring Program, industrial hygiene sampling will be conducted throughout the year for noise, silica, respirable dust and metals. Additionally, characterization sampling will be conducted for less frequent, task specific hazards. All samples are collected in accordance with approved sampling methodologies. Recent sampling results are outlined below.

## Results

**Table 1: Silica and Respirable Dust Results**

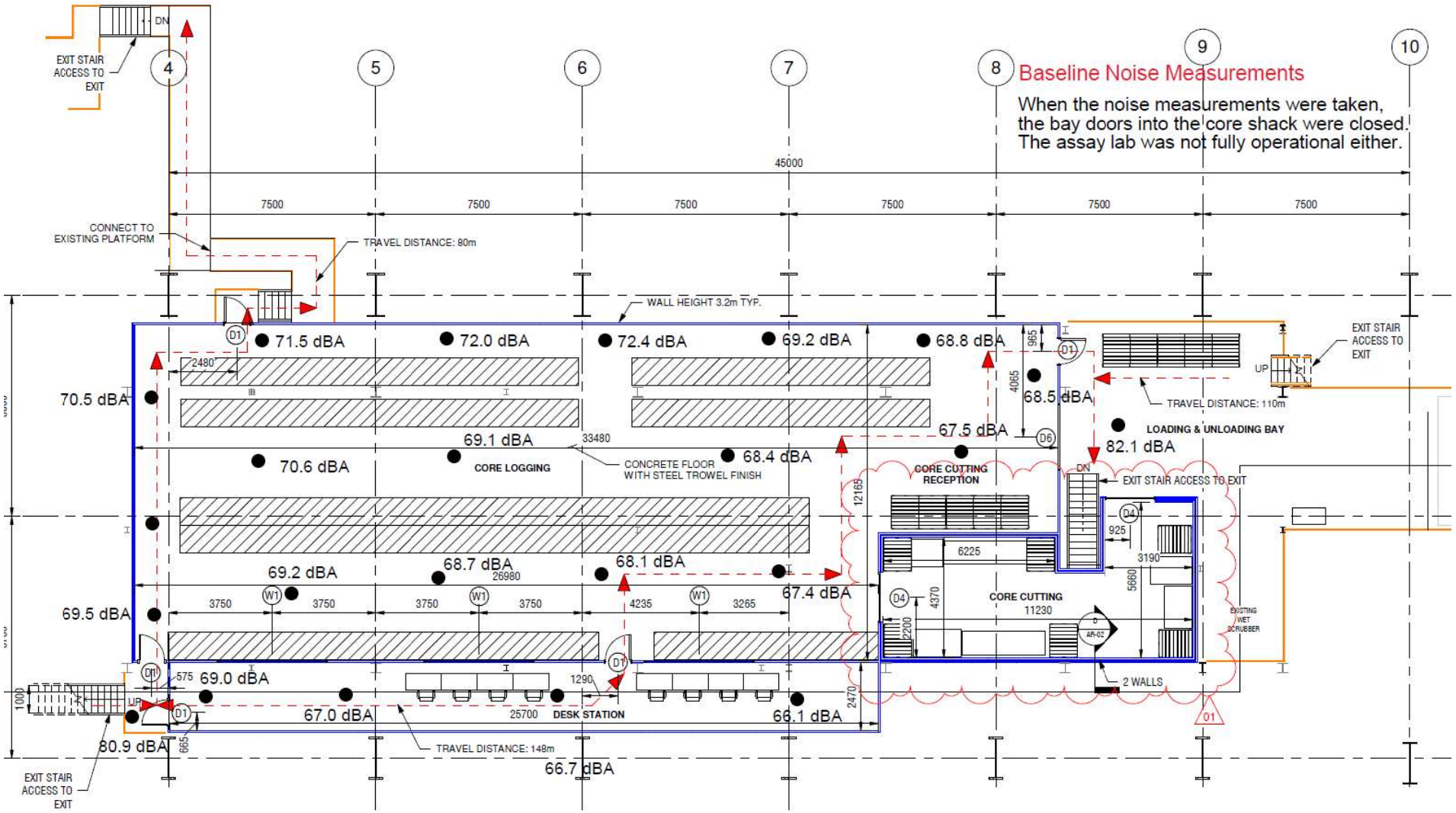
| Sampling Date | Occupation/ SEG | Silica Dust | | Respirable Dust | | Comments |
|---|---|---|---|---|---|---|
| | | Status | %of 12hr OEL | Status | %of 12hr OEL | |
| **Baseline Core Shack Area Samples** | | | | | | |
| July 31, 2021 | Area Sample | Low | <LOD | Moderate | 24% | Core shack area sample. Placed on metal shelf by the bay door closest to the elevator (east side of room) |
| July 31, 2021 | Area Sample | Low | <LOD | Moderate | 20% | Core shack area sample. Placed on table with sample bags at SW corner of shack near door up to assay lab. |
| July 31, 2021 | Area Sample | Low | <LOD | Moderate | 19% | Core shack area sample. Placed in middle of room between two core racks. |

| | | | | | | |
|---|---|---|---|---|---|---|
| July 31, 2021 | Area Sample | Low | <LOD | Moderate | 29% | Core shack area sample. Placed on far West wall by the grey cabinet in the NW area of the room (by entrance door). Only 1/4 of a normal day because only a few tables were being used. A lot more wetting was being done than normal. |
| **Core Cutting Results- September 2021** | | | | | | |
| September 8, 2021 | Matt Walker | Over | 261% | High | 61% | Hose fell off for about an hour. He worked with Neil, who also had a pump. They did 38 boxes, which is approximately 2 pallets. In the wet cutting room till 430. Typical day so far but will increase going forward. |
| September 8, 2021 | Neil Smythe | Over | 263% | High | 66% | Pump was hanging in room when it was collected. He worked with Matt, who also had a pump. They dd 38 boxes, which is approximately 2 pallets. In the wet cutting room till 430. Typical day so far but will increase going forward. |
| September 8, 2021 | Cutting Room Area Sample | Over | 199% | High | 53% | Pump was placed at the opposite end of the core cutting room to the saws. It was by the door exiting to the mill. |
| September 8, 2021 | Cutting Room Area Sample | Low | <LOD | Low | 5% | Pump placed outside core cutting room on the table (near roller door). |
| September 8, 2021 | Cutting Room Area Sample | Moderate | 20% | Low | <LOD | Pump placed in office within the core shack by the microwave. |
| September 8, 2021 | Cutting Room Area Sample | Over | 298% | High | 74% | Pump was placed on top of the core cutter (one closest to roller door) |
| **Core Cutting Results- October 2021** | | | | | | |
| October 31, 2021 | Matt Walker | Over | 342% | Over | 77% | Was cutting core for 4 hours, then took sampler off to go underground for tour. |
| October 31, 2021 | Kyle Morgan | Over | 471% | Over | 115% | Cut core 7:35-11:30. Other duties until 14:15. Then cut core rest of shift. Hose came undone but unsure of when it happened. |

| | | | | | | |
|---|---|---|---|---|---|---|
| October 31, 2021 | Cutting Room Area Sample | Over | 377% | High | 87% | Pump placed at far end of core cutting room. |
| October 31, 2021 | Cutting Room Area Sample | Over | 375% | High | 89% | Pump placed on top of core cutting saw. |
| October 31, 2021 | Cutting Room Area Sample | Over | 128% | High | 50% | Pump placed on top of cable rack in middle of landing outside cutting room. |
| October 31, 2021 | Cutting Room Area Sample | Over | 686% | Over | 187% | Pump placed in cut shack entrance on rack. |

* Where <LOD = below the analytical limit of detection for silica

**Figure 2: Baseline Noise Results**



## Action Plan

Based on the above results, the following actions are being recommended to mitigate the hazards:

- Local exhaust ventilation should be placed over the core cutting saws to capture the dust being generated. After observing the saws in operation, it was determined that the majority of the dust is being released as the piece of core comes out the other side of the saw once it's been cut in half. This is where a dust collection system needs to be installed/placed.
- The cutting saws must be regularly maintained to prevent any blockage where the water comes out while cutting. The saw closest to the office was significantly more dusty and appeared to be blocked where the water was being generated inside of it. The saw on the other side of the room had much larger holes where the water came out from and was generally more effective at mitigating the dust being generated.
- In the interim until effective ventilation is installed, the cut shack should be deemed a "respirator-required" area. Workers must wear a half-face respirator with P100 filters at all times in this room, even when the saws are no longer running. All workers required to wear a respirator must be clean shaven.
- The bay door leading from the cutting area into the logging area should be kept closed as much as possible to prevent dust from entering into the logging area.
- The fan in the core cutting area should continue to be placed such that it blows out into the mill and not into the core logging area.
- The core cutting and core logging areas must be cleaned regularly to reduce the amount of dust and debris building up in those locations. No dry sweeping is permitted. Always wet the area first before sweeping or use a mop.
- Silica sampling will be done on a regular basis to monitor exposure levels within the entire core facility.
- Noise monitoring will be redone now that the core shack and assay lab are fully operational.

Sincerely,

Jamie Tersago

Industrial Hygiene Advisor

September 23, 2021

Attention: Joel Ashburner/Matt McManus

**Re: 2021 Industrial Hygiene Sampling Results – Core Facility Sampling Results**

## Introduction

As part of the Pretium 2021 Workplace Monitoring Program, industrial hygiene sampling will be conducted throughout the year for noise, silica, respirable dust and metals. Additionally, characterization sampling will be conducted for less frequent, task specific hazards. All samples are collected in accordance with approved sampling methodologies. Recent sampling results are outlined below.

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| September 8, 2021 | Cutting Room Area Sample | Over | 199% | High | 53% | Pump was placed at the opposite end of the core cutting room to the saws. It was by the door exiting to the mill. |
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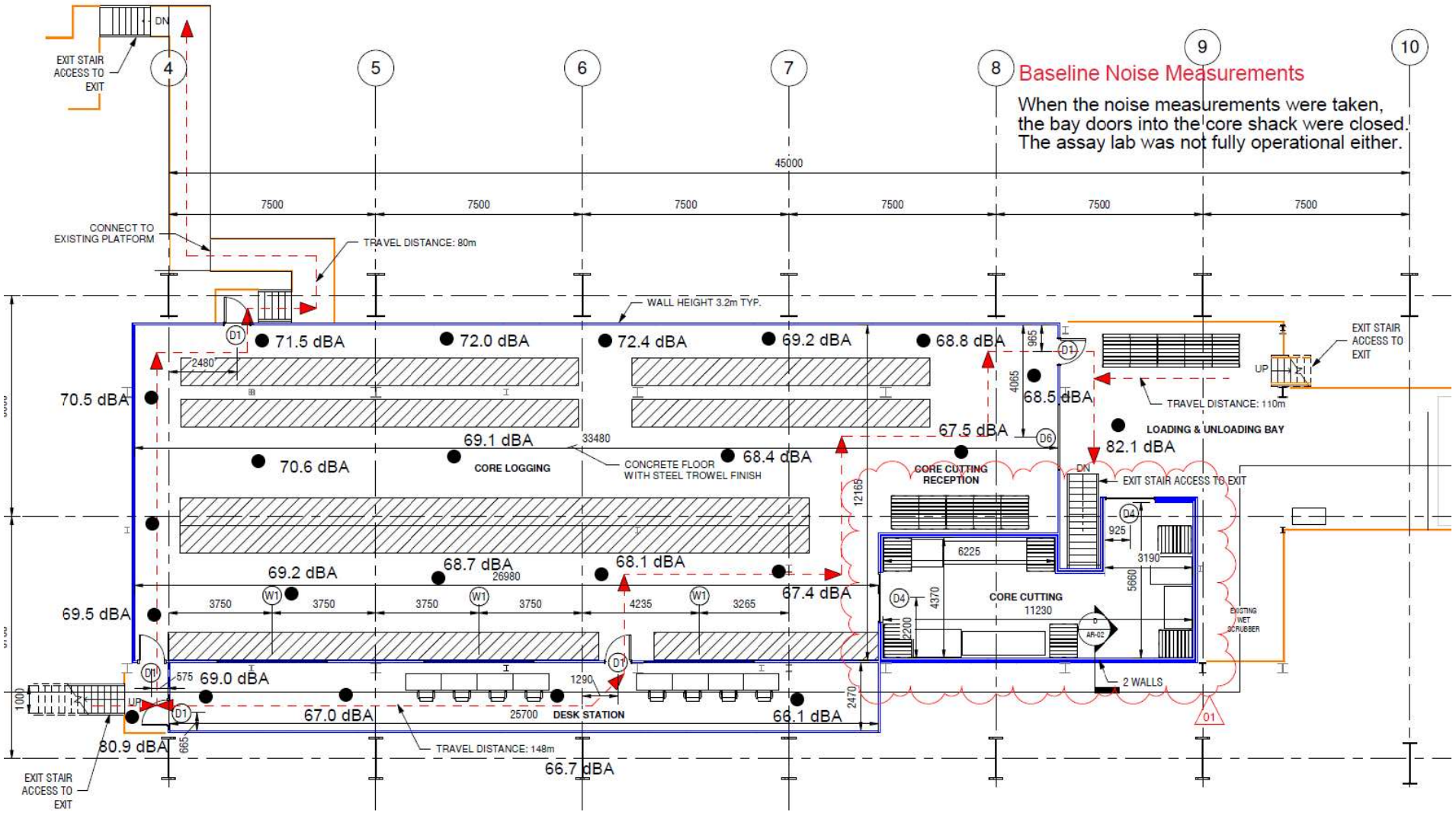
| September 8, 2021 | Cutting Room Area Sample | Moderate | 20% | Low | <LOD | Pump placed in office within the core shack by the microwave. |
| September 8, 2021 | Cutting Room Area Sample | Over | 298% | High | 74% | Pumped was placed on top of the core cutter (one closest to roller door) |

* Where <LOD = below the analytical limit of detection for silica

**Figure 2: Baseline Noise Results**



## Action Plan

Based on the above results, the following actions are being recommended to mitigate the hazards:

- Local exhaust ventilation should be placed over the core cutting saws to capture the dust being generated. After observing the saws in operation, it was determined that the majority of the dust is being released as the piece of core comes out the other side of the saw once it's been cut in half. This is where a dust collection system needs to be installed/placed.
- The cutting saws must be regularly maintained to prevent any blockage where the water comes out while cutting. The saw closest to the office was significantly more dusty and appeared to be blocked where the water was being generated inside of it. The saw on the other side of the room had much larger holes where the water came out from and was generally more effective at mitigating the dust being generated.
- In the interim until effective ventilation is installed, the cut shack should be deemed a "respirator-required" area. Workers must wear a half-face respirator with P100 filters at all times in this room, even when the saws are no longer running. All workers required to wear a respirator must be clean shaven.
- The bay door leading from the cutting area into the logging area should be kept closed as much as possible to prevent dust from entering into the logging area.
- The fan in the core cutting area should continue to be placed such that it blows out into the mill and not into the core logging area.
- The core cutting and core logging areas must be cleaned regularly to reduce the amount of dust and debris building up in those locations. No dry sweeping is permitted. Always wet the area first before sweeping or use a mop.
- Silica sampling will be done on a regular basis to monitor exposure levels within the entire core facility.
- Noise monitoring will be redone now that the core shack and assay lab are fully operational.

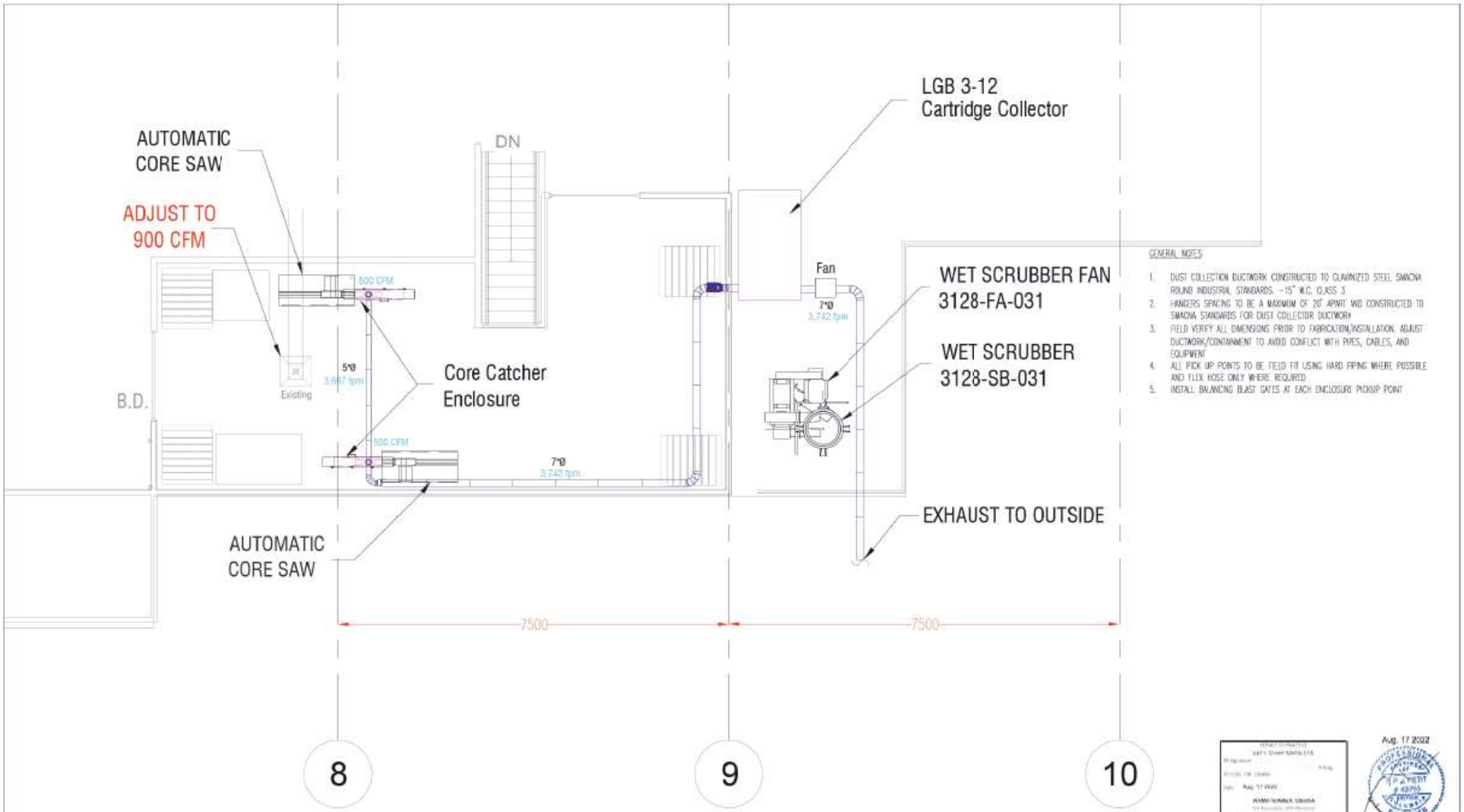
Sincerely,

Allison Buchhorn

Industrial Hygiene Advisor

# APPENDIX B

## PROPOSED DUST CONTROL AND MANAGEMENT SYSTEM – PLAN VIEW




GENERAL NOTES

1. DUST COLLECTION DUCTWORK CONSTRUCTED TO GLAVANIZED STEEL SMACNA ROUND INDUSTRIAL STANDARDS. -15" W.C. CLASS 3
2. HANGERS SPACING TO BE A MAXIMUM OF 20' APART AND CONSTRUCTED TO SMACNA STANDARDS FOR DUST COLLECTOR DUCTWORK
3. FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION/INSTALLATION. ADJUST DUCTWORK/CONTAINMENT TO AVOID CONFLICT WITH PIPES, CABLES, AND EQUIPMENT
4. ALL PICK UP POINTS TO BE FIELD FIT USING HARD PIPING WHERE POSSIBLE AND FLEX HOSE ONLY WHERE REQUIRED
5. INSTALL BALANCING BLAST GATES AT EACH ENCLOSURE PICKUP POINT

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CORE SAW VENTILATION
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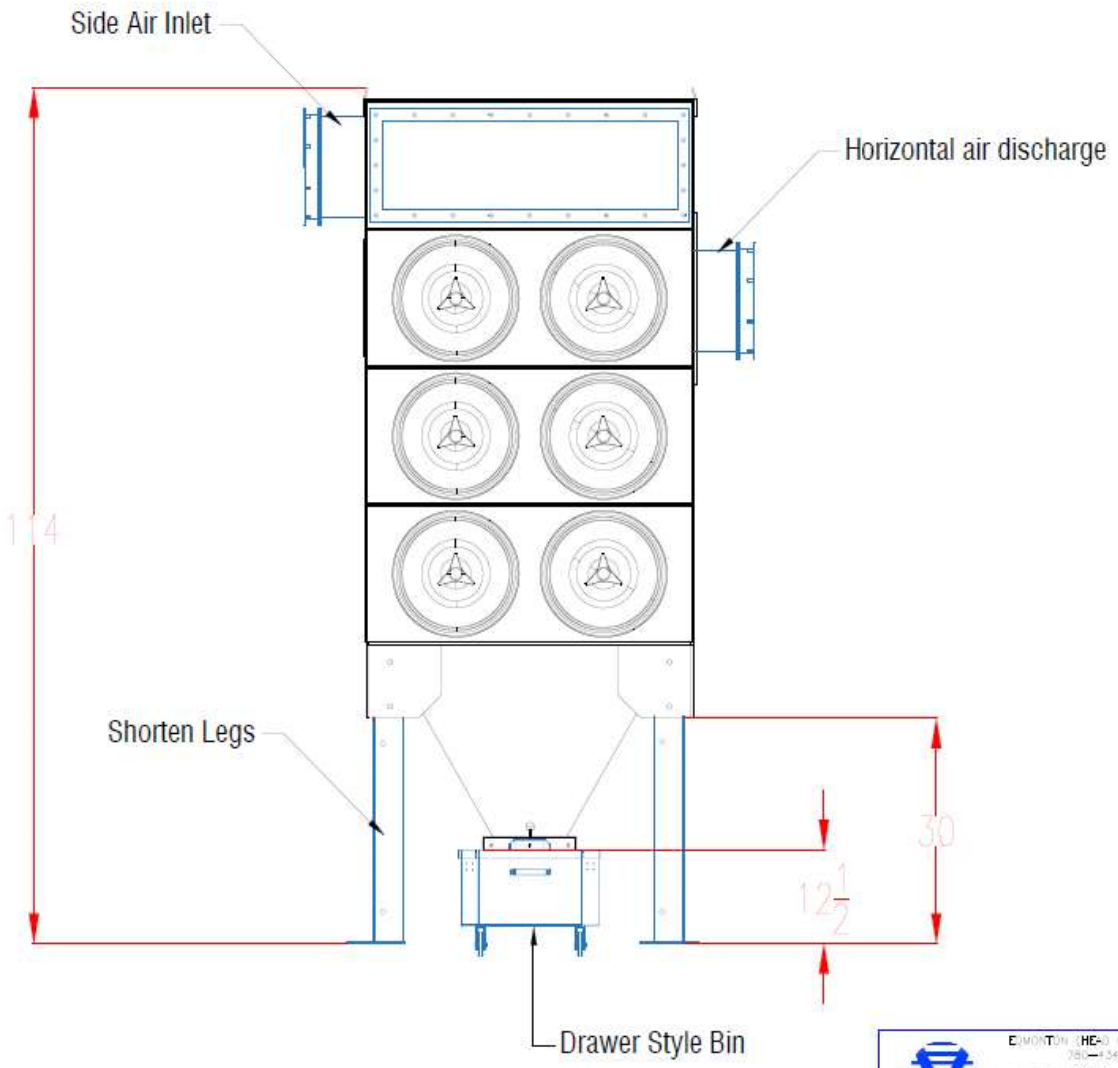
PLAN VIEW
PROJECT# 46650

# PROPOSED DUST COLLECTOR

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LGB 3-12 Collector Modifications
PROJECT# 46650
46650_02

# APPENDIX D VETS PROPOSAL FOR CORE SAW EXHAUST

See attached PDF portfolio

# Pretivm – Core Saw Exhaust

15 August 2022

**RS2022_08.2**

VETS Sheet Metal is pleased to provide a quotation to Timothy Bates and Pretivm for the fabrication and install of the dust collection and exhaust system for the two Core Saws located in the Core Room of the Brucejack Mining facility as outlined in the scope of work in this document.

## Project Overview

The dust collection system proposed will consist of a centralized collector and fan servicing the two core saws respectively. The Core room is desired to be set to a slightly negative air pressure to ensure air contaminants do not travel from the Core room into the adjacent rooms of the facility. The maximum supply air into the core room with the current AHU is measured to be 900CFM. The exhaust system will therefore be constrained to a maximum of 1,000CFM. The system will be designed with the consideration of water vapor present within the collection area.

The main source of fugitive dust was found to be escaping from the opening under the core catcher circled in RED in Figure 1. This area will be enclosed using sheet metal. All other sources of dust containment is the responsibility of the owner to provide sealing as desired for the execution of the project.

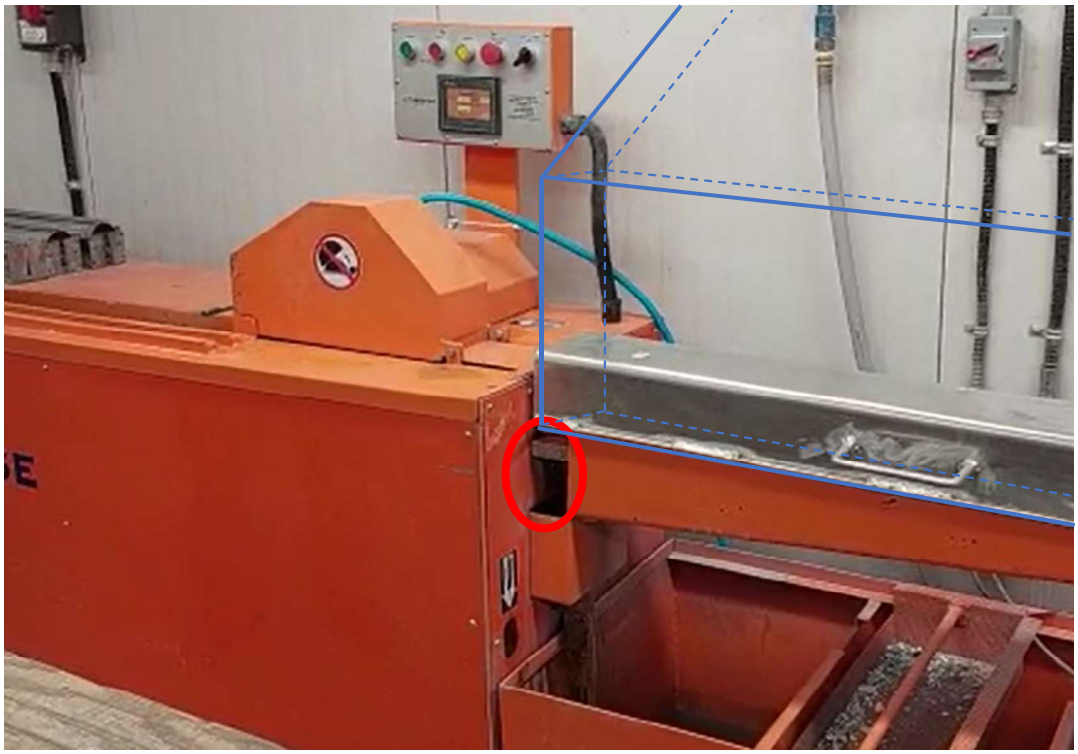

Figure 1: Core Saw – Location of Fugitive Dust

Dust from the cutting process can then be directed into the core catcher area which will be enclosed with a custom designed hood and enclosure as roughly outlined in BLUE. Due to the nature of the core cutting process, the moisture content within the dust is a concern for the system design. Materials, containment, dust pickup and collector will be selected to ensure the system operates with this in mind.

## Enclosure Design

An enclosure will be fabricated as presented in Figure 2 and will provide containment of the fugitive dust where low pickup air velocity will convey dust to the collection system while allowing for any water vapour to drop from the air stream. The pickup velocity at the face of this hood will be 303fpm increasing to 857fpm at the location of the chevron demister.

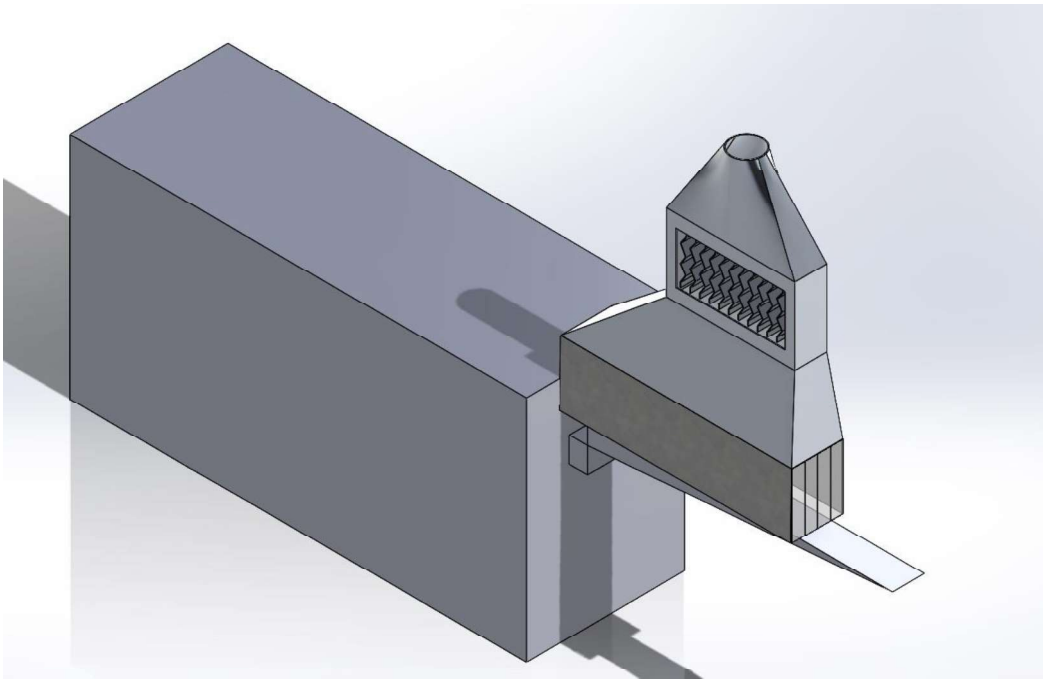

Figure 2: Design Model

Some moisture may still be present within the dust. For this consideration, baffle plates will be designed in the enclosure which will allow for the dust to coalesce and further reduce the moisture content present within the collection system. An access door will be present to allow for the maintenance and cleaning of the baffle plates. The enclosure will also be designed with a hinged opening as shown in the opened position in Figure 4 to ensure for access to core catcher for cleaning and maintenance.

Figure 3: Baffle Plate

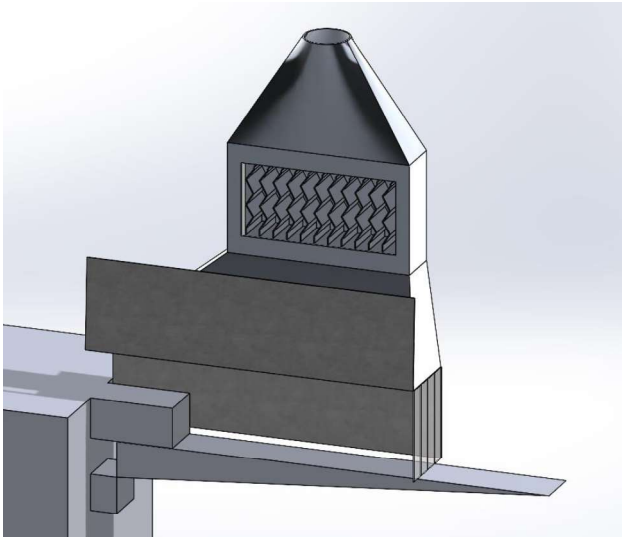

Figure 4: Opened Hinge Position

## Dust Collector

The AirPlus Industrial LGB 3-12 Cartridge collector was chosen for this application due to the ease of serviceability the cartridge style allows. The high Air-to-Cloth ratio and Nano PET Spunbond ePTFE cartridges also provide good performance and capture of the high-humidity air/dust. The collector will require some modifications to the intake/exhaust ducting as-well as reduction to the overall length. These modifications will be completed by VETS and are highlighted BLUE in Figure 5.

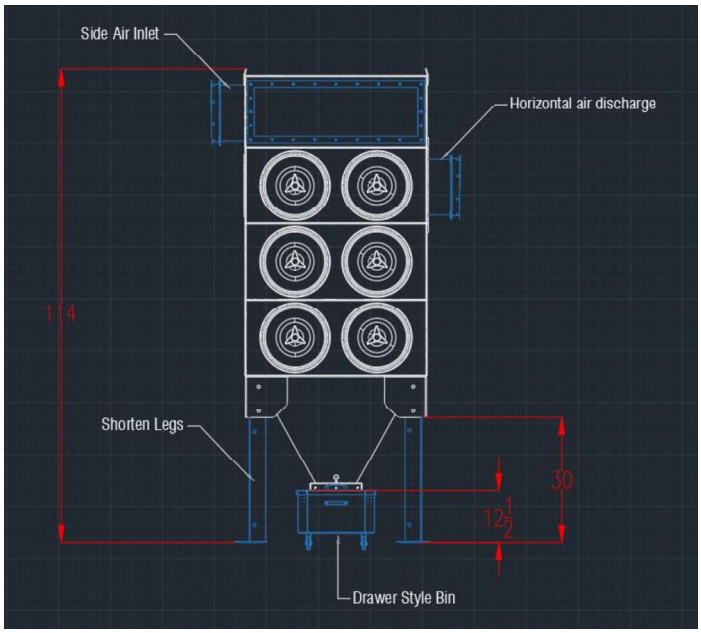


Figure 5: LGB 3-12 Collector Modifications

## Scope of Work

- Truck charges and travel to and from Brucejack Gold Mine (1 trip)
- Fabrication and install of 2 enclosure/extraction hoods (Aluminum)
- Supply, delivery and install of AirPlus Industrial LGB 3-12 Dust Collector
    - Modification of LGB 3-12 Dust Collector to adjust total height to 120”
- Supply and install of Galvanized steel ductwork to SMACNA standards
- Supply and install of Fan and motor
    - 1,000 CFM
    - 12” w.c.
- Containment of fugitive dust under Core Catcher area for two core saws
- VETS Air Balancing
- Engineering Commissioning and Sign-off

**Total Cost: $122,000**

**Not Included**

- ✖ Permitting - Building and Emission
- ✖ Standdown Time
- ✖ EWP equipment, crane rentals and material lifting equipment
- ✖ Camp and meal
- ✖ Electrical wiring installation and controls
- ✖ Sealing of any other areas with fugitive dust not specified above
- ✖ Compressed Air hookup
- ✖ Third party Air Balancing
- ✖ Scaffolding

**Project Terms**

- **Applicable taxes are extra.**
- Quote valid for 30 days.
- Purchase order and 30% down payment to cover equipment and fabrication costs. Payment terms to be negotiated prior to any work proceeding.

***Due to the current world Pandemic metal prices and shortages of stock are becoming an issue. Therefore, all metal prices on this quote will need to be verified for cost and delivery before issue of any contract or Purchase Order.***

We trust that the above is as per your request. Please feel free to contact me for any questions or concerns regarding the above information.


## Rahul Sarangal

Engineer in training - Dust Collection

**Direct. 780-638-1576**
**Main. 780-434-7476**
**Cell. 780-818-4609**
**Fax.** 780-437-6130
**24 hour Service. 780-434-7476**
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DUST COLLECTION AT ITS FINEST

VETS SHEET METAL

**VETS GROUP SYSTEMS LIMITED WARRANTY**

**MANUFACTURED COMPONENTS -** Only products manufactured and installed by VETS are to be free from defects in materials and workmanship for a period of six (6) months after installation unless otherwise specified and accepted prior to installation. VETS' material and workmanship warranties DO NOT cover Labour provided by VETS or the buyer to remove or replace defective parts.

**SUPPLIED COMPONENTS – PARTS WARRANTY ONLY -** Equipment, parts, components etc. supplied and installed but not manufactured by VETS sold to the buyer shall carry the original manufacturer's warranty only. All transportation charges and any and all sales and use taxes, duties, import or excises for such part or parts shall be paid for by the buyer. Manufactures warranty may require proof from the buyer that the goods were properly used and maintained by the buyer and responsibility for providing such proof is that of the buyer. Manufacturers warranties DO NOT cover Labour provided by VETS or the buyer to remove or replace defective parts.

**Exclusions –** this warranty does not cover abrasion, erosion and wear, nor does it cover any product which, in the judgement of VETS, or the manufacturer, has been subject to misuse or neglect, or which has been repaired or altered outside of VETS' or the manufacturers plant in any way which may have impaired its safety, operation or efficiency, or any product which has been subject to accident.

# VETS Ducting and Fitting Project Specifications – Brucejack Core Saw Ventilation

| | |
|---|---|
| **Project Name:** | Core Saw Ventilation |
| **Project Number:** | 46903 |
| **Location:** | Victoria Gold – Brucejack Mine, BC |
| **Date:** | Wednesday, August 17, 2022 |

Table 1: VETS Duct Construction Details

| | |
|---|---|
| **Ducting Connectors** | Plain ends provided for field cutting |
| **Fittings Connectors** | K&B flanges to be minimum 1-¼", or as per SMACNA reinforcement |
| **Elbows Construction** | 2 x CL radius; lap and weld |
| **Tee Construction** | Welded Tees |
| **Flange Construction** | K&B flanges to be minimum 1-¼", or as per SMACNA reinforcement |
| **Duct Material** | Duct will be galvanized steel construction |

Table 2: SMACNA Design Criteria

| | |
|---|---|
| **Class of Duct:** | Class 1 |
| **Pressure Rating** | -15 *inwg* |
| **Duct Material** | Galvanized steel |
| **Particulate** | Core Rock and water vapour |
| **Designed Percent Full** | - |
| **Design Temperature** | 70 *°F* |
| **Support Spacing** | 20 *ft* |
| **Particulate Density** | 75-86 lb/ft$^3$ |
| **Maintenance Load** | 0 *lb* |
| **Stiffener Requirement** | No |
| **Insulation and/or Cladding** | None |

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RR EGBC ID# 196460
Date Aug. 17 2022
**PERMIT NUMBER: 1003954**
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Aug. 17 2022
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. P. J. PETIT
# 43793

Table 3: SMACNA Design Gauge Table

| Diameter | Gauge: Duct | Ring Reinforcement | Gauge: Fittings | Elbow Radius/Gore |
|---|---|---|---|---|
| 4 | 22 | unreinforced | 20 | 2R – 5 gore |
| 6 | 22 | unreinforced | 20 | 2R – 5 gore |
| 8 | 22 | unreinforced | 20 | 2R – 5 gore |
| 10 | 20 | unreinforced | 18 | 2R – 5 gore |
| 12 | 18 | unreinforced | 16 | 2R – 5 gore |
| 14 | 16 | unreinforced | 14 | 2R – 5 gore |
| 16 | 16 | unreinforced | 14 | 2R – 5 gore |
| 18 | 14 | unreinforced | 12 | 2R – 5 gore |
| 20 | 14 | unreinforced | 12 | 2R – 5 gore |
| 22 | 12 | unreinforced | 10 | 2R – 5 gore |
| 24 | 12 | unreinforced | 10 | 2R – 5 gore |

*Duct diameters in between table sizes correspond to the larger sized diameter.

# Appendices

TABLE IV: MINIMUM GAUGE REQUIRED FOR ROUND DUCT, BASED ON SUPPORT SPACING FOR CLASSES 1 AND 5

| Class 1 | Carbon and Coated Steels | | | | | |
|---|---|---|---|---|---|---|
| Diameter, in. | No Particulate | | | | | |
| Support Spacing, ft | 10 | | 15 | | 20 | |
| Maint. Load, lb | 0 | 250 | 0 | 250 | 0 | 250 |
| 4 | 22 | 14 | 22 | 12 | 22 | 7 |
| 6 | 22 | 22 | 22 | 18 | 22 | 14 |
| 8 through 10 | 22 | 22 | 22 | 22 | 22 | 20 |
| 12 through 20 | 22 ga All | | | | | |
| 22 through 24 | 20 ga All | | | | | |
| 26 through 30 | 18 ga All | | | | | |
| 32 through 42 | 16 ga All | | | | | |
| 44 through 54 | 14 ga All | | | | | |
| 56 through 72 | 12 ga All | | | | | |
| 74 through 84 | 11 ga All | | | | | |
| 86 through 96 | 10 ga All | | | | | |

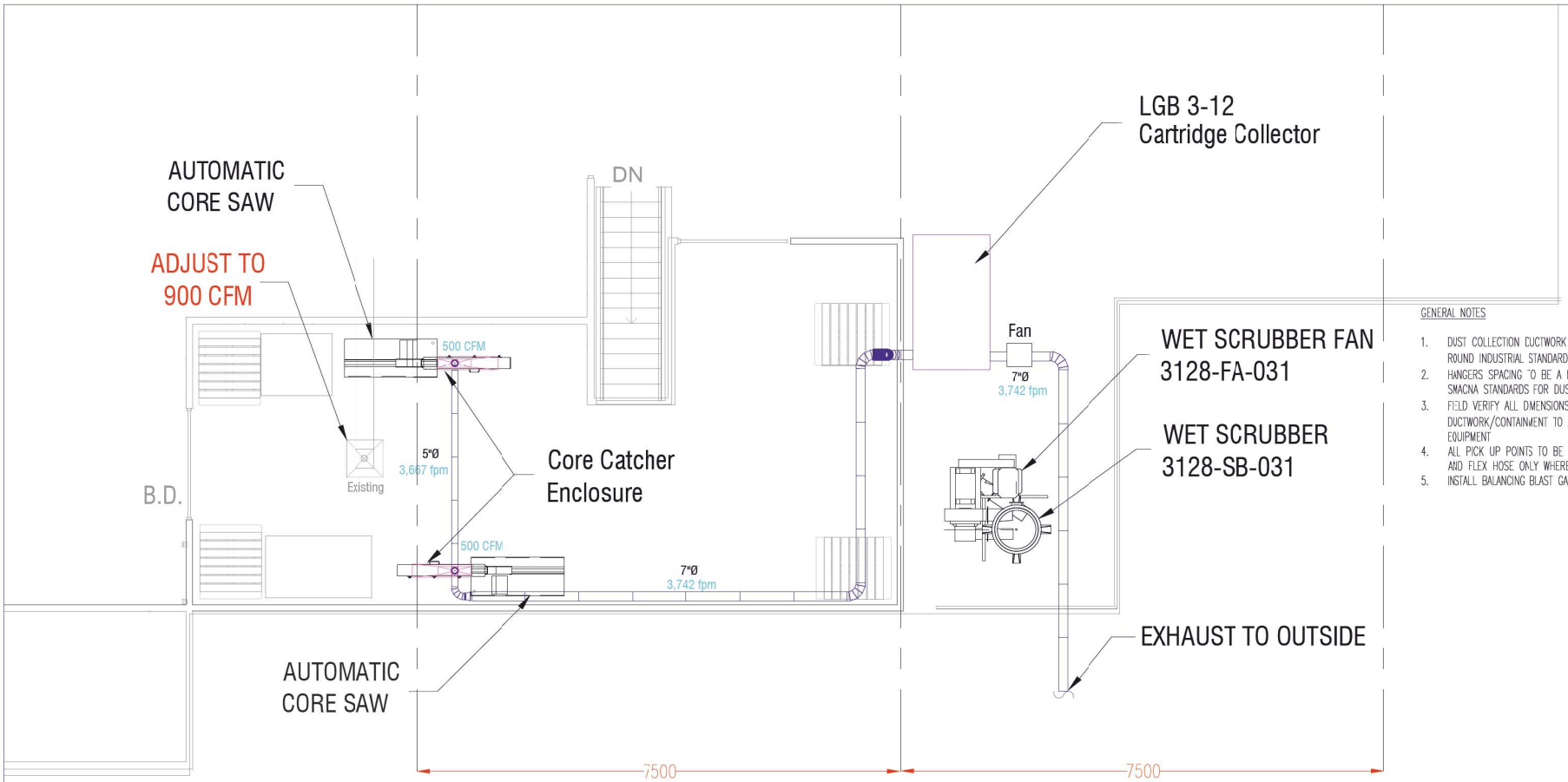
**Table 8–1.1 Minimum Gage Required for Round Duct, Based on Support Spacing for Class 1**

TABLE V: MATERIAL AND REINFORCEMENT SCHEDULE FOR ROUND DUCT CLASSES 1 AND 5 AT -15 IN. WG

## –15 in. wg

**Table Rating:** Carbon and Aluminized Steel To 650°F
Galvanized Steels To 400°F

| Duct Dia. in. | Class 1 Gage | Class 2 Gage | Class 3 Gage | Class 4 Gage | Stiffener Spacing, ft | Minimum Required | | Stiffener Size/Type | No. / Size Welds[f] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | *I*, in.$^4$ | *A*, in.$^2$ | | |
| 8 & Under | 22 | 22 | 16 | 14 | Shaded Rows Represent Unstiffened Design | | | | |
| 10 | 20 | 18 | 16 | 14 | Shaded Rows Represent Unstiffened Design | | | | |
| 10 | Use Unstiff | Use Unstiff | Use Unstiff | Use Unstiff | 20 | | | | |
| 10 | 22 | 20 | Use Unstiff | Use Unstiff | 10 | 0.001 | 0.036 | L 1 × 1 × ⅛ | 6 – 1.5 |
| 12 | 18 | 16 | 16 | 14 | Shaded Rows Represent Unstiffened Design | | | | |
| 12 | Use Unstiff | Use Unstiff | Use Unstiff | Use Unstiff | 20 | | | | |
| 12 | 20 | 18 | Use Unstiff | Use Unstiff | 10 | 0.002 | 0.043 | L 1 × 1 × ⅛ | 7 – 1.0 |
| 14 | 16 | 16 | 14 | 12 | Shaded Rows Represent Unstiffened Design | | | | |
| 14 | 18 | Use Unstiff | Use Unstiff | 14 | 20 | 0.006 | 0.101 | L 1 × 1 × ⅛ | 7 – 1.5 |
| 14 | 20 | 18 | 16 | 14 | 10 | 0.003 | 0.051 | L 1 × 1 × ⅛ | 7 – 1.0 |
| 16 | 16 | 14 | 14 | 12 | Shaded Rows Represent Unstiffened Design | | | | |
| 16 | Use Unstiff | 16 | Use Unstiff | Use Unstiff | 20 | 0.008 | 0.115 | L 1 × 1 × ⅛ | 7 – 1.5 |
| 16 | 18 | 18 | 16 | 14 | 10 | 0.004 | 0.058 | L 1 × 1 × ⅛ | 7 – 1.0 |
| 18 | 14 | 14 | 12 | 12 | Shaded Rows Represent Unstiffened Design | | | | |
| 18 | 16 | Use Unstiff | 14 | Use Unstiff | 20 | 0.012 | 0.130 | L 1 × 1 × ⅛ | 8 – 1.5 |
| 18 | 18 | 16 | 16 | 14 | 10 | 0.006 | 0.065 | L 1 × 1 × ⅛ | 8 – 1.0 |
| 20 | 14 | 12 | 12 | 12 | Shaded Rows Represent Unstiffened Design | | | | |
| 20 | 16 | 14 | 14 | Use Unstiff | 20 | 0.016 | 0.144 | L 1 × 1 × ⅛ | 8 – 2.0 |
| 20 | 18 | 16 | 14 | 14 | 10 | 0.008 | 0.072 | L 1 × 1 × ⅛ | 8 – 1.0 |
| 22 | 12 | 12 | 12 | 12 | Shaded Rows Represent Unstiffened Design | | | | |
| 22 | 14 | 14 | Use Unstiff | Use Unstiff | 20 | 0.022 | 0.159 | L 1 × 1 × ⅛ | 8 – 1.5 |
| 22 | 16 | 14 | 14 | Use Unstiff | 15 | 0.016 | 0.119 | L 1 × 1 × ⅛ | 8 – 1.5 |
| 22 | 18 | 16 | 14 | 14 | 10 | 0.011 | 0.079 | L 1 × 1 × ⅛ | 8 – 1.5 |
| 24 | 12 | 12 | 12 | 11 | Shaded Rows Represent Unstiffened Design | | | | |
| 24 | 14 | 14 | Use Unstiff | 12 | 20 | 0.028 | 0.173 | L 1½ × 1½ × ⅛ | 9 – 1.5 |
| 24 | 16 | 14 | 14 | 12 | 15 | 0.021 | 0.130 | L 1 × 1 × ⅛ | 9 – 1.5 |
| 24 | 16 | 16 | 14 | 12 | 10 | 0.014 | 0.087 | L 1 × 1 × ⅛ | 9 – 1.0 |
| 30 | 11 | 11 | 11 | 10 | Shaded Rows Represent Unstiffened Design | | | | |
| 30 | 14 | 12 | 12 | 12 | 20 | 0.055 | 0.217 | L 1½ × 1½ × ⅛ | 9 – 2.0 |
| 30 | 14 | 14 | 12 | 12 | 15 | 0.041 | 0.162 | L 1½ × 1½ × ⅛ | 9 – 1.5 |
| 30 | 16 | 14 | 14 | 12 | 10 | 0.027 | 0.108 | L 1½ × 1½ × ⅛ | 9 – 1.0 |
| 36 | 10 | 10 | 7 | 7 | Shaded Rows Represent Unstiffened Design | | | | |
| 36 | 14 | 12 | 12 | 12 | 15 | 0.071 | 0.195 | L 2 × 2 × ⅛ | 10 – 1.5 |
| 36 | 14 | 14 | 12 | 12 | 12 | 0.057 | 0.156 | L 1½ × 1½ × ⅛ | 10 – 1.5 |
| 36 | 14 | 14 | 12 | 12 | 10 | 0.047 | 0.130 | L 1½ × 1½ × ⅛ | 10 – 1.0 |
| 42 | 7 | 7 | 7 | 7 | Shaded Rows Represent Unstiffened Design | | | | |
| 42 | 12 | 12 | 12 | 11 | 15 | 0.113 | 0.227 | L 2 × 2 × ⅛ | 10 – 1.5 |
| 42 | 14 | 12 | 12 | 12 | 12 | 0.090 | 0.182 | L 2 × 2 × ⅛ | 10 – 1.5 |
| 42 | 14 | 12 | 12 | 12 | 10 | 0.075 | 0.152 | L 2 × 2 × ⅛ | 10 – 1.5 |
| 48 | 7 | 7 | 7 | ¼ | Shaded Rows Represent Unstiffened Design | | | | |
| 48 | 12 | 12 | 12 | 11 | 15 | 0.168 | 0.260 | L 2 × 2 × ⅛ | 11 – 1.5 |
| 48 | 12 | 12 | 12 | 11 | 12 | 0.134 | 0.208 | L 2 × 2 × ⅛ | 11 – 1.5 |
| 48 | 12 | 12 | 12 | 12 | 10 | 0.112 | 0.173 | L 2 × 2 × ⅛ | 11 – 1.0 |
| 54 | 3/16 | ¼ | ¼ | ¼ | Shaded Rows Represent Unstiffened Design | | | | |
| 54 | 12 | 12 | 11 | 11 | 15 | 0.239 | 0.292 | L 2 × 2 × 3/16 | 11 – 1.5 |
| 54 | 12 | 12 | 12 | 11 | 12 | 0.191 | 0.234 | L 2 × 2 × 3/16 | 11 – 1.5 |
| 54 | 12 | 12 | 12 | 11 | 10 | 0.160 | 0.195 | L 2 × 2 × ⅛ | 11 – 1.0 |




GENERAL NOTES

1. DUST COLLECTION DUCTWORK CONSTRUCTED TO GLAVANIZED STEEL SMACNA ROUND INDUSTRIAL STANDARDS. -15" W.C. CLASS 3
2. HANGERS SPACING TO BE A MAXIMUM OF 20' APART AND CONSTRUCTED TO SMACNA STANDARDS FOR DUST COLLECTOR DUCTWORK
3. FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION/INSTALLATION. ADJUST DUCTWORK/CONTAINMENT TO AVOID CONFLICT WITH PIPES, CABLES, AND EQUIPMENT
4. ALL PICK UP POINTS TO BE FIELD FIT USING HARD PIPING WHERE POSSBLE AND FLEX HOSE ONLY WHERE REQUIRED
5. INSTALL BALANCING BLAST GATES AT EACH ENCLOSURE PICKUP POINT

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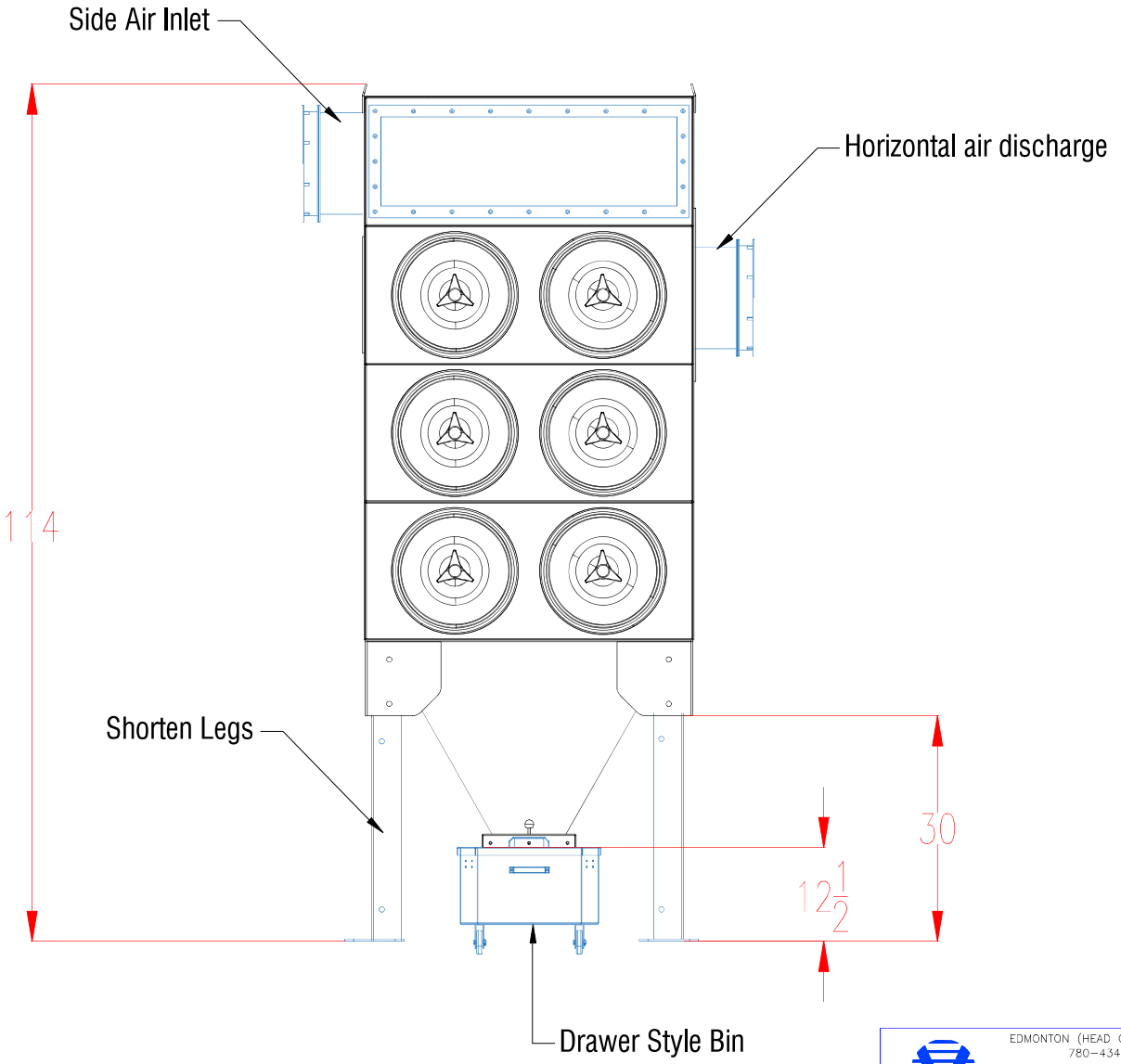


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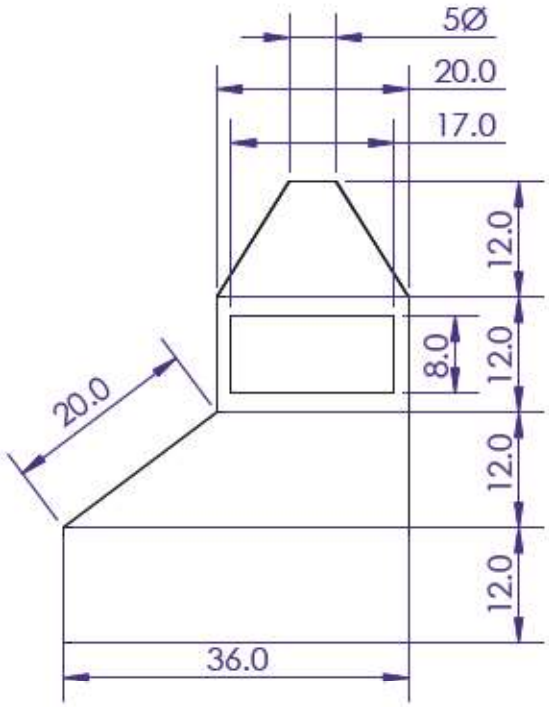


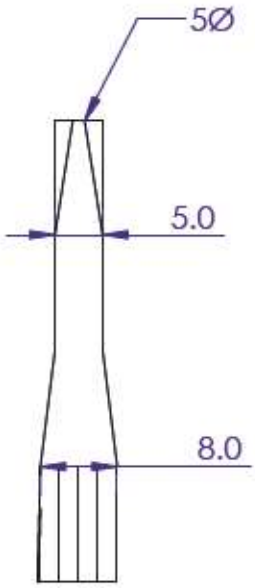


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THIRD ANGLE PROJECTION

DIMENSIONS ARE IN INCHES
± 0.5° TOL ON ANGLE U.N.O.
FRACTIONAL ± 1/16" U.N.O.

VETS

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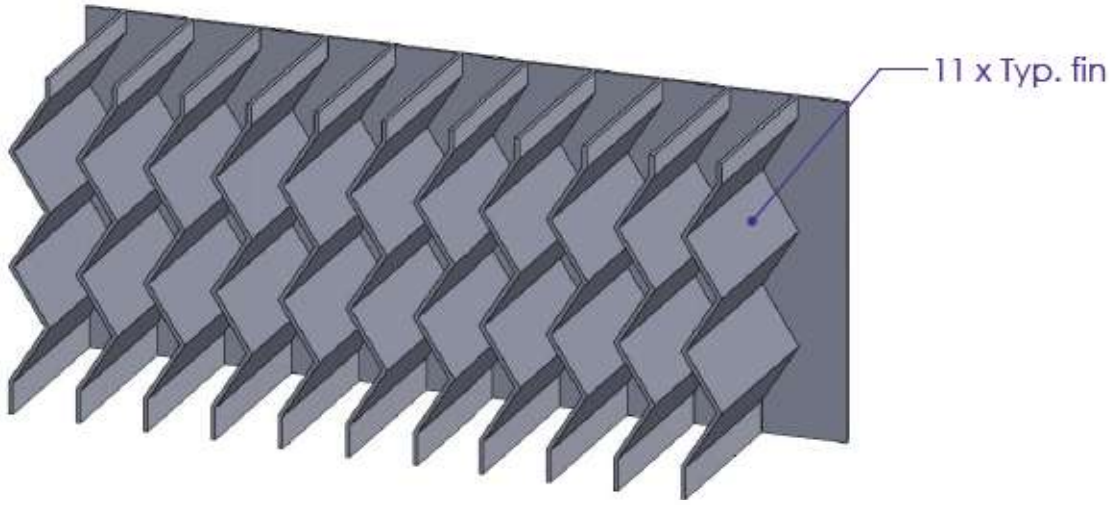
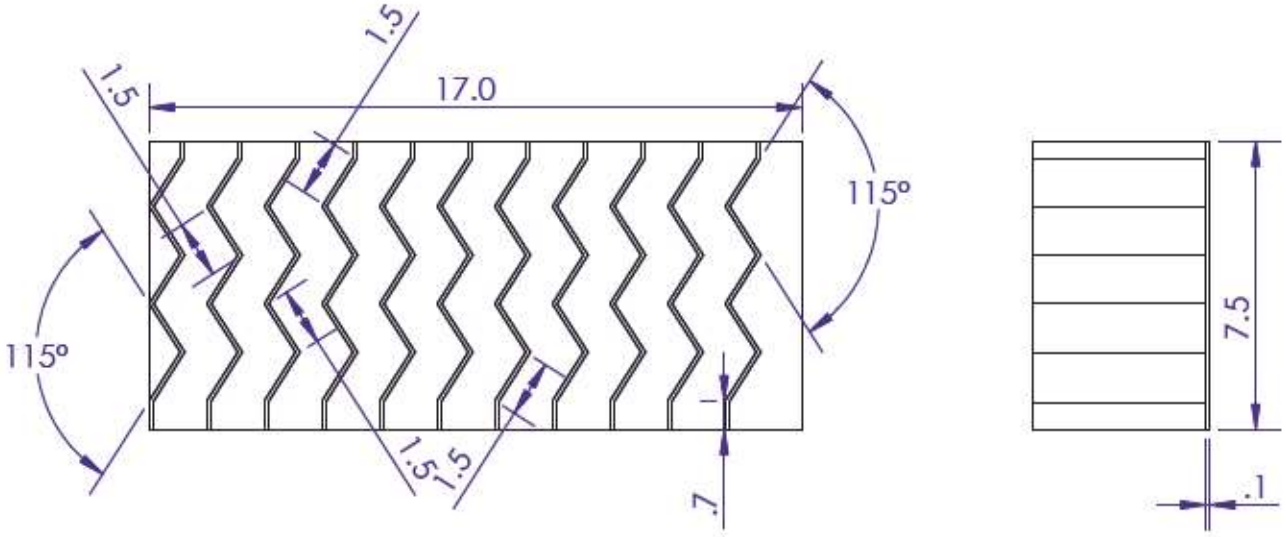
BRUCEJACK B.C.
HOOD ENCLOSURE
MATERIAL: 10 GAUGE ALUMINUM

SCALE. 1:16 DWG. PRT_46958_01 REV. A

S:\Projects\1. Projects\Active Projects\46985 - Brucejack Core Saw Engineering\4. Engineering Design\1. Prelimonary Design\4. SolidWORKS\




PERMIT TO PRACTICE
Vet's Sheet Metal Ltd.
RR Signature P.Eng.
RR EGBC ID# 196460
Date Aug. 17 2022
**PERMIT NUMBER: 1003954**
The Association of Professional Engineers and Geoscientists of British Columbia

Aug. 17 2022

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA R. P. J. PETIT # 43793



THIRD ANGLE PROJECTION

DIMENSIONS ARE IN INCHES
± 0.5° TOL ON ANGLE U.N.O.
FRACTIONAL ± 1/16" U.N.O.

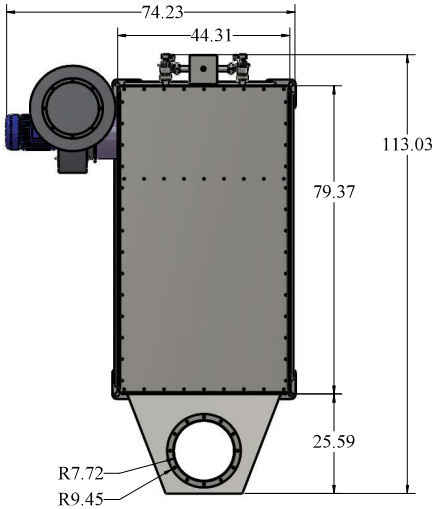
VETS

EDMONTON (HEAD OFFICE) 780-434-7476
BURNABY (OFFICE) 604-881-1223

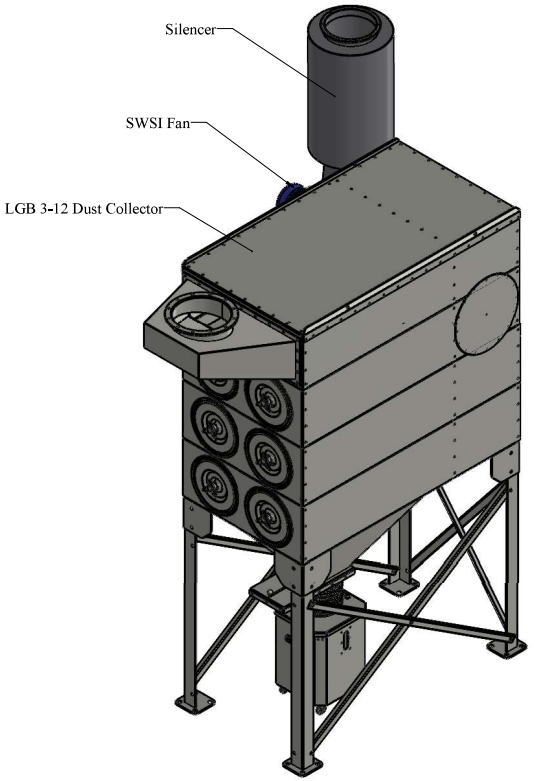
| DSG. R.S. | DWN. R.S. | CHK. – |
|---|---|---|
| DATE. – | DATE. 2022-08-15 | DATE. – |

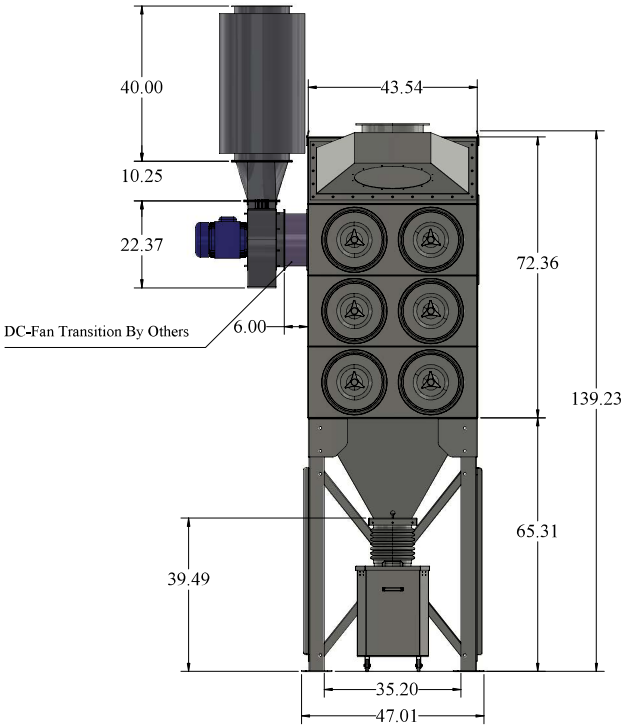
NEWCREST MINE
CORE SAW ENGINEERING
BRUCEJACK B.C.
CHEVERON FLUID DEMISTER
MATERIAL: 10 GAUGE ALUMINUM

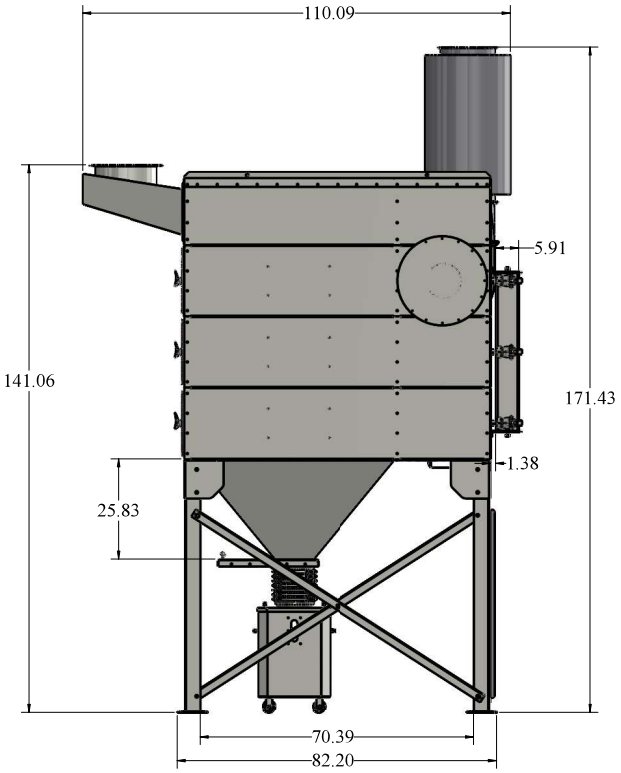
SCALE. 1:4 DWG. PRT_46985_02 REV. A




Generic drawings hopper modified to reduce the overall height of the dust collector. Refer to drawing: 46985-02 for more information




PROPRIETARY AND CONFIDENTIAL

AIRPLUS Industrial

| | NAME | DATE |
|---|---|---|
| DRAWN | M.S | 23-04-06 |
| CHECKED | | |
| ENG APPR. | | |
| MFG APPR. | | |
| Q.A. | | |

COMMENTS:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±

INTERPRET GEOMETRIC TOLERANCING PER:

MATERIAL

FINISH

DO NOT SCALE DRAWING

NEXT ASSY | USED ON | APPLICATION

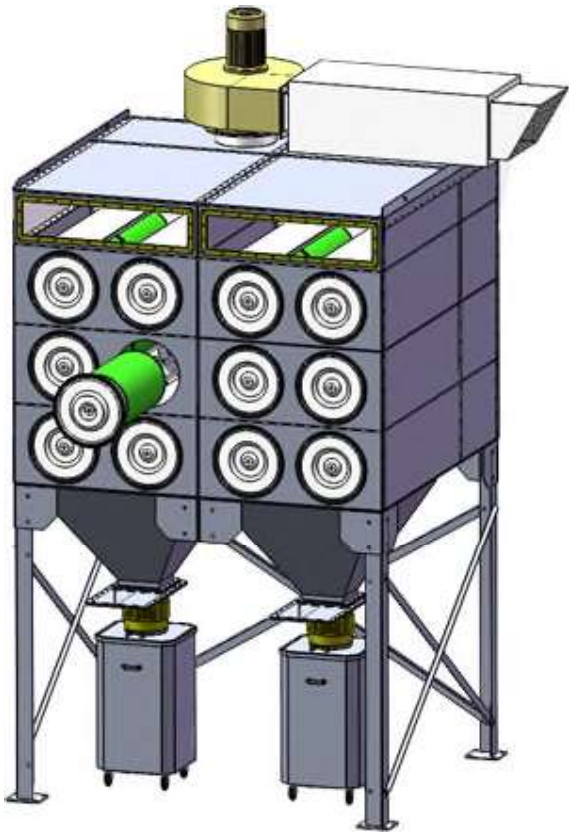
TITLE: LGB 3-12 Dust Collector

SIZE: D | DWG. NO. D 220401D-01 | REV

SCALE: 1:24

**AIRPLUS INDUSTRIAL CORPORATION**
Unit B100 5320 272 Street, Langley, BC, V1W 1S3
T: 604-381-3742 F: 604-381-3742
www.airplusindustrial.ca

# LGB Horizontal Cartridge Dust Collector

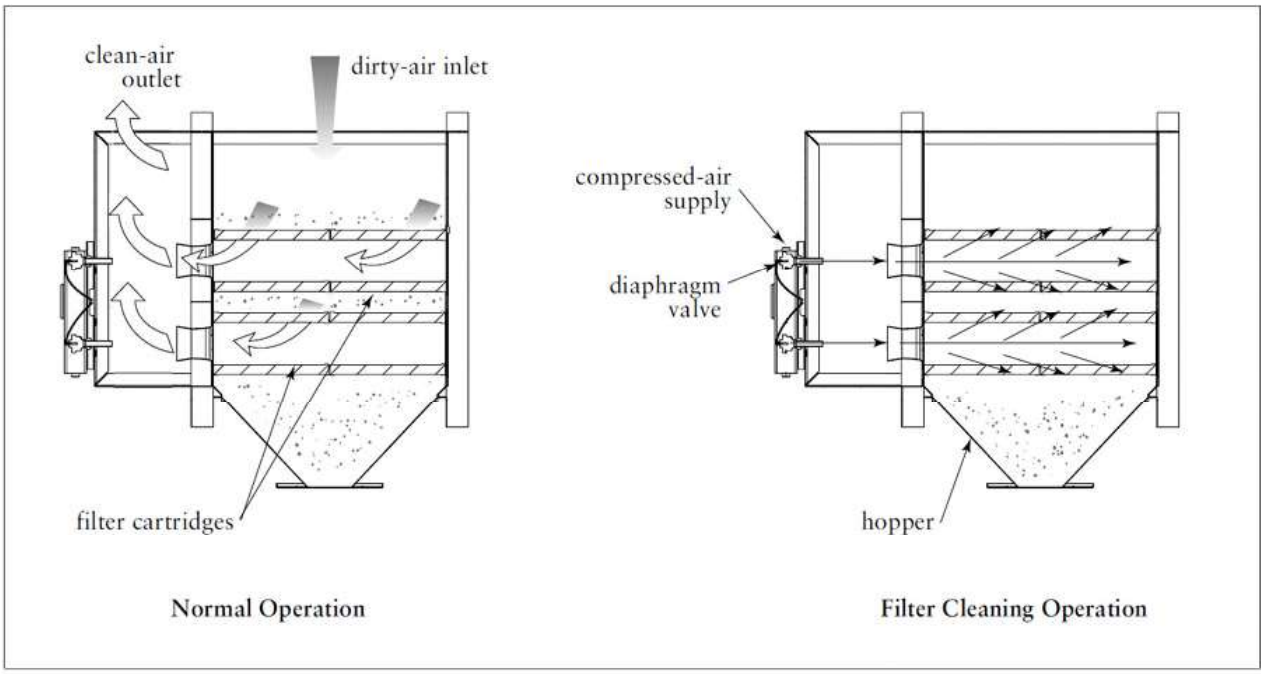


## Dust Collector from 12~80 Cartridges

- Modular and bolt-on structure makes quick manufacturing and fast delivery
- Most of the components pre-installed and tested in factory before delivery. Minimum site installation required
- Various cartridge filter media available for various dust collection applications
- Special designed deflector plates greatly reduce the dusts falling from top cartridges to down cartridges. This ensures longest cartridge filter life.
- Special venturi and supersonic injection nozzles achieve the premium pulse cleaning effects on filters. The cartridge extraction system working with highest performance
- Flexible configurations to fit site conditions. The inlet and control placement can be set up to fit specific facility needs.

# Horizontal Cartridge Dust Collector

## Unit Descriptions & Operation Explanation



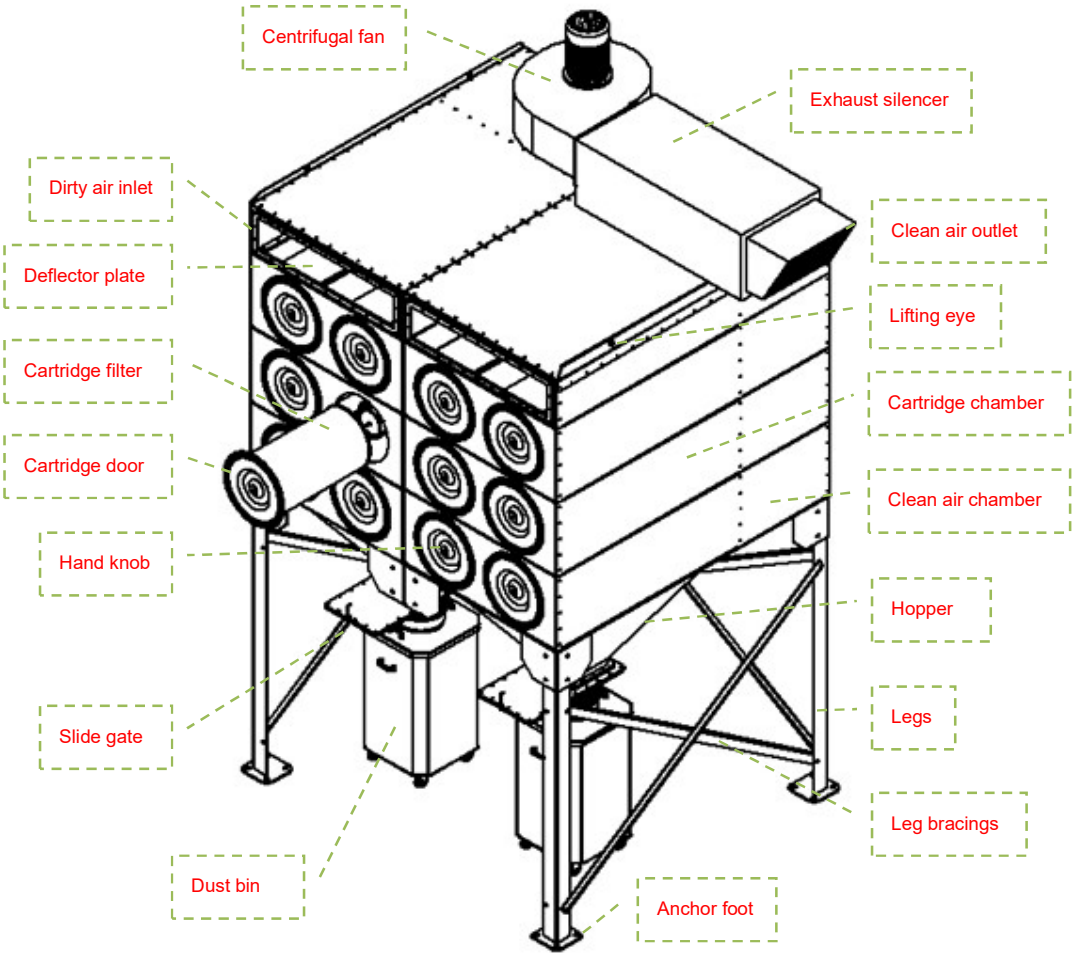

Horizontal cartridge dust collectors use gravity and downward airflow to achieve self-clean and reduce pressure across the cartridge filters. They collect airborne contaminants from industrial processes varying from welding and metal working to chemical and pharmaceutical processing. The units can be used in almost every manufacturing processes and efficiently control pollution levels. They are economical, simple install and maintenance. They are especially suitable for fine and low dust loading applications.

During normal operation, dust-laden air enters the unit through the dirty-air inlet. Airflow is directed downward through the collector and heavier particulate falls directly into the hopper. The cartridges remove fine particulate and clean filtered air passes through the cartridges to the clean-air plenum and discharges through the clean-air outlet.

Filter cleaning is completed using pulse-jet technology. A solenoid and diaphragm valve aligned to each row of filters provides the pulse cleaning. The cleaning sequence starts at the top filter row and continues down through each row. Remove, inspect, or change the cartridges from outside the unit by removing the filter access cover and sliding the filters out.

# Horizontal Cartridge Dust Collector

## Dust Collector Components



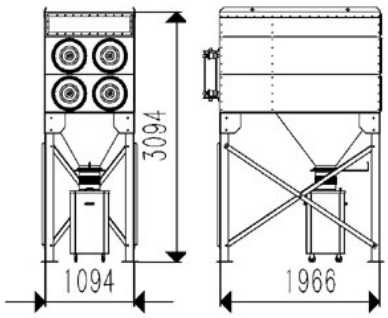

**Construction:** Material: Carbon steel, Stainless steel or Galvanized steel

## Standard Operating Conditions

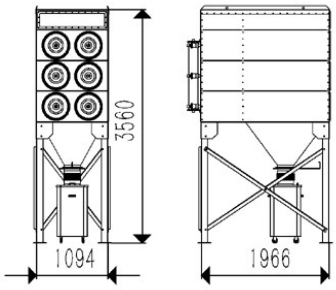
- Seismic Rating (zone): 4
- Wind Load Rating (Km/h): 160
- Housing Rating (Pa): +3800 / -5000
- Valves and controls: 50/60 Khz
- Compressed Air Required (MPa): 0.62-0.67 or (90-100 psig)

# Horizontal Cartridge Dust Collector

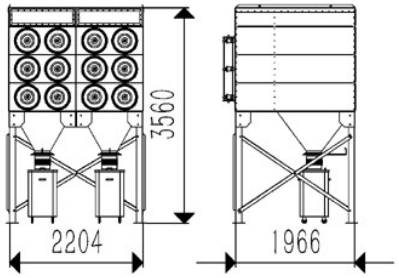
## Typical Model Outer Dimensions



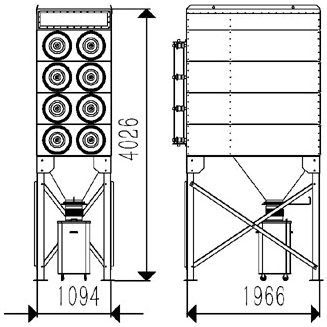

LGB 2-8



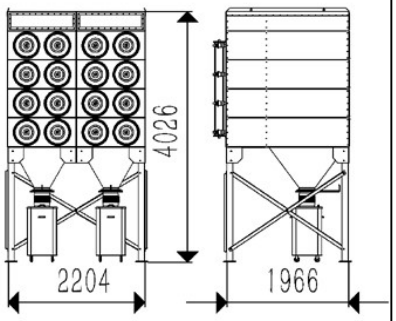

LGB 3-12



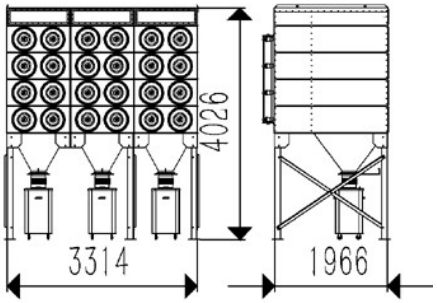

LGB 3-24




LGB 4-16

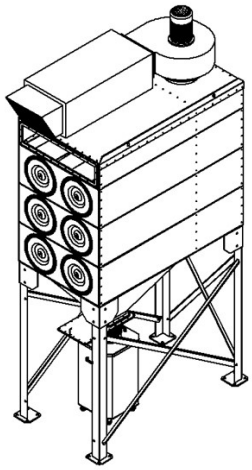



LGB 4-32

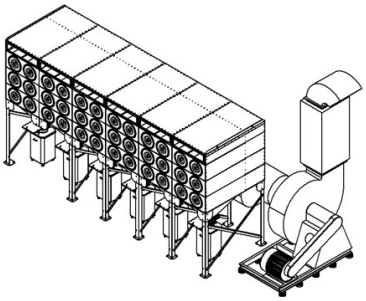



LGB 4-48

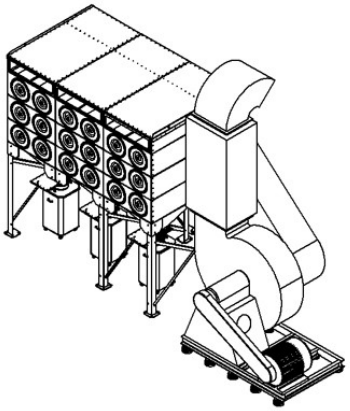
## Fan Mounting Style



Top Mounting



Ground Mounting 1



Ground Mounting 2

# Horizontal Cartridge Dust Collector

## Specifications & Container Loading Numbers

| Model | Cartridge Numbers | Polyester Filter Area | Cellulose Filter Area | Airflow |
|---|---|---|---|---|
| LGB 3-12 | 12 | 1,214 $ft^2$ | 2,067 $ft^2$ | 4,238~5,650 cfm |
| LGB 3-24 | 24 | 2,428 $ft^2$ | 4,133 $ft^2$ | 8,476~11,301 cfm |
| LGB 3-36 | 36 | 3,643 $ft^2$ | 6,200 $ft^2$ | 12,713~16,951 cfm |
| LGB 3-48 | 48 | 4,857 $ft^2$ | 8,267 $ft^2$ | 16,951~22,601 cfm |
| LGB 3-60 | 60 | 6,071 $ft^2$ | 10,333 $ft^2$ | 21,189~28,252 cfm |
| LGB 3-72 | 72 | 7,285 $ft^2$ | 12,400 $ft^2$ | 25,427~33,902 cfm |
| | | | | |
| LGB 4-16 | 16 | 1,619 $ft^2$ | 2,756 $ft^2$ | 5660~7534 cfm |
| LGB 4-32 | 32 | 3,238 $ft^2$ | 5,511 $ft^2$ | 11,301~15,068 cfm |
| LGB 4-48 | 48 | 4,857 $ft^2$ | 8,267 $ft^2$ | 16,951~22,601 cfm |
| LGB 4-64 | 64 | 6,476 $ft^2$ | 11,022 $ft^2$ | 22,601~30,135 cfm |
| LGB 4-80 | 80 | 8,095 $ft^2$ | 13,778 $ft^2$ | 33,902~45,203 cfm |

## Standard Components

- Cartridge filter chamber
- Clean air chamber
- Cellulose cartridge filters
- Hopper
- Slide gate
- Dust bin with hose and casters
- Pulse valves
- Compressed air tank
- Pulse valve controller
- Prime and surface painting

## Optional Components

- Other media cartridge filter
- Centrifugal fan
- Fan exhaust silencer
- Fan control cabinet
- Explosion relief vents
- Differential pressure controller
- Rotary valves
- Access platform
- Epoxy surface coating

# BRUCEJACK CORE SAW VENTILATION - EQUIPMENT SCHEDULE

**FAN & BLOWER - SCHEDULE**

| Unit No. | Service | Manuf. | Model | Capacity | | Motor Specs | | | Supply Info | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | VFD | | STARTER | | DISCONNECT | | |
| | | | | Design Airflow (cfm) | Total SP (mixed) | Rotation speed (RPM) | Power (HP) | Voltage (V/ϕ/Hz) | MECH | ELEC | MECH | ELEC | MECH | ELEC | |
| EF-01 | Core Saw Dust Collection | NYB | 1406A05 Pressure Blower | 1,000 | 13.6 | 3500 | 3.51 | 575/3/60 | N/A | N/A | | X | | X | |

**DUST COLLECTOR - SCHEDULE**

| Unit No. | Service | Manuf. | Model | Capacity | | Installation Specs | | | Supply Info | | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Design Airflow (cfm) | AMR | Compressed Air (psig) | Valves and Controls (Khz) | Siesmic Rating (Zone) | Filters | Pulse Control | Dust Bin | |
| EF-01 | Core Saw Dust Collection | Airplus Industrial | LGB 3-12 Dust Collector | 1,000 | 1.12 | 90-100 | 50/60 | 4 | NXTT Nano PET Spunbound w/ ePTFE | Timer w/ Photohelic Gauge | Steel dust bin (120L) | |

**GRILLES/HOOD - SCHEDULE**

| Unit No. | Supply/Exhaust | Service | Model | Capacity | | Comments |
|---|---|---|---|---|---|---|
| | | | | Design Airflow (cfm) | Face Velocity (fpm) | |
| SG-01 | Supply | Core Saw Room | UNKWN | 900 | UNKWN | |
| EH-01 | Exhaust | Core Saw Room | VETS Cheveron Demister | 500 | 250 | |
| EH-02 | Exhaust | Core Saw Room | VETS Cheveron Demister | 500 | 250 | |

PERMIT TO PRACTICE
Vet's Sheet Metal Ltd.
RR Signature P.Eng.
RR EGBC ID# 196460
Date Aug. 17 2022
**PERMIT NUMBER: 1003954**
The Association of Professional Engineers and Geoscientists of British Columbia

Aug. 17 2022

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
P. J. PETIT
# 43793

# APPENDIX E UPDATED AIR QUALITY MANAGEMENT PLAN


NEWCREST

PRETIUM RESOURCES INC.

A member of the Newcrest Group of companies

BRUCEJACK MINE

# Air Quality Management Plan

August 2023


**PRETIUM RESOURCES INC.**

A member of the Newcrest Group of companies

BRUCEJACK MINE

# Air Quality Management Plan

Date: August 2023

Pretium Resources Inc.
Suite 2300, Four Bentall Centre
1055 Dunsmuir Street
PO Box 49334
Vancouver, BC, V7X 1L4
T: (604) 558-1784
F: (604) 558-4784

# VERSION CONTROL

| Version # | Date Released | Approved By | Amendment/Details |
|---|---|---|---|
| 1 | May 2015 | Pretium Exploration Inc. | Original |
| 1a | December 2018 | Pretium Resources Inc. | Input to version control table and cover page added |
| 2 | January 2021 | Pretium Resources Inc. | Address comments from Nisga'a Lisims Government; removed reference to construction phase; update to present verb tense |
| 2a | January 2022 | Pretium Resources Inc. | Updated figures and made minor formatting changes/edits |
| 3 | August 2023 | Pretium Resources Inc. | Updated figures, dates, minor edits, and addition of core saw exhaust. |
| | | | |
| | | | |
| | | | |

BRUCEJACK GOLD MINE

# Air Quality Management Plan

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## *LIST OF FIGURES*



## *LIST OF TABLES*



## *LIST OF APPENDICES*

# GLOSSARY AND ABBREVIATIONS

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

| | |
|---|---|
| **Air Quality Standards** | Objectives for maximum concentrations air contaminants in the atmosphere developed to ensure long-term protection of public health and the environment. |
| **Ambient Air Quality** | The outdoor air quality at a particular site. |
| **BC** | British Columbia |
| **BJAR** | Brucejack Access Road |
| **CAAQS** | Canadian Ambient Air Quality Standards |
| **CWS** | Canada-wide Standards |
| **Dioxins** | Polychlorinated dibenzodioxins (PCDDs), or simply dioxins, are a group of polyhalogenated organic compounds that can act as environmental pollutants. They are commonly referred to as dioxins for simplicity in scientific publications because every PCDD molecule contains a dioxin skeletal structure. Members of the PCDD family have been shown to bioaccumulate in humans and wildlife due to their lipophilic properties. |
| **ERM** | Environmental Resource Management Group, Inc. |
| **Fugitive Dust** | Particulate matter, often sand or mineral dust, released to the atmosphere by mechanical disruption of soil or by wind scouring. |
| **Furans** | Polychlorinated dibenzofurans (PCDFs), or simply furans, are a group of halogenated organic compounds which are toxic environmental pollutants. PCDFs tend to co-occur with polychlorinated dibenzodioxins (PCDDs). PCDFs can be formed by pyrolysis or incineration at temperatures below 1,200 °C of chlorine containing products, such as polyvinyl chloride (PVC), polychlorinated biphenyls (PCBs), and other organochlorides, or of non-chlorine containing products in the presence of chlorine donors. |
| **GHG** | Greenhouse gas |
| **m** | Metre |
| **Mercury** | Mercury is a natural and persistent bioaccumulative element which can be transported many kilometers in the atmosphere. Mercury can be deposited to waterbodies from anthropogenic emissions and poses a threat to human and ecosystem health. Mercury also enters the environment through the disposal (e.g., land filling, incineration) of certain products. Products containing mercury include: auto parts, batteries, fluorescent bulbs, medical products, thermometers, and thermostats. |

| | |
|---|---|
| **NAAQO** | National Ambient Air Quality Objectives |
| **NLG** | Nisga'a Lisims Government |
| **NPRI** | National Pollutant Release Inventory |
| **Oxides of Nitrogen ($NO_x$)** | $NO_x$ gas primarily consists of nitrogen oxide (NO) and nitrogen dioxide ($NO_2$). The gases are emitted with exhaust from combustion engines and are by-products of blasting operations. $NO_x$ can be converted to nitric acid in the atmosphere and thus contribute to acid deposition. |
| **PASS** | Passive Air Sampling System |
| **PCDD** | Polychlorinated dibenzodioxins |
| **$PM_{10}$** | Inhalable particulate matter. $PM_{10}$ particles are airborne particles that have a diameter of 10 µm or less. The majority of $PM_{10}$ particles are from fugitive dust sources. $PM_{10}$ can enter the respiratory system and has been linked to respiratory problems. |
| **$PM_{2.5}$** | Respirable particulate matter ($PM_{2.5}$) is a subset of $PM_{10}$ and defined as particles with a diameter less than 2.5 µm. These particles are small enough to enter deep into the respiratory system. Most of particulate matter emitted in diesel engine exhaust is $PM_{2.5}$. |
| **Pretium** | Pretium Resources Inc. |
| **s** | Second |
| **SOP** | Standard operating procedure |
| **Sulphur Dioxide ($SO_2$)** | Fossil fuel contains a small amount of sulphur-containing organic compounds. During fuel combustion, the sulphur is oxidized and emitted as $SO_2$ gas with the engine exhaust. In the atmosphere, $SO_2$ can further oxidize to sulphate, which contributes to acid deposition. |
| **US EPA** | United States Environmental Protection Agency<br>The US EPA has promulgated a variety of guidelines, objectives, emission factors, air dispersion modelling procedures and statutes for the protection of ambient air quality. |
| **VOK** | Valley of the Kings |

# 1 PURPOSE

The purpose of the Air Quality Management Plan is to discuss the mitigation measures that are implemented to manage and reduce air emissions resulting from the Operations of Brucejack Mine (the Mine), to outline the continual assessment, monitoring, and reporting of emissions that will take place throughout the mine life, and to fulfill Condition 2 of the Environmental Assessment Certificate (#M15-01) granted to Pretium on March 26, 2015. This management plan fulfills Condition #2, in relation to a Component Plan for air quality management, presented within Schedule B of the Certificate and copied below.

> *Condition 2*
>
> *"The Holder must prepare the Construction, Operations, Closure and Post-Closure Component Plans identified in Appendix A in consultation with, and to the satisfaction of, RRAs.*
>
> *Component Plans, at minimum, must include the following information:*
>
> - *Purpose of Component Plan;*
> - *Performance objectives;*
> - *Effects mitigation measures;*
> - *Monitoring programs;*
> - *Monitoring schedules; and*
> - *Reporting requirements.*
>
> *The Holder must consult with the NLG, Tahltan and TSKLH on the content and implementation of Component Plans in accordance with the ACP set out in Condition 5.*
>
> *The Holder must implement Component Plans according to timelines set by RRAs. This can be no later than the commencement of Construction."*

# 2 PERFORMANCE OBJECTIVES

The objective of the Air Quality Management Plan is to mitigate for, monitor, and report on air emissions resulting from Mine related activities, and to comply with required conditions in Permit 107025.

# 3 SCOPE

The Air Quality Management Plan applies to the Brucejack Mine Site, the Brucejack Access Road (BJAR), the Knipple Transfer Area and the Bowser Aerodrome during Mine Operations.

# 4 RELEVANT LEGISLATION, REGULATIONS, AND AEC CONDITIONS

## 4.1 AIR QUALITY

The federal government has set National Ambient Air Quality Objectives (NAAQOs) and Canada-wide Standards (CWSs) under the *Canadian Environmental Protection Act, 1999* (1999). CWSs are intended to be achievable targets that will reduce health and environmental risks within a specific timeframe, whereas NAAQOs identify benchmark levels of protection for people and the environment. The new Canadian Ambient Air Quality Standards (CAAQS), adopted in 2013, are in effect since 2020, and supersede the CWSs. There are also several federal regulations relating to specific emission sources, such as incinerators, off-road engines, and open burning. In addition to federal legislation, British Columbia (BC) has also developed air quality objectives for some contaminants. Previously established criteria for $NO_2$ and $SO_2$ were developed in the 1970s. New CAAQS for $NO_2$ and $SO_2$ were adopted in 2017; however, new provincial criteria are not yet available and interim criteria (2014 and 2016) are still in use. Table 4.1-1 summarizes the federal and provincial ambient air quality criteria.

The applicable standards, objectives, legislation, and regulations relevant to the Mine include:

- NAAQOs (CCME 1999);
- CAAQS (CCME 2020);
- *British Columbia Ambient Air Quality Objectives* (BC MOE 2021;
- *Interim Ambient Air Quality Objectives* (BC MOE 2018);
- *Pollution Control Objectives for the Mining, Smelting, and Related Industries* (BC MOE 1979);
- CWS for dioxins and furans (CCME 2009);
- CWS for mercury emissions (CCME 2010);
- Sulphur in Diesel Fuel Regulation (SOR/2002-254);
- Code of Practice for the Concrete and Concrete Products Industry (BC Reg. 329/2007); and
- Open Burning Smoke Control Regulation (BC Reg. 152/2019).

Pretium Resources Inc. (Pretium) is currently authorized to discharge emissions of air contaminants from underground ventilation, a dust collection system, smelting furnace, assay labs, refuse incinerators, open burning of clean wood waste as well as fugitive dust associated with the Mine as per the Air Permit PA-107025 issued under the provisions of the *Environmental Management Act* (2003) on January 9, 2014 and most recently amended on July 8, 2021.

**Table 4.1-1. Federal and Provincial Ambient Air Quality Criteria**

| Pollutant | Averaging Period | Concentrations (µg/m$^3$) | |
|---|---|---|---|
| | | Air Quality Criteria | |
| | | Canada | BC |
| $NO_2$ | 1-hour | 113 (2020) [a] and 79 (2025) | 113[c] |
| | Annual | 32 (2020) [b] and 23 (2025) | 32[d] |
| $SO_2$ | 1-hour | 183 (2020) [e] and 170 (2025) | * |
| | Annual | 13(2020) [f] and 10 (2025) | * |
| $PM_{10}$ | 24-hour | - | 50 |
| $PM_{2.5}$ | 24-hour | 27[g] | 25[h] |
| | Annual | 8.8[i] | 8[j] |

*Notes:*
*Dash (-) indicates information not available or applicable. Bold indicates exceedance over criteria.*
*(2020) and (2025) indicate the criteria will come into effect in 2020 and 2025, respectively.*
*a The 3-year average of the annual 98th percentile of the daily maximum 1-hour average concentrations.*
*c Based on annual 98th percentile of daily 1-hour maximum , over one year*
*b, d, f Average over a single calendar year of all 1-hour average concentrations.*
*e The 3-year average of the annual 99th percentile of the daily maximum 1-hour average concentrations.*
*g The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations.*
*h The 3-year average of the annual average of all 1-hour average concentrations.*
*i Based on annual 98th percentile of daily average, over one year.*
*j Annual average over one year.*
** Superseded by CAAQS, effective January 1, 2020.*

In addition to established air quality standards and objectives, there are also reporting requirements. Under the authority of the *Canadian Environmental Protection Act, 1999* (1999), owners or operators of facilities that meet published reporting requirements are required to report to Environment Canada's National Pollutant Release Inventory (NPRI; Environment Canada 2014a). Details about NPRI reporting are described in Section 7.1.1.2.

## 4.2 GREENHOUSE GAS

There is currently no national or provincial legislation in place regarding greenhouse gas (GHG) emission limits at the project level. There are, however, provincial and national reporting requirements regarding the emission of GHGs.

In support of Canada's GHG mitigation targets, since 2010, facilities emitting over 10,000 tonnes $CO_2e$ have been required to report emissions to Environment Canada for the Greenhouse Gas Emissions Reporting Program (Environment Canada 2014b), under the jurisdiction of Section 46 of the *Canadian Environmental Protection Act, 1999* (1999).

In BC, since January 1, 2010, facilities emitting over 10,000 tonnes $CO_2e$ must report to the BC Ministry of Environment, and those emitting over 25,000 tonnes $CO_2$ must also have their emissions verified by an independent and accredited third party under the BC Reporting Regulation (BC Reg. 272/2009) of the *Greenhouse Gas Reduction (Cap and Trade) Act* (2008).

# 5 ENVIRONMENTAL PROTECTION AND MANAGEMENT

## 5.1 MITIGATION MEASURES AND BEST MANAGEMENT PRACTICES

Air emissions are will be generated during the Mine's Operations and Closure phases from the following sources and activities:

- Diesel exhaust from:
  - mining equipment and vehicles operating underground and on surface; and
  - diesel generators operating as back-up power sources.
- Fugitive dust generated from:
  - surface blasting and earthworks at the Brucejack Mine Site;
  - upgrading the BJAR during Operations;
  - underground blasting and mining activities;
  - ore handling both underground and at surface; and
  - using the BJAR, Knipple Transfer Area, Bowser Aerodrome, and Brucejack Mine Site roads (unpaved surfaces).
- Emissions from the smelting furnace and from the assay laboratory located at the Brucejack Mine Site.
- Emissions resulting from incineration of:
  - inorganic and organic wastes in the incinerators located at the Brucejack Mine Site and Knipple Transfer Area; and
  - non-hazardous organic wastes (i.e., clean wood waste, paper packaging) from four open burn pits located at the Brucejack Mine Site, Knipple Transfer Area, Bowser Aerodrome, and Wildfire Camp.

The following sections describe the environmental protection measures that are implemented to effectively manage air emissions.

### *5.1.1 Mine Equipment and Vehicles*

Poorly maintained engines can use up to 50% more fuel than those that are properly maintained (D. Cope Enterprises 2004). Studies have also shown that 1995 model-year and older vehicles produce smog-causing pollutants at a rate up to 19 times greater than a new vehicle (Summerhill 2013). Equipment and vehicles are scheduled for regular maintenance to optimize operating conditions and, at that time, parts showing signs of excessive wear that indicate near-term failure are promptly replaced. Additionally, equipment and vehicles purchased by Pretium are newer model-years than 1995. Diesel fuel purchased will have a sulphur content of 0.0015% (15 ppm) or less, as regulated by the Sulphur in Diesel Fuel Regulations (SOR/2002-254) for off-road engines and on-road vehicles. Idling of vehicles is to be avoided as much as feasible.

### 5.1.2 Generators and Incinerators

Generators were used during the Construction phase before the transmission line was completed. Currently generators are only used as a source of backup power.

Through proper operation of the incinerators, in addition to proper waste segregation and following manufacturer maintenance/inspection schedules, emissions from the incinerators are expected to comply with the CWS for dioxins and furans (CCME 2009) and the CWS for mercury emissions (CCME 2010). Note that the incinerators have a failsafe to only burn at temperatures greater than 1000ºC to accomplish a cleaner burn.

### 5.1.3 Burn Pits

Open burn pits are managed as per the conditions outlined in Pretium's current Air Permit PA-107025 for the open burn pit at the Brucejack Mine Site. Additional burn pits located at the Wildfire and Knipple camps, and at the Bowser Aerodrome are operated periodically throughout the year. Acceptable materials for open burning include only dry, unpainted, untreated demolition and construction wood wastes, broken lumber and pallets, slabs, log ends and branches, brush and miscellaneous, non-recyclable cardboard and paper products. Excluded open burning materials include nuisance-causing combustibles such as painted and treated wood, sawdust, mulch, wood chips, stumps, rubber, plastics, tars, insulation, etc.

All reasonable alternatives for reducing, reusing, or recycling wood are pursued to minimize the amount of material open burned. The burn piles have been constructed in a manner to minimize smoke emissions and open burning is conducted in accordance with the Open Burning Smoke Control Regulation (BC Reg. 152/2019). The closest ventilation index publicly available is from Stewart, approximately 65 kilometres south of the Brucejack Mine Site. Open burning will not be initiated unless the ventilation index is forecast as "good" for the day the open burning is to be started, and "good" or "fair" on the second day the debris is anticipated to release smoke. If the ventilation index is not available, a small test burn (maximum 60 minutes duration) constructed of a material like what will be burned may be completed. A full-scale burn will follow if the test burn shows the weather conditions are adequate to provide good smoke dispersion.

Ash from burn pits and incinerators are sent offsite to an approved landfill facility or buried and covered at designated locations. At the end of mine life, burn pits will be buried.

### 5.1.4 Fugitive Dust from Ore Processing and Concrete Batch Plant

Crushing is the first step in ore processing. Crushing of low- and high-moisture ore produces significantly different amounts of particulate matter. Primary crushing of ore at the Mine will take place underground, thereby minimizing dust emissions to the environment. Moreover, the ore is wet, resulting in minimal dust generation during primary crushing.

The crushed ore is transported to the mill through the conveyor decline where the ore is further handled. The different air velocities will be controlled at less than 4.5 m/s to reduce the suspension of dust.

Dust generated from ore handling, plus dust generated from the cement hoppers in the concrete batch plant, is managed by dust collectors at transfer points, surge bins, and hoppers. Fabric filters generally

collect particles with sizes ranging from submicron to several hundred microns in diameter at efficiencies more than 99% (US EPA 2002). The dust collectors are operated and maintained per manufacturer recommendations.

### *5.1.5 Fugitive Dust from Unpaved Surfaces*

Fugitive dust generated from use of the unpaved BJAR and other site roads, as well as unpaved surfaces at the Knipple Transfer Area and Bowser Aerodrome, is managed through the application of water. Watering increases the moisture content and conglomerates particles, effectively reducing the likelihood of them becoming re-suspended. Additionally, a dust suppression agent (e.g., Ca/Mg brine mixture) may be applied to roadways and some unpaved surface areas annually, or as needed, to help reduce dust generation. Roadways are also properly graded, compacted, and maintained to reduce silt content, and topped with gravel during upgrades.

### *5.1.6 Smelting Furnace and Assay Laboratory*

In the gold refining process, gold-silver concentrate recovered by gravity concentration is smelted at the Brucejack Mine Site into gold and silver doré. During the smelting process, sulphur from the gravity concentration may be released to the air, producing $SO_2$. Exhaust from the assay laboratory may contain acidic moisture and particulate matter resulting from sample preparation. Scrubbers are equipped to these exhaust points to mitigate $SO_2$ emissions. The scrubbers use lime solutions or other alkaline solutions such as NaOH or $Na_2CO_3$. The scrubbers are operated and maintained per manufacturer recommendations.

### *5.1.7 Core Saw Exhaust*

A dust control system is used to reduce particulate matter in the resulting from the two core saws located in the mill. The core saw exhaust is discharged outside of the mill after being treated through the dust collector and filter. The filter media is PE201, MERV 18, and is expected to capture the high-humidity air/dust and collect more than 99% of larger than 0.3 micrometre dust. The dust collection system is operated and maintained per manufacturer recommendations.

## 5.2 STANDARD OPERATING PROCEDURE AND POLICIES

The following Standard Operating Procedure (SOP) has been developed to support this plan:

- Dustfall Setup SOP (Appendix A);
- Dustfall Swap SOP (Appendix B); and
- Passive Air Sampling System (PASS) SOP (Appendix C).

Additional SOPs and/or policies will be added to this plan on an as-needed basis.

# 6 ENVIRONMENTAL MONITORING

The air quality monitoring program consists of the following components:

- meteorological monitoring;
- dustfall monitoring of particulates, anions, cations and metals; and
- passive air quality monitoring of $NO_2$ and $SO_2$.

## 6.1 PERFORMANCE MONITORING

Monitoring is a mechanism to gauge the effectiveness of site wide mitigation measures.

### *6.1.1 Meteorological Monitoring*

There are currently three meteorology stations operating as part of the Mine, which will continue to be monitored during the life of mine. These stations include the Bowser Station used to advise on flying conditions, Scott Pass Station used to advise on conditions along the BJAR, and the Valley of the Kings (VOK) Station used to provide meteorological conditions at the Brucejack Mine Site. The current locations of the meteorological stations are shown in Figure 6.1-1.

Each of the stations consists of a standard 10-m meteorological tower with instrumentations to measure the following parameters:

- wind speed and wind direction;
- air temperature;
- barometric pressure;
- relative humidity;
- snow depth;
- net radiation;
- solar radiation; and
- precipitation (as rainfall and total precipitation).

The meteorological monitoring program was initially designed to monitor meteorological conditions in the area to support mine infrastructure design and management and is not considered a necessary component of the air quality monitoring program; however, data obtained from the meteorological monitoring stations such as wind speeds and directions are informative when considering results of the dustfall and PASS monitoring described below and can inform future development of air dispersion models.

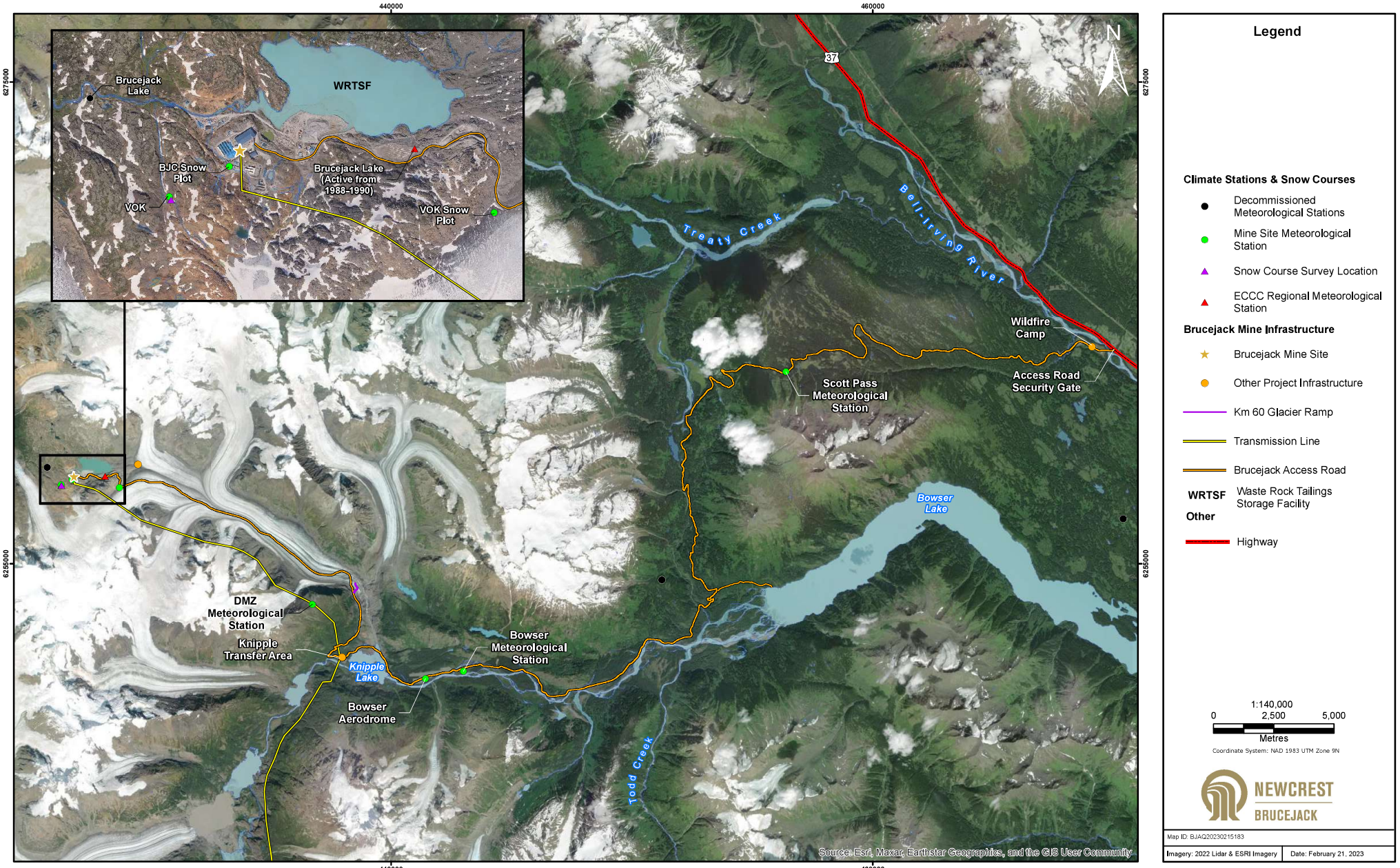


**Figure 6.1-1. Schematic showing the Location of Brucejack Mine Climate Stations and Snow Courses**

### *6.1.2 Air Quality*

Site-specific air quality monitoring consists of dustfall monitoring of particulates; anions; cations; total metals, and a Passive Air Sampling System (PASS) for $NO_2$ and $SO_2$.

#### 6.1.2.1 Dustfall

Dustfall monitoring is completed in accordance with sampling method ASTM D1739-98 (ASTM 2010). Each station monitors consecutive 30-day periods during the summer and early fall (essentially months when it is not below freezing). The dustfall monitoring stations collect particulates small enough to pass through a 1-millimetre screen and large enough to settle by virtue of their own weight. This requires containers of a standard size and shape, which are partially filled with deionised water and algaecide to prevent the growth of algae in the canisters. Each station consists of two canisters each surrounded by a wind screen and mounted on a 2-metre pole. Windscreens are erected around the sample containers to improve the dustfall collection efficiency, and bird spikes are used to minimize contaminants from bird faeces. One of the canisters is analyzed for particulates (total, soluble, and insoluble) and anions (sulphate, nitrate, chloride, and ammonia) and the other for total metals and various cations.

Monitoring is conducted at three dustfall monitoring stations at the Brucejack Mine Site: one downwind of the Crusher Air Raise (DF7), one located between the VOK Raise 1 and the VOK Raise 4 (DF8), and a background station at DF5.

#### 6.1.2.2 Passive Air Sampling System (PASS)

Emissions of $NO_2$ and $SO_2$ resulting from fuel combustion monitored during Operations with a PASS. The PASS monitors gas or vapour pollutants through the process of diffusion through a static air layer or permeation through a membrane. The sample media is installed in the field and exposed in protective shelters that are mounted to a support pole for a period of 30 days. Following the exposure period, the sample media is to be retrieved, replaced, and sent to the laboratory for analysis along with meteorological data including air temperature, wind speed, and relative humidity, to allow the ambient concentration of the compound over the sampling period to be determined.

One PASS is located at the Brucejack Mine Site between the VOK Raise 1 and the VOK Raise 4 (PASS3). An existing background station (PASS2) monitors background conditions. However, this station may be relocated farther from the access road if results indicate influence from road traffic. The PASS monitoring stations are collocated with the dustfall monitoring stations and are shown in Figure 6.1-2.

Sampling frequency will provide a 1-month average ground-level concentration for each contaminant.

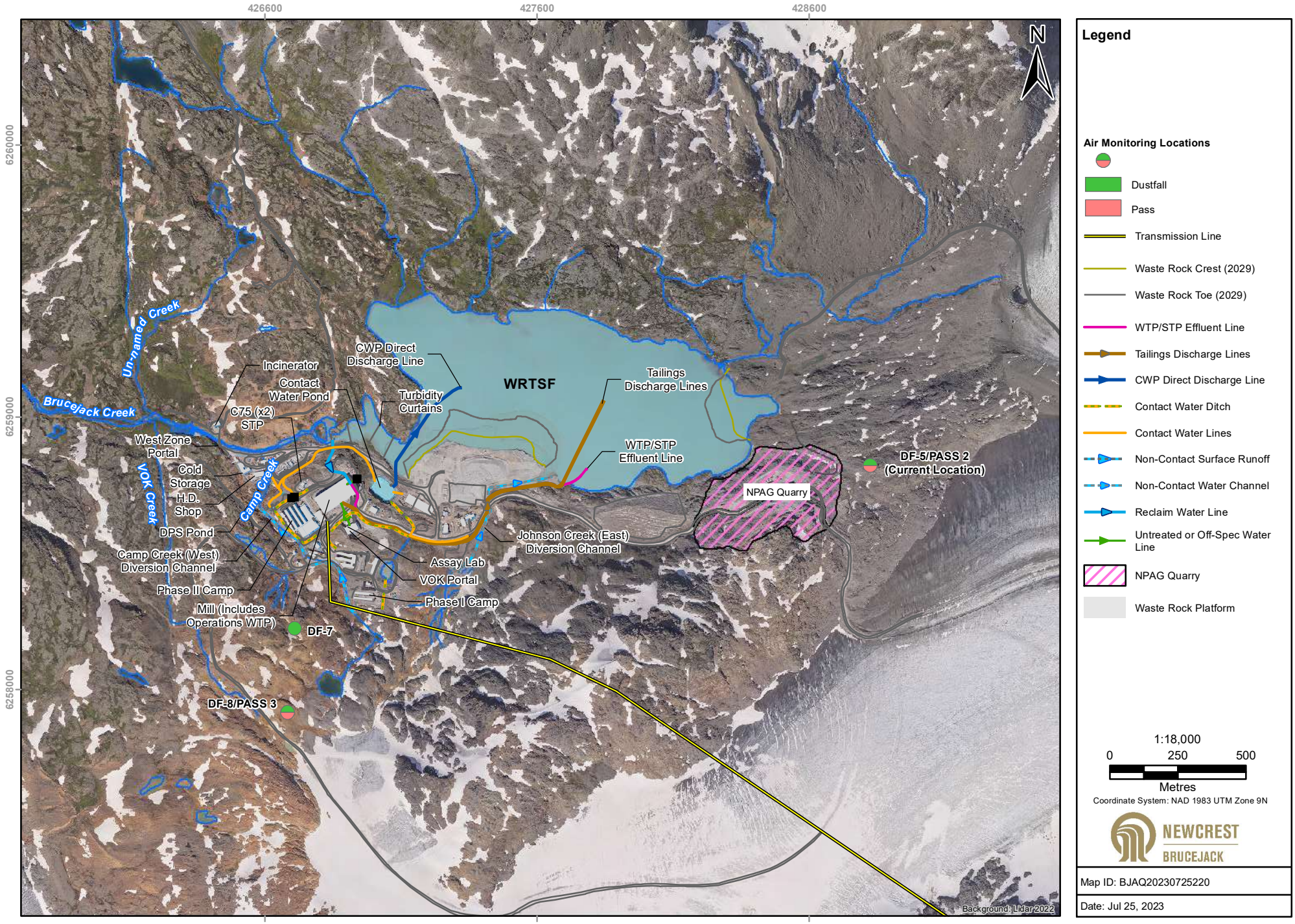


**Figure 6.1-2. Dustfall and PASS Monitoring Stations**

## 6.2 WORK PLANNING AND SCHEDULE

During the Operations phase, meteorological monitoring is continuous year-round while PASS monitoring is conducted monthly. Dustfall monitoring is also conducted monthly, but it takes place only during the summer months of July through September because the dustfall canisters may freeze during the winter and snow accumulation in the canister prevents accurate dustfall monitoring. Summer months will capture the period during which the highest emissions would be expected to occur.

# 7 REPORTING AND RECORDING

## 7.1 REPORTING

### *7.1.1 Compliance Reporting*

#### 7.1.1.1 *Environmental Management Act* Permit Reporting

Results from PASS monitoring, and non-compliances will be reported to the BC Ministry of Environment and Climate Change Strategy (ENV) at a frequency and in a format defined by the following conditions in permit PA 107025: *5.8 Non-Compliance Reporting* and *5.9 Annual Reporting*.

#### 7.1.1.2 National Pollutant Release Inventory (NPRI) Reporting

If the amounts of any pollutant released are above the reporting threshold, reporting to the NPRI is undertaken. Emissions are estimated annually based on fuel usage and equipment activity levels. Results are compared to the NPRI reporting threshold.

#### 7.1.1.3 Greenhouse Gas Emission Reporting

Greenhouse gas emissions are calculated annually based on fuel usage. Annual emissions are compared to the federal reporting requirements (10,000 tonnes) and provincial reporting requirements (10,000 tonnes). If the facility-level GHG emissions surpass the federal and provincial reporting requirements, GHG emissions are assessed and reported to the federal and provincial reporting systems and verified (if over 25,000 tonnes) by an independent third party for the provincial reporting.

The provincial and national reporting regulations specified Greenhouse Gas Emissions Reporting Program (Environment Canada 2014b) and *Greenhouse Gas Reduction (Cap and Trade) Act* (2008) only pertain to facility-level emissions, and do not include indirect emissions.

### *7.1.2 External / Internal Reporting*

A copy of the report of the results from dustfall and PASS monitoring (7.1.1.1 above) is submitted to the Nisga'a Lisims Government (NLG).

## 7.2 RECORD KEEPING / TRACKING

### *7.2.1 Fuel Usage and Activity Levels*

In order to determine if reporting of GHGs and other contaminant emissions is required, fuel usage from power, mobile, and stationary equipment is tracked. Equipment and vehicle activities such as distance travelled and grading are tracked to a feasible extent.

### 7.2.2 Monitoring Results

Pretium assumes the responsibility of data management and record keeping of monitoring results. Data are entered into suitable electronic databases and have quality control checks completed upon receipt of results. Data are entered in a format and program that allows for comparison between years and stored in a single file format for each type of survey or monitoring activity. Monitoring data are stored for the life of the mine, and are made available for review upon request.

### 7.2.3 Continuous Improvement, Follow-up, and Adaptive Management

If monitoring data are out of compliance with permit conditions or are showing an increasing trend in contaminant concentrations, adaptive management options are assessed. The need for any corrective actions to reduce on-site emissions or install additional control measures will be determined on a case-by-case basis.

Monitoring data are also used to provide feedback to modify the dust management measures implemented at the site, as required. This plan is designed to be adaptive, effective, and achievable in both the short and long term. Components of the Air Quality Management Plan may need to be revised over the life of the Mine, based on regulatory changes and/or technological advances. Any modifications made to the overall Plan is communicated to regulatory authorities where applicable.

### 7.2.4 Incident Response Records

Incident response records is stored for a minimum of five years and made available for review upon request.

### 7.2.5 Permit Database and Amendments

The following permits related to air quality are currently held for the Mine:

- *Environmental Management Act* (2003) - Air Discharge Permit PA-107025.

Additional permit and permit amendments will be added on an as-needed basis.

# 8 REFERENCES

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# *Appendix A*

*Standard Operating Procedure: Dustfall Setup Instructions*

# APPENDIX A. STANDARD OPERATING PROCEDURE: DUSTFALL COLLECTION SITE SET UP

***Equipment Required***: Hand auger, shovel, screw driver and/or drill, zip ties, screws, felt marker

***Material Required*:** 5-foot pole (x2), wind shield, bird spikes, dustfall container, long bolts, washers, nuts.

The dustfall collection site should be placed in an open area, free of structures higher than 1 m within a 20-m radius of the container. It should be placed away from objects that could affect the settling of particulate matter such as nearby trees and local sources of pollution. Site accessibility should also be taken into consideration in the selection of a site.

The dustfall container is housed inside the wind shield which is mounted on the dustfall pole (Plate 1). The orifice of the dustfall bottle should not be lower than 6 feet from the ground. Dustfall sites typically consist of two dustfall collectors approximately 15 feet apart (Plate 2).

*Plate 1. Dustfall container inside wind shield housing.*

*Plate 2. Typical dustfall collection site.*

Installing and setting up a Dustfall collector site is a straight forward process that should take approximately 20 minutes to complete. The following are instructions on how-to set up the dustfall site once an appropriate location has been selected:

1. Assemble the pipe stand by coupling the two lengths of 5-foot pipe together with long bolts and nuts.
2. Connect the metal flange and treated wood block to the top of the stand with screws.

3. Attach the wind shield (Figure 1) to the dustfall stand by screwing the base of the shield to the wooden block at the top of the pole. There should be four holes predrilled in the base of the plastic shield where the screws can be placed.

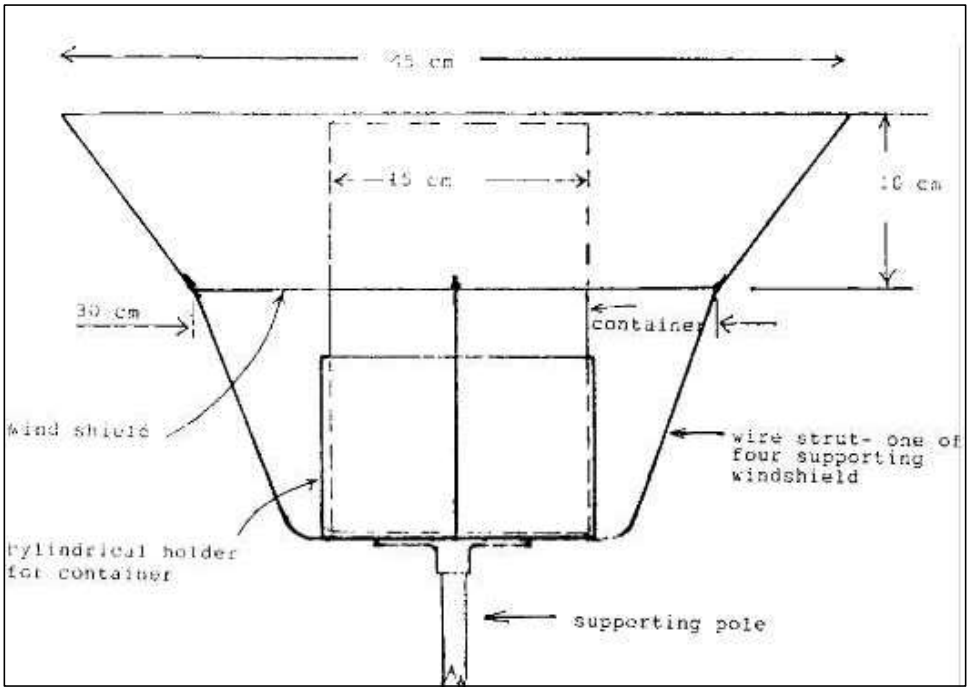


**Figure 1. Wind Shield for Dustfall Container**

4. Use zip ties to install the bird spikes at the top of the wind shield. Typically two sets are bird spikes are required to cover the circumference of the wind shield. Three evenly spaced zip ties should be used for each set of bird spike to ensure it does not slip down.
5. Use the hand auger to remove a column of soil at least 1.5 feet to 2 feet deep. If the ground is too hard, large rocks can be used to assist in propping up the dustfall pole. Do not use snow to hold the pole in place as it is prone to shifting and melting.

   (NOTE): Rather than using the hand auger, it may be easier to pound in the lower portion of the stand by placing a piece of scrap wood (2x4) on lower portion (to protect the threads) and using a medium sized sledge hammer to pound the lower portion in AND THEN attach the rest of the pole.

6. Place the bottom of the dustfall pole into the hole and ensure that it is able to stand freely. The stand should be stable enough to withstand strong gusts of wind.
7. By writing on a piece of flagging with sharpie or on the dustfall screen with a white marker, write **Total Metals (TM**) on one dustfall stand and **Total Particulate (TP)** on the other stand.
8. Retrieve the dustfall containers and use the felt marker to label the following information:
   a. Site Name (i.e., DF-1).
   b. Write Total Metals (TM) on one canister and Total Particulate (TP) on the other canister.

c. Project Name.

d. Date and Time Installed.

9. Remove the protective plastic wrap around the top of the collection containers.
10. Gently unscrew the white plastic lids on the collection containers.
11. Place the open dustfall container labeled Total Metals (TM) in the dustfall stand labeled Total Metals (TM) by placing it in the white PVC pipe that resides in the wind shield while ensuring not to touch the inside of the collection vessel (Figure 2).

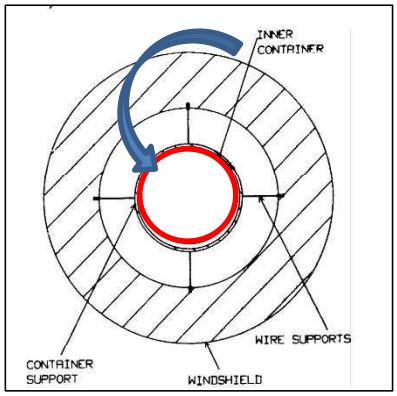


**Figure 2. Plan view of wind shield.**

12. Place the open dustfall container labeled Total Particulate (TP) in the dustfall stand labeled Total Particulate (TP) by placing it in the white PVC pipe that resides in the wind shield while ensuring not to touch the inside of the collection vessel (Figure 2).
13. Place all the lids in a ziplock bag to ensure the lids will not be contaminated. These lids will not be used again till the final demobilization in the fall, and they should be kept in a location where they will be found again.
14. Take photos of the apparatus, ensuring that in the photos it can be discerned which stand is **Total Particulate (TP)** and **Total Metals (TM)**.

# *Appendix B*

*Standard Operating Procedure: Dustfall Swap Instructions*

# APPENDIX B. STANDARD OPERATING PROCEDURES: DUSTFALL SWAP INSTRUCTIONS

1. There will be two dustfall stands at each dustfall station. One will be labeled by white marker or with sharpie on flagging, **Total Particulate (TP)** and the other will be labeled **Total Metals (TM)**.
2. The dustfall sample bottles are to be swapped at 30 day intervals, ± 1 or 2 days is fine.
3. On the new dustfall containers, use the felt marker to label the following information:
   a. Site Name (i.e., DF-1) on both canisters.
   b. Write **Total Metals (TM)** on one canister and **Total Particulate (TP)** on the other canister corresponding to the labels on the stand from which each canister was retrieved.
   c. Project Name on both canisters.
   d. Date and Time Installed on both canisters.
4. Remove the lid from the fresh bottle and put it on the bottle being recovered. **Write the date and time on the bottle being recovered**.
5. If the sample has been overfilled with rain or snow it should be noted during collection and sample may be voided. Bugs are fine to send to the lab. Make note if there is bird feces in the sample (**this would void the sample and it should not be sent to the lab**). Make a note of anything else which may impact the results, including if the sample was found on the ground, if there was anything else within the container or if there was anything surrounding the container which may have influence the results e.g. construction activities nearby. If there is anything else in the canister other than bugs (birds have been found) it will more than likely void the sample.
6. Put the canister labeled **Total Metals (TM)** in the stand labeled **Total Metals (TM)**. Put the other canister labeled **Total Particulate (TP)** in the stand labeled **Total Particulate (TP)**.
7. Take photos, ensuring that in the photos it can be discerned which stand is **Total Particulate (TP)** and **Total Metals (TM)**.
8. Fill out the Chain of Custody form. Examples have been provided. If anything noteworthy occurred then put this in the chain of custody form clearly marking which container was affected. Examples of noteworthy items are, if the stand was damaged by wildlife, if the sample canister was found on the ground, whether the sample canister had bird feces or had anything else that may have contaminated the sample. If one of the two samples at a site is void, clearly state that the sample which is being sent to the laboratory should be analyzed for <u>both</u> **Total Particulate (TP)** and **Total Metals (TM)**.
9. Bring the bottles back to camp and ship the two coolers to ALS Environmental in Burnaby. You can fit 8 bottles per cooler, maybe split the 10 bottles up between two coolers and add some stuffing in the coolers to ensure the bottles don't tip over during shipping.

10. Ship to:

ALS Environmental
8081 Lougheed Highway
Burnaby, BC
V5A 1W9
Attn: Amber Springer
Phone: (604) 253-4188

# *Appendix C*

*Standard Operating Procedure: Pass Installation and Swaps*

# APPENDIX C. STANDARD OPERATING PROCEDURE: PASS INSTALLATION AND SWAPS

***Equipment and Materials Required***: PASS rain shelter (Plate 1), hose clamps, mounting pole, passive filter medium.


*Plate 1. $SO_2$, $NO_2$, and $O_3$ sample filters attached to the rain shelter.*

***Site Selection Requirements:*** The PASS collection site should not be located near pollution sources that can cause inappropriately high measurement. Monitoring sites should not be close to roadways. There should be a distance of more than 10 m between the site and a roadway. The site should be selected to represent a typical air pollution concentration. The site should be flat, and located away from nearby obstructions such as buildings or trees. The site should be more than 20 m from the nearest tree canopy defined by the drip line. Be aware that the last requirement may be very difficult to meet in many sampling locations.

***Installation:*** It is recommended to at least duplicate samplers for each monitoring location. To validate results, travel blanks must be included. The requirements for Alberta Environment are as follows:

- Rain shelter should be 1 – 3 m above ground;
- Election angle should be less than 30° from the rain shelter to the top of any obstacle (Figure 1); and
- The distance from the obstacle to the rain shelter should be greater than 10 times the obstacle height.

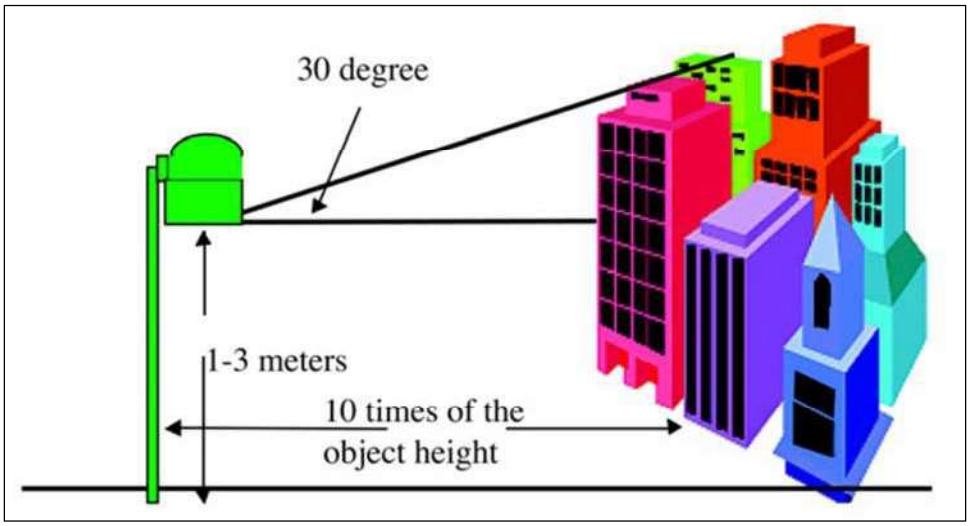


**Figure 1. PASS Rain Shelter Installation Recommendations (as per Alberta Environment)**

The rain shelter should be installed to prevent interference from animals/humans or the surroundings. More than 1 shelter in one location can be installed together. The exposure start and end times should be recorded on a field sampling sheet.

Typically the PASS shelter is mounted on the dustfall pole (Plates 2 and 3).


*Plate 2. Pass Filters in Rain shelter attached to wood dustfall stand.*

*Plate 3. Pass filters in rain shelter attached to metal dustfall stand.*

One side of the PASS shelter has a slot to insert a hose clamp or strapping to attaché the shelter to a metal pole or a wooden one.

A set of travel blanks must be taken when the samples are recovered and sent to the laboratory for analysis.

**Instructions for Swapping PASS sample filters:**

1. Take a set of filters labeled blanks and a new set of filters to be deployed.
2. On the filters to be deployed, write the station ID and installation date on the plastic on the back of the filter (not on the removable plastic cap or on the filter paper).
3. Remove the current set of filters from the rain shelter and write down the removal date, then replace with the new round of filters. Be sure to remove the white plastic cap on the new filter.
4. Put the old filter in the container that the new filter came in.
5. Take photos.
6. Fill out the CoC form and ship to:

Maxxam Analytics
Attn: Passive Air
6716 – 50th St.
Edmonton AB
T6B 3M9

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