



**Brucejack Gold Mine  
2017 CEAA Annual Report**

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March 2018

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## EXECUTIVE SUMMARY

Pretium Resources Inc. (Pretium) received the Canadian Environmental Ministers Decision Statement on July 30, 2015 for the Brucejack Gold Mine, an underground gold mine located 65 km north of Stewart, British Columbia (BC). Construction activities commenced on September 5, 2015 with commercial operation achieved on July 1, 2017.

The Implementation Schedule was provided to Aboriginal groups and the Canadian Environmental Assessment Agency (CEAA) in August 2015. An updated Implementation Schedule was disseminated to CEAA and Aboriginal groups on February 24, 2017.

At the mine site, fish and fish habitat protection continued to be achieved through operation of the Operations Water Treatment Plant (OWTP) during the reporting period and maintenance of the three turbidity curtains at the outlet to Brucejack Creek. Tailings were generated in 2017 and deposited as a thickened slurry on the bottom of Brucejack Lake. Waste rock from surface development and underground activities was sub-aqueously disposed of into Brucejack Lake. Effluent monitoring continued as per the BC *Environmental Management Act* permit 107835. Metal Mining Effluent Regulations (MMER) water quality monitoring was also undertaken in 2017 as was the MMER First Biological Monitoring Study.

To protect Western Toad (*Anaxyrus boreas*) during migration four toad tunnels were installed along the Brucejack Access Road in 2017, adding to one tunnel installed in 2016. A modified bridge was also built to facilitate Western Toad travel under the access road in an area where the shallow water table made a tunnel installation impractical.

Ten bat houses, each capable of housing 300 bats, were installed in suitable habitat, half along the access road and half along the transmission line.

Air quality management focused on measures to reduce fugitive dust. In 2017 Tsetsaut/Skii km Lax Ha relocated their lodge, monitoring of air quality continued at the new lodge location.

Pretium continued maintaining a security gate at the start of the Brucejack Access Road during 2017. The “No Hunting, No Fishing, No Trapping Policy” remained in place. The Brucejack Access Road was managed to protect wildlife with the intention to prevent wildlife being trapped on the road by high snowbanks, posting additional wildlife signage and reminders regarding speed limits.

No heritage or archaeological sites were discovered during 2017 development activities or during archaeological surveying.

On March 15, 2017 a diesel fuel spill with the potential to cause adverse environmental effects occurred. Containment and remediation of spilled fuel prevented escape of diesel fuel to any water course.

Record keeping continued during 2017 using the systems established in 2015.

In 2017 Pretium worked closely with local and regional First Nations to provide information and to maximize benefits associated with employment, training, and business opportunities. Pretium is in regular contact with First Nations' employment representatives to communicate job postings, provide information about required skills and experience, and organize recruitment events. Pretium continues to work with First Nations to identify training needs and opportunities, as well as opportunities for First Nations' businesses to provide goods and services. An Impact Benefits Agreement (IBA) was finalized with the Tahltan Nation in 2017.

## RÉSUMÉ

Le 30 juillet 2015, Pretium Resources Inc. a reçu la déclaration de décision des ministres de l'Environnement canadiens relativement au projet de mine d'or Brucejack, mine d'or souterraine située à 65 km au nord de Stewart en Colombie-Britannique. Les travaux de construction ont débuté le 5 septembre 2015 et l'opération commerciale a commencé le 1<sup>er</sup> juillet 2017.

Le calendrier de la mise en œuvre a été fourni aux groupes autochtones et à l'Agence canadienne d'évaluation environnementale (ACEE) en août 2015. Le calendrier actualisé de la mise en œuvre a été fourni à l'ACEE et aux groupes autochtones le 24 février 2017.

Sur le site de la mine, la protection du poisson et de l'habitat du poisson a continué à être assurée au moyen des travaux de l'usine de traitement des eaux durant la période visée, ainsi que du maintien des trois rideaux de confinement au point de rejet du ruisseau Brucejack. Des résidus ont été produits en 2017 et déposés sous une forme de pâte épaisse au fond du lac Brucejack. Les roches stériles provenant de l'aménagement de la surface et des travaux souterrains ont été éliminées dans les eaux du lac Brucejack. La surveillance des effluents s'est poursuivie en vertu du permis 107835 de l'*Environmental Management Act* de la Colombie-Britannique. La surveillance de la qualité de l'eau a aussi été entreprise en vertu du Règlement sur les effluents des mines de métaux (REMM) en 2017, comme la première étude de suivi biologique du REMM.

En vue de protéger le crapaud de l'Ouest (*Anaxyrus boreas*) durant la migration, quatre tunnels à amphibiens ont été aménagés le long de la route d'accès Brucejack en 2017, en supplément de celui qui avait été installé en 2016. Un pont modifié a également été construit en vue de faciliter le déplacement du crapaud de l'Ouest sous la route d'accès, dans une zone où la nappe phréatique peu profonde rendait impossible l'installation d'un tunnel.

Dix habitacles pour chauves-souris, chacun pouvant accueillir 300 chauves-souris, ont été installés dans un habitat adéquat, à mi-chemin de la route d'accès et de la ligne de transmission.

La gestion de la qualité de l'air a été axée sur des mesures visant à réduire les poussières diffuses. En 2017 le groupe des Tsetsaut/Skii km Lax Ha a déplacé son pavillon; la surveillance de la qualité de l'air s'est poursuivie sur le nouvel emplacement du pavillon.

Pretium Resources Inc. a maintenu une barrière de sécurité à l'entrée de la route d'accès Brucejack durant l'année 2017. La consigne « Interdiction de chasser, de pêcher et de piéger » reste en vigueur. Gérer la route d'accès Brucejack consiste à protéger la faune et à s'assurer que les animaux ne restent pas bloqués sur la route dans des bancs de neige élevés; la présence de la faune et les limites de vitesse seront rappelées par des panneaux de signalisation.

Aucun site patrimonial ou archéologique n'a été découvert durant les travaux de développement de 2017 ou durant les études archéologiques.

Le 15 mars 2017, un déversement de carburant diesel s'est produit, risquant de causer des effets nuisibles sur l'environnement. Le confinement et la réhabilitation du déversement de carburant ont permis d'éviter l'écoulement du diesel dans des cours d'eau.

La tenue des dossiers s'est effectuée en 2017 selon les systèmes établis en 2015.

En 2017, Pretium Resources Inc. a travaillé étroitement avec les Premières Nations locales et régionales en vue de fournir des renseignements et de maximiser les avantages associés à l'emploi, à la formation et aux occasions d'affaires. Pretium Resources Inc. communique régulièrement avec les représentants des Premières Nations responsables de l'emploi pour leur transmettre des offres d'emploi, leur donner des renseignements sur les compétences et l'expérience requises, et organiser des activités de recrutement. Enfin, la compagnie continue à travailler avec les Premières Nations en vue de définir les besoins et les occasions de formation, et de voir également si leurs entreprises peuvent offrir des biens et services. Une entente sur les répercussions et les avantages (ERA) a été conclue avec la Nation Tahltan en 2017.

## **1 Introduction**

The Brucejack Gold Mine is a gold-silver underground mine located approximately 65 kilometres north of Stewart, British Columbia (Figure 1). Current permitted production totals approximately 16 million tonnes of mineralized material at a rate of up to 2,700 tonnes per day over a minimum 18-year mine life. In December 2017 an application was made to both the BC Ministry of Energy, Mines and Petroleum Resources and the BC Ministry of Environment & Climate Change Strategy to amend the BC Mines Act Permit M-243 and the Environmental Management Act Permit 107835, respectively. This amendment is to increase daily production to 3,800 tonnes per day and increase total life-of-mine production to 18.5 million tonnes.

Pretium received a BC provincial Environmental Assessment Certificate (# M15-01) on March 26, 2015 and a Canadian Environmental Minister's Decision Statement on July 30, 2015. All of the various provincial and federal permits required to construct, operate and decommission the mine have been received. Surface construction activities began at the Brucejack Mine Site on September 5, 2015 following the federally mandated pre-construction notice period. Commercial production was achieved on July 1, 2017. On December 21, 2017 the BC Environmental Assessment Office issued a determination that the Brucejack Gold Mine was substantially started which means the provincial Environmental Assessment Certificate remains in effect for the life of the project.

This report has been developed to meet Decision Statement Condition 2.5: *the Proponent shall, from the reporting year where construction starts, submit to the Agency an annual report*. The report is laid out such that each heading addresses an annual reporting requirement as defined within the subheadings of Condition 2.5.

## **2 Condition 2.5.1: Update on Implementation of Decision Statement Conditions**

*Condition 2.5.1: The proponent shall document in the annual report implementation activities undertaken in the reporting year for each of the conditions set out in this Decision Statement.*

Refer to Appendix A for the table titled *Brucejack Gold Mine Project: Implementation activities undertaken (as per CEAA Decision Statement Condition 2.5.1)* for a compilation of implementation activities that took place during 2017.

## **3 Condition 2.5.2 Informed Technology and Knowledge**

*Condition 2.5.2: The proponent shall document in the annual report how it has considered and incorporated the factors set out in condition 2.1 in the implementation of the conditions set out in this Decision Statement.*

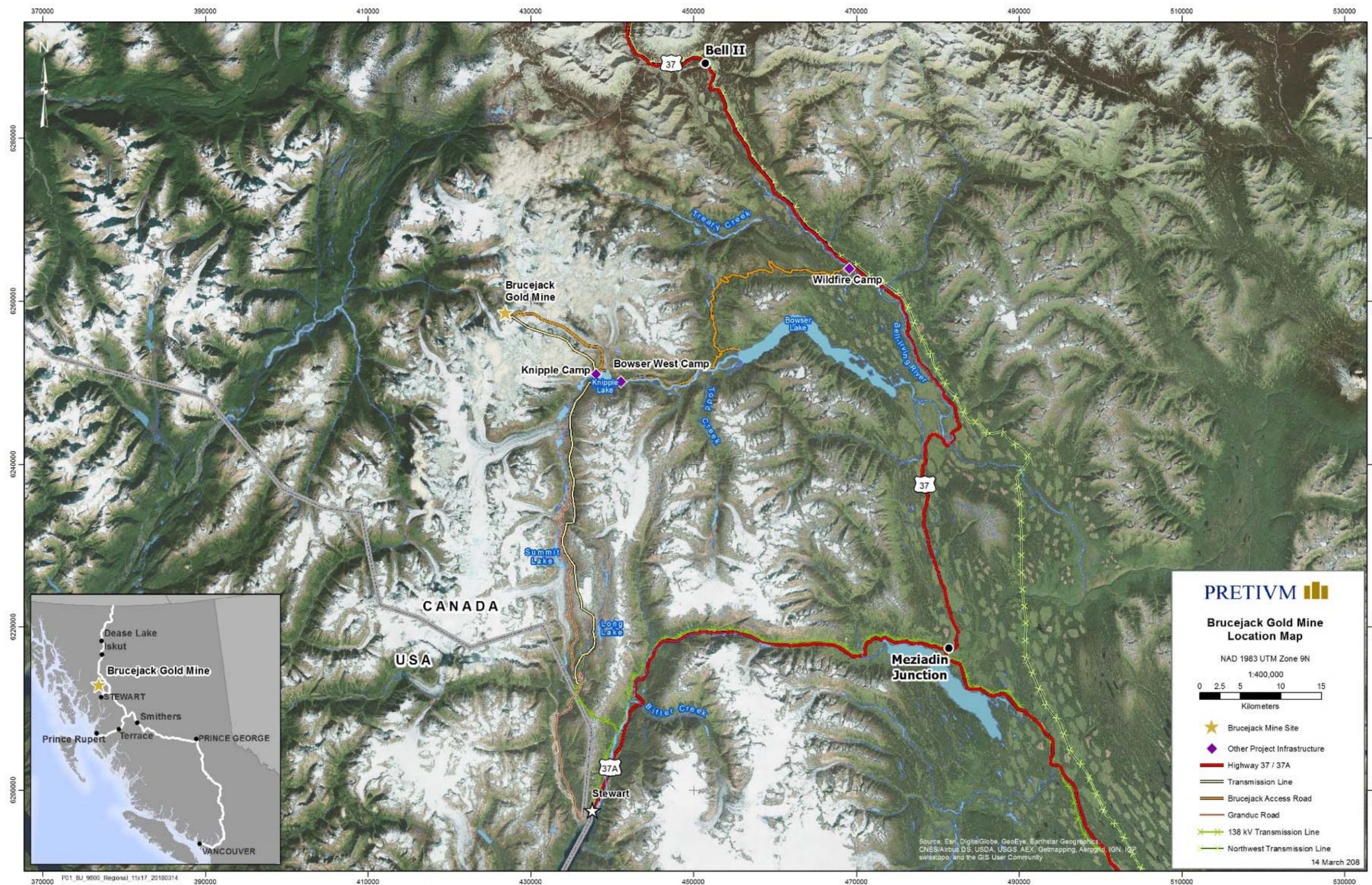


Figure 1: Brucejack Gold Mine Location Map

*Condition 2.1: The Proponent shall, throughout all phases of the Designated Project, ensure that its actions in meeting the conditions set out in this Decision Statement are informed by the best available information and knowledge, including community and Aboriginal traditional knowledge, are based on validated methods and models, are undertaken by qualified individuals, and have applied the best available economically and technologically feasible measures.*

In 2017 Pretivm continued to engage the services of numerous reputable consulting companies (Lorax Environmental Services Ltd., ERM Consultants Canada Ltd., BGC Engineering Inc., SRK Consulting, Northwest Invasive Plant Council) to provide the qualified professionals (e.g. R.P.Bio., P. Eng., P. Geo.) to implement all activities according to requirements. For example these activities included, archaeological surveying, MMER First Biological Study design and execution, pre-clearing surveys for bats and birds prior to tree cutting, invasive plant species survey, ongoing water quality monitoring in Brucejack Creek, monitoring ambient air quality parameters at the Tsetsaut/Skii km Lax Ha Lodge, construction of wildlife tunnels and a modified bridge at prioritized locations for the passage of Western Toad (*Anaxyrus boreas*) beneath the road, and completion of a weir at the outlet of Brucejack Lake to precisely monitor flow from the lake into Brucejack Creek.

Pretium continues to engage Veolia Water Technologies (Veolia), who specialize in technological solutions for water treatment. The Operations Water Treatment Plant, designed by Veolia, was installed and began operating in 2017, replacing the Construction Water Treatment Plant. OpusDaytonKnight supported Pretivm with the operation of the sewage treatment plants.

Maintenance of the Brucejack Access Road is under contract to a First Nation company whose employees use their traditional knowledge of large ungulate movement and furbearing animals to ensure that snow clearing activities do not trap ungulates and other wildlife on the road as per condition 6.5.

First Nations individuals also assisted in a 2017 archaeological survey.

#### **4 Condition 2.5.3: Considerations from Consultation**

*The proponent shall document in the annual report for conditions set out in this Decision Statement for which consultation is a requirement, how the Proponent has considered any views and information that the Proponent received during or as a result of the consultation.*

The following sections identify the Decision Statement conditions that required consultation, and how the Proponent has considered the views and information received as per the requirements set out in Condition 2.2:

- *2.2.1 provide a written notice of the opportunity for the party or parties being consulted to present their views on the subject of the consultation;*

Consultation comments were requested from Nisga'a Lisims Government, Tahltan Central Government and Tsetsaut Skii km Lax Ha Nation regarding an updated Economic and Social Effects Management Plan in March 2017, an amendment to the Air Quality Discharge Permit in October 2017, and a permit application to remove beaver dams that were causing flooding of the access road and endangering a bridge in November 2017. A notice was also sent out to the same groups in November 2017 informing them that a production increase application will be forthcoming.

- *2.2.2 provide sufficient information and a reasonable period of time to permit the party or parties being consulted to prepare their views;*

Drafts of documents or copies of permit applications were distributed electronically and all parties were given a minimum of 30 days to respond to the requests for comment.

- *2.2.3 provide a full and impartial consideration of any views presented by the party or parties being consulted; and*

To year end no responses were received to the consultation requests.

- *2.2.4 advise the party or parties that have provided comments on how the views and information received have been considered by the Proponent.*

#### **4.1 Condition 2.4.2**

*Discuss consultation activities relative to Condition 2.4.2: Where the results of the monitoring and analysis indicate issues with respect to accuracy of the environmental assessment and/or the effectiveness of any mitigation measures that may lead to adverse environmental effects, identify the means by which the Proponent determines whether additional mitigation measures are required, including the need for consultation with other parties in reaching that determination.*

There were no exceedances of MMER water quality authorized limits of deleterious substances in 2017, however, there were two sampling events in excess of BC discharge permit limits but no exceedances of BC maximum water quality guidelines. These two discharge limits exceedances were not sufficient to cause harm to aquatic life. No additional mitigation measures were required in 2017 and, therefore consultation with other parties was not required.

Water quality modelling, based upon analysis of Brucejack Lake and Creek water samples collected since the start of waste rock deposition and tailings discharge to Brucejack Lake, has indicated that arsenic concentration is increasing at a faster rate than predicted and will exceed levels originally modelled, however, concentrations will not exceed those in MMER Schedule 4 Authorized Limits of Deleterious Substances. This change in arsenic concentration will be a considered in consultation with provincial regulators and Aboriginal groups during the production increase permit amendment application review process in 2018.

## 4.2 Conditions 5.2 and 5.4

*Discuss consultation activities relative to Condition 5.2: The Proponent shall, in consultation with the Nisga'a Nation and Tsetsaut/Skii km Lax Ha, monitor and assess any changes to ambient air quality at the Tsetsaut/Skii km Lax Ha Lodge that result from the Designated Project during all phases for particulate matter (10 microns in diameter or less) and fine particulate matter (2.5 microns in diameter or less) using the Canadian Ambient Air Quality Standards of the Canadian Council of Ministers of the Environment as a benchmark, as well as for nitrogen oxide, sulphur dioxide and carbon monoxide.*

Ambient air quality monitoring at the Tsetsaut/Skii km Lax Ha Lodge was conducted throughout 2017. Monitoring was supported by the installation of a passive air sampling system (PASS) at the Tsetsaut/Skii km Lax Ha Lodge and use of a portable 3M EVM-7 Environmental Monitor. Ambient NO<sub>2</sub> and SO<sub>2</sub> were measured monthly with the PASS sampler, while monitoring for PM<sub>10</sub>, PM<sub>2.5</sub> and CO was completed quarterly using the portable air analyzer. A memorandum regarding the 2017 monitoring results at the Tsetsaut/Skii km Lax Ha Lodge was prepared by a Qualified Professional and has been provided to the Nisga'a Nation and Tsetsaut/Skii km Lax Ha. Following issuance of the 2016 monitoring report there were no requests for a follow up to the report by either the Nisga'a Nation or Tsetsaut/Skii km Lax Ha. Any future request for consultation on results of monitoring will be followed up by Pretium.

*Discuss consultation activities relative to Condition 5.4: The Proponent shall develop and implement, in consultation with the Nisga'a Nation and Tsetsaut/Skii km Lax Ha, a follow-up program based on the monitoring specified in condition 5.2 to evaluate the effectiveness of mitigation measures identified under condition 5.1. The follow-up program shall start with construction and ceases at the end of the decommissioning phase.*

During the permitting process in 2015, Pretium consulted the Nisga'a Nation and the Tsetsaut/Skii km Lax Ha on the development of the Air Quality Monitoring Plan. Ambient air quality monitoring occurred in 2016 and in 2017, all results in both years were below Canadian Ambient Air Quality Standards of the Canadian Council of Ministers of the Environment benchmarks. A memorandum regarding 2016 monitoring results at the Tsetsaut/Skii km Lax Ha Lodge was prepared by a Qualified Professional and was provided to the Nisga'a Nation and Tsetsaut/Skii km Lax Ha for review on March 22, 2017; no responses to the report were received. Similarly, a report of 2017 monitoring results was forwarded to Nisga'a Nation and Tsetsaut/Skii km Lax Ha on March 15, 2018.

During 2017, mitigation measures for dust suppression using water and a calcium/magnesium chloride brine mixture (applied by Billabong Road and Maintenance Inc.) following discussions with Tsetsaut/Skii km Lax Ha (TSKLH) in 2016. Should ongoing dust and PASS sampling reveal the need for further mitigation measures, additional consultation will be undertaken.

In response to the discovery of a potential geotechnical hazard south of Bowser River, a decision was made in 2016 to close the Bowser Camp and the Temporary Construction Camp at Bowser on March

31, 2017. The Tsetsaut/Skii km Lax Ha Lodge which was located at the Bowser Camp, was relocated to the new Bowser West Camp area in July 2017 after the older Bowser Camp was deactivated.

#### **4.3 Condition 5.3**

*Discuss consultation activities relative to Condition 5.3: The Proponent shall develop and implement, in consultation with the Nisga'a Nation and Tsetsaut/Skii km Lax Ha, a mechanism for receiving noise complaints due to noise caused by the Designated Project during all phases, and respond in a timely manner to any noise complaint received.*

A Noise Complaint Form was developed by Pretivm and provided to the Nisga'a Nation and Tsetsaut/Skii km Lax Ha for their review and input on September 2, 2015. The form was revised based on comments received from the Tsetsaut/Skii km Lax Ha on September 2, 2015 and reissued shortly thereafter. No other comments and no complaints were received in 2017.

#### **4.4 Conditions 6.6 and 6.7**

*Discuss consultation activities relative to Condition 6.6: The Proponent shall, following consultation with Tsetsaut/Skii km Lax Ha, provide access to the Project Area to the Tsetsaut/Skii km Lax Ha for traditional purposes, to the extent that such access is safe.*

*Discuss consultation activities relative to Condition 6.7: The Proponent shall, following consultation with the Nisga'a Nation, provide access to the Project Area for the Nisga'a Nation to exercise rights under the Nisga'a Final Agreement, to the extent that such access is safe.*

The Traffic and Access Management Plan, which states that “Persons authorized to use the Brucejack Access Road will include First Nations people conducting traditional use activities under authorization of their Nation’s government”, was reviewed during the *Mines Act-Environmental Management Act* Permits Application review process in 2015, at which time comments from the Tsetsaut/Skii km Lax Ha were received and reflected in the Traffic and Access Management Plan. No comments were received from the Nisga'a Nation. No requests for site access related to traditional use activities occurred in 2017.

#### **4.5 Condition 6.8**

*Discuss consultation activities relative to Condition 6.8: Develop and implement, in consultation with the Nisga'a Nation and Tsetsaut/Skii km Lax Ha, a follow-up program to determine the effectiveness of the mitigation measures used to avoid mortality of fauna, including ungulates and furbearers, along the access road and to verify the accuracy of the environmental assessment.*

During the permitting process in 2015, Pretivm consulted the Nisga'a Nation and the Tsetsaut/Skii km Lax Ha on the development of the Wildlife Management Plan (WMP). Pretivm proposed that the Wildlife Advisory Committee would be an appropriate venue for discussion of the effectiveness of mitigation measures, wildlife mortalities, accuracy of impacts to wildlife and potential additional

mitigation measures. As per the WMP, Pretium established a Wildlife Advisory Committee with Nisga'a Nation and Tsetsaut/Skii km Lax Ha attending the initial committee meeting in April, 2016 and a second meeting in May 2017.

At the 2017 meeting the committee discussed electric fencing around portions of lower elevation camps, access road improvements, possibilities of establishing a no shooting zone around the access road, wolverine near camps, bear awareness, mountain goat monitoring, moose observations along the access road, waste management and wildlife attractants, wildlife incident/observation reporting, spill prevention training, and snow bank management along the access road in winter,

The monitoring activities outlined in the WMP were ongoing in 2017. The number of wildlife observations in 2017 was 534 separate reports; however, this includes repeated reports of the same animals on the same day. Sightings are weighted towards larger animals of concern for safety of traffic along the access road or individuals working outdoors. Smaller animals were less commonly reported. Wildlife reported include beaver, barn swallow, black bear, bushy tailed woodrat, cougar, doves, ducks, eagles, golden eagle, grizzly bear, fisher, fox, grouse, humming bird, lynx, marmot, marten, moose, mountain goat, otter, porcupine, ruffed grouse, snow geese, toad, warbler, western toad, wolf and wolverine.

Numbers per sighting ranged from groups of 20 mountain goats to small groups of moose and single animals of all species. The most common sightings reported in 2017 were black bears (48% of reports), followed by moose (13% of reports), fox (10% of reports) and mountain goats (7% of reports). Black bears were seen exclusively at elevations lower than Knipple Glacier and west of the glacier; 30 % of black bear sightings were along the Bell Irving River valley. Grizzly bear fall sightings were restricted to mountain sides along Knipple Glacier while summer sightings were along the Bowser River valley or from outside the project area.

A comparison of actual wildlife mortalities as a result of vehicular traffic to forecasted mortalities indicates forecasts were overestimated, for those species that mortality estimates were provided in the environmental assessment application. In 2017 mortalities on the access road included a marten struck by a vehicle, with another marten found deceased in a snow bank beside the road (cause of mortality unknown). At the mine site a raptor was found partially consumed (cause of mortality unknown) and a deceased warbler was found (presumably a vehicle collision). Mortalities are a subject for discussion with Aboriginal groups attending the Wildlife Committee meetings as is the effectiveness of mitigation plans and potential adaptive management measures.

#### **4.6 Condition 7.1**

*Discuss consultation activities relative to Condition 7.1: Develop and implement, in consultation with Aboriginal groups, an archaeological and heritage resources management plan for the Designated Project prior to construction.*

The Heritage Management Plan, and associated Heritage Chance Find Procedure, was reviewed by Aboriginal groups during the *Mines Act-Environmental Management Act* Permits Application review process and completed in 2015. No comments were received. During construction activities in 2017 crews were made aware of and trained to use the Chance Find Procedure. No new archaeological or heritage resources were identified during construction activities. Consistent with the Heritage Management Plan and permit requirements, Aboriginal groups were consulted in 2017 in relation to archaeological assessment work being completed in the vicinity of mine site access road. A First Nation individual assisted with the field assessment work in 2017.

#### **4.7 Conditions 9.2 and 9.4**

*Discuss consultation activities relative to Condition 9.2: The Proponent shall, prior to construction, consult with Aboriginal groups to identify potential accidents and malfunctions that may result in an adverse environmental effect, and on the measures to be applied to prevent such accidents and malfunctions.*

*Discuss consultation activities relative to Condition 9.4: Develop and implement a communication plan, in consultation with Aboriginal groups that shall include:*

*9.4.1: The types of accidents or malfunctions requiring a notification by the Proponent to the respective Aboriginal groups;*

*9.4.2: The manner by which Aboriginal groups shall be notified by the Proponent of an accident or malfunction and of any opportunities for the Aboriginal groups to assist in the response to the accident or malfunction; and*

*9.4.3: The contact information of the representatives of the Proponent that the Aboriginal groups may contact and of the respective Aboriginal groups to which the Proponent provides notification.*

Pretivm sent a letter on September 4, 2015 to Aboriginal groups regarding Conditions 9.2 and 9.4.

Specifically the letter stated that Pretivm considered the consultation undertaken during the *Mines Act-Environmental Management Act* Permits Application review process to have by and large fulfilled Condition 9.2, to consult with Aboriginal groups to identify potential accidents and malfunctions that may result in an adverse environmental effect, and on the measures to be applied to prevent such accidents and malfunctions. Though Pretivm did encourage groups to review the materials provided in the letter regarding accidents and malfunctions and invited suggestions for change or additions to the plan or further consultation on the matters, Pretivm received no responses to date.

With regards to development and implementation of a communications plan concerning accidents and malfunctions (Condition 9.4), the September 2015 letter from Pretivm suggested to the Tsetsaut/Skii km Lax Ha and the Tahltan Central Government (TCG) that the methods of notification and contact information included in the Aboriginal Consultation Plan (developed in consultation with these groups) be used. For the Nisga'a Lisims Government (NLG), Pretivm

suggested that the Impacts and Benefits Agreement between Pretium and NLG provide the platform for fulfilling Condition 9.4. In 2017 an IBA was reached with the TCG and that agreement will provide the platform for fulfilling Condition 9.4.

Regarding notification to Aboriginal groups about types of accidents and malfunctions, Condition 9.4.1, Pretium provided in the September 2015 letter a table of types of accidents and malfunctions, and associated risk and mitigation strategies to prevent the accident or malfunction. The table was intended as a basis for discussion of notification. Pretium also asked Aboriginal groups for suggestions on how they would like to assist in response to an accident or malfunction, as per Condition 9.4.2. To date Pretium has received no responses from any of the Aboriginal groups to this letter.

Tsetsaut/Skii km Lax Ha have participated in company risk assessment meetings in the Vancouver office, follow-up meetings by conference calls and monthly Joint Occupational Health and Safety Committee meetings at the mine site.

## **5 Condition 2.5.4: Follow-up Programs**

*Condition 2.5.4: The proponent shall document in the annual report the results of the follow-up program requirements identified in conditions 3.4, 5.4 and 6.8.*

### **5.1 Condition 3.4: Water Quality and Fish and Fish Habitat Follow-up Program**

*The Proponent shall develop and implement a water quality and fish and fish habitat follow-up program that shall include:*

*3.4.1 Monitoring the quality of water flowing from Brucejack Lake into Brucejack Creek to verify the accuracy of the water quality and fish and fish habitat predictions in the environmental assessment; and*

*3.4.2 Determining whether mitigation measures implemented to protect the quality of water flowing from Brucejack Lake into Brucejack Creek and downstream fish and fish habitat are effective.*

Water flowing from Brucejack Lake to Brucejack Creek continued to be monitored as per MMER regulations and Appendix B of Effluent Discharge permit 107835, as well as the Aquatic Effects Monitoring Plan, during the reporting period. The 2017 monitoring results identified two incidents with exceedances of BC permit discharge limits at the mine water discharge site. One sample for total zinc with a concentration of 0.0094 mg/L (discharge limit 0.0075 mg/L). A second sampling event recorded an exceedance for total copper concentrations of 0.00287 mg/L (discharge limit 0.002 mg/L)

The zinc exceedance has no identifiable root cause. The total copper concentration was anomalous in that for a duplicate sample collected at the same time total copper was below detection limits. For both exceedances previous and subsequent samples were in compliance with discharge limits and there were no unusual mine site activities at the time of sample collection. Investigations suggest the most likely cause of both exceedances was sample contamination.

While the two exceedances were in excess of BC long-term Water Quality Guidelines they did not exceed BC maximum Water Quality Guidelines and were below the applicable guidelines for the protection of aquatic life. A negative effect to aquatic life in Brucejack Creek is not considered to have occurred.

No exceedances of MMER discharge limits were recorded.

The Brucejack Gold Mine became subject to MMER on January 12, 2016 and the First Biological Monitoring Study was conducted in 2017. The objective of the First Design Study is to present a biological monitoring program that will determine potential effects to the aquatic environment from effluent discharges. An interpretive report will be forthcoming in July 2018.

## **5.2 Condition 5.4: Tsetsaut/Skii km Lax Ha Lodge Ambient Air Quality Monitoring Follow-up Program**

*The Proponent shall develop and implement, in consultation with the Nisga'a Nation and Tsetsaut/Skii km Lax Ha, a follow-up program based on the monitoring specified in condition 5.2 to evaluate the effectiveness of mitigation measures identified under condition 5.1. The follow-up program shall start with construction and ceases at the end of the decommissioning phase.*

In 2017, monthly passive monitoring of sulphur dioxide (SO<sub>2</sub>) and nitrogen dioxide (NO<sub>2</sub>) as well as quarterly ambient particulate and carbon monoxide (CO) sampling was completed at the Tsetsaut/Skii km Lax Ha (TSKLH) Lodge. Results indicated that annual average concentrations for SO<sub>2</sub> and NO<sub>2</sub> and all results for CO and PM<sub>2.5</sub> were below the respective benchmarks (Canadian Ambient Air Quality Standards of the Canadian Council of Ministers of the Environment); no additional mitigation measures are required.

Details of the 2017 air quality monitoring results at the Tsetsaut/Skii km Lax Ha Lodge have been made available in the memorandum to Nisga'a Nation and Tsetsaut/Skii km Lax Ha (Appendix B).

In late July 2017 the Tsetsaut/Skii km Lax Ha moved their lodge from the old Bowser Camp to the new Bowser West Camp.

## **5.3 Condition 6.8: Effectiveness of Mitigation Measures to Avoid Mortality of Fauna Follow-up Program**

*The Proponent shall develop and implement, in consultation with the Nisga'a Nation and Tsetsaut/Skii km Lax Ha, a follow-up program to determine the effectiveness of the mitigation*

*measures used to avoid mortality of fauna, including ungulates and furbearers, along the access road and to verify the accuracy of the environmental assessment.*

During the permitting process in 2015, Pretium consulted the Nisga'a Nation and the Tsetsaut/Skii km Lax Ha on the development of the Wildlife Management Plan (WMP). The monitoring activities outlined in the WMP were ongoing in 2017. The wildlife observations in 2017 were recorded in 534 separate reports, commonly the same animals in multiple reports. Mortalities along the access road or at facilities in 2017 were a marten struck by a vehicle, a warbler likely struck by a vehicle, another marten found deceased in a snow bank beside the road (cause of mortality unknown), and a raptor partially consumed and likely killed by a predator. Mortality rates for bears and moose predicted in the environmental assessment of the project have not occurred. Mitigation measures in effect are considered effective.

## **6 Condition 2.5.5: Additional Mitigation Measures Implemented**

*Condition 2.5.5: The proponent shall document in the annual report any additional mitigation measures implemented or proposed by the Proponent, as determined under condition 2.4.*

*Condition 2.4: The Proponent shall, where a follow-up program is a requirement of a condition set out in this Decision Statement:*

*2.4.1. Undertake monitoring and analysis to verify the accuracy of the environmental assessment as it pertains to the particular condition and/or to determine the effectiveness of any mitigation measure(s);*

*2.4.2. Where the results of the monitoring and analysis indicate issues with respect to the accuracy of the environmental assessment and/or the effectiveness of any mitigation measures that may lead to adverse environmental effects, identify the means by which the Proponent determines whether additional mitigation measures are required, including the need for consultation with other parties in reaching that determination; and*

*2.4.3. If additional mitigation measures are required pursuant to condition 2.4.2, implement and monitor these additional mitigation measures pursuant to condition 2.4.1.*

No additional mitigation measures to those presented within Component Plans under the Environmental Management System and within permits, were required to be implemented or proposed in 2017. However, in response to a potential geotechnical hazard the Bowser Camp was closed and the new Bowser West Camp was opened on a seasonal basis.

**APPENDIX A:**  
**Decision Statement Conditions –**  
**Implementation Activities Undertaken**

Section	Sub-section	Condition	Implementation Activities Undertaken
<b>2</b>	<b>General Conditions</b>		
<b>2.1</b>		The Proponent shall, throughout all phases of the Designated Project, ensure that its actions in meeting the conditions set out in this Decision Statement are informed by the best available information and knowledge, including community and Aboriginal traditional knowledge, are based on validated methods and models, are undertaken by qualified individuals, and have applied the best available economically and technologically feasible measures.	Refer to 2017 CEAA Annual Report Section 3.
<b>2.2</b>		The Proponent shall, where consultation is a requirement of a condition set out in this Decision Statement:	Consultation is guided by the Aboriginal Consultation Plan developed by Pretivm, as a condition of their Environmental Assessment Certificate, with review and input from First Nations. Consultation activities will also be directed per the Impact Benefit Agreements established with the Nisga'a Nation and Tahltan Nation, and those that may be established with the Tsetsaut/Skii km Lax Ha.
	<b>2.2.1</b>	Provide a written notice of the opportunity for the party or parties being consulted to present their views on the subject of the consultation;	This practice has been implemented and will continue for the duration of the Project.
	<b>2.2.2</b>	Provide sufficient information and a reasonable period of time to permit the party or parties being consulted to prepare their views;	This practice has been implemented and will continue for the duration of the Project.
	<b>2.2.3</b>	Provide a full and impartial consideration of any views presented by the party or parties being consulted; and	This practice has been implemented and will continue for the duration of the Project.
	<b>2.2.4</b>	Advise the party or parties that have provided comments on how the views and information received have been considered by the Proponent.	This practice has been implemented and will continue for the duration of the Project.
<b>2.3</b>		The Proponent shall, where consultation with Aboriginal groups is a requirement of a condition set out in this Decision Statement, and prior to initiating that consultation, communicate with each Aboriginal group to determine the manner by which to satisfy the consultation requirements referred to in condition 2.2.	Consultation will be guided by the Aboriginal Consultation Plan developed by Pretivm, as a condition of their Environmental Assessment Certificate, with review and input from First Nations. Consultation activities will also be directed per the Impact Benefit Agreements established with the Nisga'a Nation and Tahltan Nation, and those that may be established with the Tsetsaut/Skii km Lax Ha.
<b>2.4</b>		The Proponent shall, where a follow-up program is a requirement of a condition set out in this Decision Statement:	
	<b>2.4.1</b>	Undertake monitoring and analysis to verify the accuracy of the environmental assessment as it pertains to the particular condition and/or to determine the effectiveness of any mitigation measure(s);	Monitoring and analysis of data to verify the accuracy of the environmental assessment has been implemented as per <i>Mines Act</i> permit M-243 issued by the Ministry of Energy, Mines and Petroleum Resources and <i>Environmental Management Act</i> permits 107835 (effluent) and 107025 (air) issued by the Ministry of Environment and Climate Change Strategy, in addition to various other permits that contain monitoring requirements.
	<b>2.4.2</b>	Where the results of the monitoring and analysis indicate issues with respect to the accuracy of the environmental assessment and/or the effectiveness of any mitigation measures that may lead to adverse environmental effects, identify the means by which the Proponent determines whether additional mitigation measures are required, including the need for consultation with other parties in reaching that determination; and	Refer to 2017 CEAA Annual Report Section 4.1.
	<b>2.4.3</b>	If additional mitigation measures are required pursuant to condition 2.4.2, implement and monitor these additional mitigation measures pursuant to condition 2.4.1.	No additional mitigation measures have been required to date.
<b>2.5</b>		The Proponent shall, from the reporting year where construction starts, submit to the Agency an annual report, including an executive summary of the annual report in both official languages. The annual report shall be submitted by the Proponent no later than March 31 following the reporting year. The Proponent shall document in the annual report:	Refer to 2017 CEAA Annual Report.
	<b>2.5.1</b>	Implementation activities undertaken in the reporting year for each of the conditions set out in this Decision Statement;	Implementation activities undertaken are tabulated in this Appendix.
	<b>2.5.2</b>	How it has considered and incorporated the factors set out in condition 2.1 in the implementation of the conditions set out in this Decision Statement;	Refer to 2017 CEAA Annual Report Section 3
	<b>2.5.3</b>	For conditions set out in this Decision Statement for which consultation is a requirement, how the Proponent has considered any views and information that the Proponent received during or as a result of the consultation;	Refer to 2017 CEAA Annual Report Section 4.

Section	Sub-section	Condition	Implementation Activities Undertaken
	<b>2.5.4</b>	The results of the follow-up program requirements identified in conditions 3.4, 5.4 and 6.8; and	Refer to 2017 CEAA Annual Report Section 5.
	<b>2.5.5</b>	Any additional mitigation measures implemented or proposed by the Proponent, as determined under condition 2.4.	Refer to 2017 CEAA Annual Report Section 6.
<b>2.6</b>		The Proponent shall publish on the Internet, or any similar medium, the annual report and the executive summary referred to in condition 2.5, the archaeological and heritage resources management plan referred to in condition 7.1, and the implementation schedule and any updates or revisions to that schedule referred to in condition 10, upon submission of these documents to the parties referenced in the respective conditions. The Proponent shall keep these documents publicly available for twenty-five years following the end of operation or until the end of decommissioning of the Designated Project, whichever comes first.	The Heritage Management Plan and the Implementation Schedule are available on Pretivm's website at: <a href="http://www.pretivm.com/sustainability/default.aspx">http://www.pretivm.com/sustainability/default.aspx</a>
<b>2.7</b>		The Proponent shall notify the Agency in writing no later than 60 days after the day on which there is a transfer of ownership, care, control or management of the Designated Project in whole or in part.	Not applicable. No activity undertaken.
<b>2.8</b>		In the event another party becomes the Proponent of the Designated Project, it is bound by the conditions set out in this Decision Statement.	Not applicable. No activity undertaken.
<b>3</b>	<b>Fish and fish habitat</b>		
<b>3.1</b>		The Proponent shall, for all effluent discharges, comply with the <i>Fisheries Act</i> , the Metal Mining Effluent Regulations (MMER), and any discharge limits for effluent set by British Columbia that meet or exceed the requirements of the <i>Fisheries Act</i> and the Metal Mining Effluent Regulations. In addition, the Proponent shall:	Pretivm has implemented effluent monitoring as per <i>Environmental Management Act</i> permit 107835, the Brucejack Aquatic Effects Monitoring Plan and MMER criteria. The First Biological Monitoring Design Study, per MMER requirements, was initiated in 2017.
	<b>3.1.1</b>	Design and construct the perimeter ditching around the waste rock stockpile, mill building and portals to accommodate a 200-year rain-on-snow event;	Construction completed in 2017.
	<b>3.1.2</b>	Capture and divert surface drainage and mine water effluent to the water treatment plant for treatment prior to discharge into Brucejack Lake;	Construction completed in 2017, operations water treatment plant replaced construction water treatment plant in 2017.
	<b>3.1.3</b>	Immobilize tailings and deposit potentially acid generating rocks on the bottom of Brucejack Lake where they shall remain submerged at all times or in decommissioned stopes; and	Waste rock from surface development and underground activities continued to be deposited into Brucejack Lake during 2017; tailings deposition in Brucejack Lake began in 2017.
	<b>3.1.4</b>	Use multiple turbidity curtains at the outlet of Brucejack Lake.	The three turbidity curtains installed at the outlet of Brucejack Lake in September 2015 remain in place.
<b>3.2</b>		The Proponent shall protect fish and fish habitat during all phases of the Designated Project, which shall include the implementation of mitigation measures to avoid causing harm to fish and fish habitat when using explosives or conducting activities in or around water frequented by fish, as well as on the Knipple Glacier.	At the mine site the mine water treatment plant continues to be operational, as well, three turbidity curtains were installed at the outlet of Brucejack Lake; a Standard Operating Procedure and management plan related to the crossing of the Knipple Glacier is in place, as are Emergency and Spill Response Plans; monitoring for hydrocarbons was implemented downstream of the Knipple Glacier in 2016 and continued in 2017.
<b>3.3</b>		The Proponent shall, during decommissioning, reclaim riparian habitats along the access road which shall include the planting of native plant species.	No decommissioning activities were undertaken in 2017
<b>3.4</b>		The Proponent shall develop and implement a water quality and fish and fish habitat follow-up program that shall include:	Refer to 2017 CEAA Annual Report Section 5.1
	<b>3.4.1</b>	Monitoring the quality of water flowing from Brucejack Lake into Brucejack Creek to verify the accuracy of the water quality and fish and fish habitat predictions in the environmental assessment; and	Refer to 2017 CEAA Annual Report Section 5.1
	<b>3.4.2</b>	Determining whether mitigation measures implemented to protect the quality of water flowing from Brucejack Lake into Brucejack Creek and downstream fish and fish habitat are effective.	Refer to 2017 CEAA Annual Report Section 5.1
<b>4</b>	<b>Migratory birds</b>		
<b>4.1</b>		The Proponent shall carry out all phases of the Designated Project in a manner that protects and avoids harming, killing or disturbing migratory birds or destroying, disturbing or taking their nests or eggs. In this regard, the Proponent shall take into account Environment Canada's Avoidance Guidelines. The Proponent's actions in applying the Avoidance Guidelines shall be in compliance with the <i>Migratory Birds Convention Act, 1994</i> and with the <i>Species at Risk Act</i> .	Pre-clearing surveys for raptor nests and migratory birds continued in 2017 for those areas where timber and brush was cleared in 2017. No raptor nests were found nor were migratory bird nests disturbed.

Section	Sub-section	Condition	Implementation Activities Undertaken
4.2		The Proponent shall design and build the transmission line in a manner that prevents electrocution, discourages nesting and makes the transmission line more visible to migratory birds taking into account the Avian Power Line Interaction Committee's Suggested Practices for Avian Protection on Power Lines.	The transmission line is complete and energized. A review of transmission line design and construction by a Senior Wildlife Scientist with ERM Consultants Canada confirms that the design of the transmission Line towers is such that the phase spacing and insulator length exceed the criteria for the largest avian species used in the guidelines and that the use of red and white marker balls across a number of wide valleys increases the visibility of the transmission line. The most likely avian species inhabiting the transmission line corridor is osprey and the measures in place to prevent electrocution will minimize the risk should osprey choose to nest on tower tops.
5	<b>Health and Aboriginal peoples</b>		
5.1		The Proponent shall implement mitigation measures to manage air emissions of the Designated Project during all phases, including:	
	5.1.1	Those mitigation measures required to comply with the Waste Discharge Regulation under British Columbia's <i>Environmental Management Act</i> for operational air emissions;	Mitigation measures implemented continued during 2017 to manage air emissions were as per the <i>Environmental Management Act</i> permit 107025 and the Brucejack Air Quality Management Plan.
	5.1.2	Fugitive dust best management practices; and	In 2017, a calcium/magnesium chloride brine was applied to the Brucejack Access Road from km 0 to km 59 and to the lower camp areas to assist in suppressing fugitive dust. Road watering also continued to be used as a mitigation measure for managing fugitive dust along the Brucejack Access Road, Bowser Camp, Bowser Aerodrome and at the mine site. At the mine site, high traffic areas have been capped with quarried clean non-PAG crushed rock. Along the Access Road, awareness around speed limits, which minimizes dust generation, has been implemented through road signage and Safe Working Instructions. As well, grading of the Access Road to mix the heavy dust layer that accumulates on top of the road (over time) into the more stable soil/gravel, is practiced where applicable.
	5.1.3	Use of low-sulphur diesel fuel equipment and pollution control equipment on mobile heavy equipment.	Diesel fuel is being sourced from a company supplying ultra-low sulphur diesel (<2ppm sulphur content).
5.2		The Proponent shall, in consultation with the Nisga'a Nation and Tsetsaut/Skii km Lax Ha, monitor and assess any changes to ambient air quality at the Tsetsaut/Skii km Lax Ha Lodge that result from the Designated Project during all phases for particulate matter (10 microns in diameter or less) and fine particulate matter (2.5 microns in diameter or less) using the Canadian Ambient Air Quality Standards of the Canadian Council of Ministers of the Environment as a benchmark, as well as for nitrogen oxide, sulphur dioxide and carbon monoxide.	Refer to 2017 CEAA Annual Report Section 4.2.
5.3		The Proponent shall develop and implement, in consultation with the Nisga'a Nation and Tsetsaut/Skii km Lax Ha, a mechanism for receiving noise complaints due to noise caused by the Designated Project during all phases, and respond in a timely manner to any noise complaint received.	Refer to 2017 CEAA Annual Report Section 4.3.
5.4		The Proponent shall develop and implement, in consultation with the Nisga'a Nation and Tsetsaut/Skii km Lax Ha, a follow-up program based on the monitoring specified in condition 5.2 to evaluate the effectiveness of mitigation measures identified under condition 5.1. The follow-up program shall start with construction and ceases at the end of the decommissioning phase.	Refer to 2017 CEAA Annual Report Section 4.2 and Section 5.4.
5.4.1		The Proponent shall inform the Nisga'a Nation and Tsetsaut/Skii km Lax Ha in cases of exceedances at the Tsetsaut/Skii km Lax Ha Lodge of the Canadian Ambient Air Quality Standards of the Canadian Council of Ministers of the Environment parameters specified in condition 5.2.	Ambient air quality monitoring at this site commenced in March 2016 and continued in 2017. No exceedances were noted in the Tsetsaut/Skii km Lax Ha Lodge results.
6	<b>Current use of lands and resources for traditional purposes</b>		
6.1		The Proponent shall provide Aboriginal groups with the implementation schedule and any updates or revisions to that schedule as stated in condition 10 at the same time the Proponent provides the schedule to the Agency.	The Implementation Schedule was provided to Aboriginal groups and the Agency August 2015. An updated schedule was provided on February 24, 2017.
6.2		The Proponent shall prohibit any hunting, fishing and trapping within the Project Area by the Proponent's employees and contractors hired by the Proponent, unless an employee or a contractor is provided access for traditional purposes as per condition 6.6 or for exercising rights as per condition 6.7.	Pretivm drafted a No Hunting No Fishing No Trapping Policy (dated August 27, 2015) to address this commitment. The draft policy was distributed to Aboriginal groups, and comments received incorporated into the final version.
6.3		The Proponent shall prohibit public access to the access road.	Pretivm continues to operate a manned security gate at the junction of the Brucejack Access Road and Highway 37. The gate is located on the east side of the Bell-Irving River.

Section	Sub-section	Condition	Implementation Activities Undertaken
6.4		The Proponent shall impose speed limits on the access road taking into account provincial guidelines.	Speed limits are established in the Brucejack Traffic & Access Management Plan based on the road design, and signage in both directions of travel has been posted along the Brucejack Access Road to advise of road speed. In addition, speed limits are discussed in the Safe Work Instructions (SWI) road procedure which is issued to all drivers/contractors prior to travelling the access road.
6.5		The Proponent shall construct and maintain gaps in snow banks large enough to provide passage for fauna, including ungulates and furbearers.	Once the depth of snow warranted it, gaps in the snow banks were constructed and maintained along the access road during 2017. Additionally, for much longer sections, the grader cut down the height of the snow banks to allow for wildlife passage along the length of the banks, not just at gaps. Grading practices will continue to be evaluated on an ongoing basis through the winter.
6.6		The Proponent shall, following consultation with Tsetsaut/Skii km Lax Ha, provide access to the Project Area to the Tsetsaut/Skii km Lax Ha for traditional purposes, to the extent that such access is safe.	Refer to 2017 CEAA Annual Report Section 4.4.
6.7		The Proponent shall, following consultation with the Nisga'a Nation, provide access to the Project Area for the Nisga'a Nation to exercise rights under the Nisga'a Final Agreement, to the extent that such access is safe.	Refer to 2017 CEAA Annual Report Section 4.4.
6.8		The Proponent shall develop and implement, in consultation with the Nisga'a Nation and Tsetsaut/Skii km Lax Ha, a follow-up program to determine the effectiveness of the mitigation measures used to avoid mortality of fauna, including ungulates and furbearers, along the access road and to verify the accuracy of the environmental assessment.	Refer to 2017 CEAA Annual Report Section 4.5 and Section 5.3.
<b>7</b>	<b>Physical and cultural heritage and structures, sites or things of ... significance</b>		
7.1		The Proponent shall develop and implement, in consultation with Aboriginal groups, an archaeological and heritage resources management plan for the Designated Project prior to construction. The archaeological and heritage resources management plan shall take into account British Columbia's Handbook for the Identification and Recording of Culturally Modified Trees. The archaeological and heritage resources management plan shall include:	Refer to 2017 CEAA Annual Report Section 4.6. A Heritage Management Plan and accompanying Heritage Chance Find Procedure was developed in 2015 and implemented prior to the start of construction activities and in use throughout 2017.
	7.1.1	A description of structures, sites or things of historical, archaeological, paleontological or architectural significance (including Culturally Modified Trees) that may be encountered by the Proponent during construction;	A Heritage Management Plan and accompanying Heritage Chance Find Procedure was developed and implemented prior to the start of construction activities.
	7.1.2	Procedures and practices for on-site monitoring of construction activities that may affect a structure, site or thing of historical, archaeological, paleontological or architectural significance (including a Culturally Modified Tree) and for the identification and removal of the resource; and	A Heritage Management Plan and accompanying Heritage Chance Find Procedure was developed in 2015 and implemented prior to the start of construction activities and in use throughout 2017.
	7.1.3	A chance find protocol if a previously unidentified structure, site or thing of historical, archaeological, paleontological or architectural significance (including a Culturally Modified Tree) is discovered by the Proponent or brought to the attention of the Proponent by an Aboriginal group or another party during construction.	A Heritage Management Plan and accompanying Heritage Chance Find Procedure was developed in 2015 and implemented prior to the start of construction activities and in use throughout 2017.
<b>8</b>	<b>Species at risk</b>		
8.1		The Proponent shall conduct pre-clearing surveys to determine distribution of Little Brown Myotis ( <i>Myotis lucifugus</i> ) and Northern Myotis ( <i>Myotis septentrionalis</i> ), and establish a 50-metre buffer zone around active hibernacula and active roosts.	No clearing of timber suitable for bat roosts was completed in 2017, no bat roosts were found.
8.2		The Proponent shall, prior to construction and throughout all phases of the Designated Project, install and maintain roosting structures to offset if there is loss of Little Brown Myotis ( <i>Myotis lucifugus</i> ) and Northern Myotis ( <i>Myotis septentrionalis</i> ) bat roosting habitat.	No roosting structures were found during the bat roosting surveys in 2015 or during clearing activities in 2015, 2016 or 2017, therefore no monitoring is required and no mortalities observed. However, five bat houses were installed in appropriate habitat along the access road and 5 five along the transmission line.
8.3		The Proponent shall monitor mortality of Little Brown Myotis ( <i>Myotis lucifugus</i> ) and Northern Myotis ( <i>Myotis septentrionalis</i> ) and their usage at buffer-zones and of roosting structures, to determine the effectiveness of the mitigation measures during construction and operation.	No roosting structures were found during the bat roosting surveys in 2015 or during clearing activities, and no mortalities observed. Therefore, no mitigation measures were required.

Section	Sub-section	Condition	Implementation Activities Undertaken
8.4		The Proponent shall construct wildlife tunnels and fencing along the access road to allow passage of the Western Toad ( <i>Anaxyrus boreas</i> ) beneath the road as close as possible to existing migration corridors taking into account British Columbia's Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in BC.	To protect Western Toad ( <i>Anaxyrus boreas</i> ) during migration, four toad tunnels were installed along the Brucejack Access Road in 2017, adding to one tunnel installed in 2016. A modified bridge was also built to facilitate Western Toad travel under the access road in an area where the shallow water table made a tunnel installation impractical. All sites were fenced to direct toads to the corridors.  A permit was obtained from BC Ministry of Forests, Lands and Natural Resource Operations to live capture, temporarily possess, transport and release Western Toad for purposes of carrying toads across the road and releasing in the forest prior to, and during, wildlife tunnel construction. Nine hundred and forty-four Western Toads were relocated during the 2017 monitoring period.
9	<b>Accidents or malfunctions</b>		
9.1		The Proponent shall take all reasonable measures to prevent accidents and malfunctions that may result in adverse environmental effects and shall implement emergency response procedures and contingencies developed in relation to the Designated Project.	All management plans relevant to mitigate for accidents and malfunctions have been implemented.
9.2		The Proponent shall, prior to construction, consult with Aboriginal groups to identify potential accidents and malfunctions that may result in an adverse environmental effect, and on the measures to be applied to prevent such accidents and malfunctions.	Refer to 2017 CEAA Annual Report Section 4.7.
9.3		In the event of an accident or malfunction with the potential to cause adverse environmental effects, the Proponent shall:	On March 15, 2017 a diesel fuel spill of sufficient volume (1,878 l) occurred that had the potential to cause adverse environmental effects.
	9.3.1	Notify relevant federal and provincial authorities, including notifying the Agency in writing of the accident or malfunction as soon as possible in the circumstances;	Emergency Management BC (DGIR # 163636) notified on March 15 <sup>th</sup> , BC Ministry of Energy, Mines and Petroleum Resources (Mine Incident #17-096) notified by telephone on March 15 <sup>th</sup> and in writing March 16 <sup>th</sup> , Compliance Promotion and Enforcement CEAA informed in writing March 16 <sup>th</sup> .
	9.3.2	Implement immediate measures to minimize any adverse environmental effects associated with the accident or malfunction;	Measures to limit movement of spilled fuel were immediately instituted.
	9.3.3	Submit a written report to the Agency as soon as possible in the circumstances, but no later than 30 days after the day on which the accident or malfunction took place. The written report shall include:	A preliminary report was filed with Compliance Promotion and Enforcement by email on April 10, 2017.
	9.3.3.1	A description of the accident or malfunction and of its adverse environmental effects;	During refueling of a temporary three tank fueling station, the Re-fueling Operators failed to follow Standard Operations Procedures for the task and as a result a valve was inadvertently left open during an earlier refueling which resulted in 1,878 litres of diesel fuel transferred to a previously filled tank being released through a vent pipe. Environmental effects were the contamination of glacial till materials and snow.
	9.3.3.2	The measures that were taken by the Proponent to mitigate the environmental effects of the accident or malfunction;	All contaminated snow and ponded fuel was transferred to appropriate containers for shipment by a licensed waste hauler to a treatment facility while glacial till materials were dug up and transported to a bioremediation cell for treatment. Large boulders at the spill location were treated with Micro-Blaze washing solution repeatedly until free of hydrocarbon contamination. The temporary fueling station was dismantled and the permanent fueling facility was brought online.
	9.3.3.3	A description of any residual environmental effects, and any additional measures required to address residual environmental effects; and	Sampling of downslope glacial tills and nearby Brucejack Lake indicate hydrocarbons did not migrate to the lake or reach any other water body. There are no permanent residual environmental effects.

Section	Sub-section	Condition	Implementation Activities Undertaken
	9.3.3.4	If an emergency response plan was implemented, details concerning its implementation.	The emergency response plan was acted upon immediately. The source of the fuel spill was identified and shut off. The personnel onsite immediately began using spill kit materials to limit the spread of fuel, called the mine environmental department who mobilized more personnel and equipment (e.g. mini-excavator, skidsteer and loader) to collect spilled fuel and contaminated snow. These materials were placed in appropriate containers for shipment by a licensed waste company to a treatment facility. The project spill response consultants oversaw site clean-up of remaining contaminated material with removal of contaminated materials from the spill site to remediation facilities; new training procedures and courses for all relevant site personnel; and conducted investigations to confirm by test pitting and sampling that all contaminated materials were removed and that no diesel fuel reached any water course.
	9.3.4	As soon as possible in the circumstances, but no later than 90 days after the day on which the accident or malfunction took place, submit a written report to the Agency on the changes made to avoid a subsequent occurrence of the accident or malfunction and on the implementation of any additional measures to mitigate residual environmental effects.	The final report was filed with Compliance Promotion and Enforcement by email on June 5, 2017.
9.4		The Proponent shall develop and implement a communication plan, in consultation with Aboriginal groups, that shall include:	Refer to 2017 CEAA Annual Report Section 4.7.
	9.4.1	The types of accidents or malfunctions requiring a notification by the Proponent to the respective Aboriginal groups;	Refer to 2017 CEAA Annual Report Section 4.7.
	9.4.2	The manner by which Aboriginal groups shall be notified by the Proponent of an accident or malfunction and of any opportunities for the Aboriginal groups to assist in the response to the accident or malfunction; and	Refer to 2017 CEAA Annual Report Section 4.7.
	9.4.3	The contact information of the representatives of the Proponent that the Aboriginal groups may contact and of the respective Aboriginal groups to which the Proponent provides notification.	Refer to 2017 CEAA Annual Report Section 4.7.
<b>10</b>	<b>Implementation Schedule</b>		
10.1		The Proponent shall submit an implementation schedule for conditions contained in this Decision Statement to the Agency, or anyone designated pursuant to section 89 of the <i>Canadian Environmental Assessment Act, 2012</i> , at least 30 days prior to construction. The implementation schedule shall indicate the commencement and completion dates for each activities relating to conditions set out in this Decision Statement.	The Implementation Schedule was provided to Aboriginal groups and the Agency August 2015.
10.2		The Proponent shall submit an update to this implementation schedule in writing to the Agency, or anyone designated pursuant to section 89 of the <i>Canadian Environmental Assessment Act, 2012</i> , every two years on or before March 31, until completion of the activities.	A revised schedule was provided on February 24, 2017.
10.3		The Proponent shall provide the Agency, or anyone designated pursuant to section 89 of the <i>Canadian Environmental Assessment Act, 2012</i> , with a revised implementation schedule if any change occurs from the initial schedule or any subsequent updates. The Proponent shall provide the revised implementation schedule at least 30 days prior to the implementation of the change.	A revised schedule was provided on February 24, 2017.
<b>11</b>	<b>Record keeping</b>		
11.1		The Proponent shall maintain a written record, or a record in an electronic format compatible with that used by the Agency, and retain and make available that record to the Agency, or anyone designated pursuant to section 89 of the <i>Canadian Environmental Assessment Act, 2012</i> , at a facility close to the Designated Project (local facility). The record shall include information related to the implementation of the conditions set out in this Decision Statement, and the results of all associated monitoring, including:	All records required under the Decision Statement are kept in electronic format accessible at the Brucejack Mine Site and from Pretivm's offices in Smithers and Vancouver.
	11.1.1	the place, date and time of any sampling, as well as techniques, methods or procedures used;	This practice continued during 2017.
	11.1.2	the dates and the analyses that were performed;	This practice continued during 2017.
	11.1.3	the analytical techniques, methods or procedures used in the analyses;	This practice continued during 2017.

Section	Sub-section	Condition	Implementation Activities Undertaken
	11.1.4	the names of the persons who collected and analyzed each sample and documentation of any professional certifications relevant to the work performed that they might possess; and	This practice continued during 2017.
	11.1.5	the results of the analyses.	This practice continued during 2017.
11.2		The Proponent shall retain and make available upon demand to the Agency, or anyone designated pursuant to section 89 of the <i>Canadian Environmental Assessment Act, 2012</i> , the information contained in condition 11.1 at a facility close to the Designated Project (or at a location within Canada and agreed upon by the Agency, should the local facility no longer be maintained). The information shall be retained and made available throughout construction and operation, and for twenty-five years following the end of operation or until the end of decommissioning of the Designated Project, whichever comes first.	Required information can be accessed from the Brucejack Mine Site or either of Pretivm's offices in Smithers and Vancouver.

**APPENDIX B:**  
**2017 Air Quality Monitoring Results –**  
**Tsetsaut/Skii km Lax Ha Lodge**

# Memorandum



**Date:** March 12, 2018  
**To:** Max Holtby, Pretivm Director of Permitting  
**From:** Andres Soux, M.Sc. (ERM)  
**Cc:** Sylvia Van Zalingen, Pretivm Environmental Manager  
**Subject:** 2017 Air Quality Monitoring Results - Tsetsaut/Skii km Lax Ha Lodge

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## 1. BACKGROUND

Pretium Resources Inc. (Pretivm) was granted approval to proceed with the Brucejack Gold Mine (Brucejack) by the Government of Canada on July 30, 2015 in a Decision Statement that included a series of conditions. Brucejack is required to conduct quarterly ambient air quality monitoring at the Tsetsaut/Skii km Lax Ha (TSKLH) Lodge as presented within Section 5 of the 2015 Decision Statement issued under Section 54 of the *Canadian Environmental Assessment Act* (CEA; CEA 2012) and copied below:

5.2 *The Proponent shall, in consultation with the Nisga'a Nation and Tsetsaut/Skii km Lax Ha, monitor and assess any changes to ambient air quality at the Tsetsaut/Skii km Lax Ha Lodge that result from the Designated Project during all phases for particulate matter (10 microns in diameter or less) and fine particulate matter (2.5 microns in diameter or less) using the Canadian Ambient Air Quality Standards of the Canadian Council of Ministers of the Environment as a benchmark, as well as for nitrogen oxide, sulphur dioxide and carbon monoxide.*

This memorandum specifically summarizes the air quality results of the quarterly monitoring at the TSKLH Lodge.

## 2. METHODOLOGY

### 2.1 Passive Air Sampling System (PASS)

Emissions of sulphur dioxide (SO<sub>2</sub>) and nitrogen dioxide (NO<sub>2</sub>) resulting from fuel combustion were monitored at the TSKLH Lodge as per the Decision Statement with a Passive Air Sampling System (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 were installed in the field and exposed in protective shelters that were mounted to a support pole for a period of 30 days. Following the exposure period the sample media were retrieved, replaced, and sent to Maxxam Analytics for laboratory analysis along with meteorological data including air

temperature, wind speed, and relative humidity, to determine the ambient concentration of the compound over the sampling period.

Monitoring results are compared to the Canadian Ambient Air Quality Standard (CAAQS) for SO<sub>2</sub>, the National Ambient Air Quality Objective (NAAQO) for NO<sub>2</sub>.

## **2.2 Carbon Monoxide and Particulate Matter**

The TSKLH Lodge is the only private residence that potentially may be impacted by elevated particulate matter levels related to use of the access road. As per the Decision Statement, Pretivm conducted particulate matter (PM<sub>10</sub>), fine particulate matter (PM<sub>2.5</sub>) and carbon monoxide (CO) monitoring via a portable air analyzer on a quarterly basis near the TSKLH Lodge. Monitoring results are compared to the relevant CAAQS for PM<sub>2.5</sub> and the NAAQO for CO. There is no CAAQS or NAAQO for PM<sub>10</sub>.

To monitor for PM<sub>10</sub>, PM<sub>2.5</sub>, and CO, a 3M Detection Solutions EVM-7 was used. This type of monitor is used for industrial hygiene surveys. This portable unit was available through an environmental equipment rental company and was pre-calibrated.

## **3. DISCUSSION AND RESULTS**

### **3.1 PASS**

PASS was conducted at the TSKLH Lodge from January 5, 2017 to January 4, 2018. During the twelve (12) monitoring months, twelve (12) PASS samples were collected and sent to Maxxam Analytics for analysis. The average annual concentration of SO<sub>2</sub> and NO<sub>2</sub> at the TSKLH Lodge during the 2017 monitoring period was 0.4 and 9.6 micrograms per cubic metre (µg/m<sup>3</sup>), respectively. The annual average concentrations for SO<sub>2</sub> and NO<sub>2</sub> were well below the relevant standard/objective of 13 (standard) and 60 (objective) µg/m<sup>3</sup>, respectively. Table 3-1 provides the results of PASS monitoring at the TSKLH Lodge during the 2017 monitoring period.

**Table 3-1. 2017 PASS Lodge Monitoring Results**

		SO <sub>2</sub> <sup>a</sup> (µg/m <sup>3</sup> )	NO <sub>2</sub> <sup>a</sup> (µg/m <sup>3</sup> )
Standard/Objective <sup>b</sup>	Annual	13	60
	Daily	-	-
	1-Hour	183	188
Monitoring Month	Jan-17	1.6	43.8
	Feb-17	1.3	33.8
	Mar-17	1.0	10.9
	Apr-17	<i>0.1</i>	5.3
	May-17	0.3	2.4
	Jun-17	<i>0.1</i>	1.5
	Jul-17	0.3	1.3
	Aug-17	<i>0.1</i>	0.9
	Sep-17	<i>0.1</i>	0.8
	Oct-17	<i>0.1</i>	1.9
	Nov-17	<i>0.1</i>	4.1
	Dec-17	<i>0.1</i>	7.9
<b>Annual Average</b>		<b>0.4</b>	<b>9.6</b>

<sup>a</sup> Values reported by the laboratory as being less than the detection limit were replaced with values equal to half the detection limit to allow for their use in simple descriptive statistics. Values in italics are half the detection limit.

<sup>b</sup> (CCME 1999; CCME 2000)

### 3.2 Carbon Monoxide and Particulate Matter

CO, PM<sub>10</sub>, and PM<sub>2.5</sub> monitoring was conducted at the TSKLH Lodge during the following onsite monitoring events:

- March 2-9, 2017;
- June 3-8, 2017;
- July 2-6, 2017; and
- December 7-10, 2017.

The results presented in the table shows the maximum result per the monitoring frequency during the monitoring event i.e. the maximum 1-hour average of all the 1-hour averages calculated during the monitoring event.

All results for CO and PM<sub>2.5</sub> were below the respective benchmarks. Table 3-2 summarizes the results of the CO, PM<sub>10</sub> and PM<sub>2.5</sub> monitoring as well as the respective benchmarks.

The maximum 1-hour and 8-hour results recorded at the TSKLH Lodge were 7,879.3 and 2,296.8 µg/m<sup>3</sup>, respectively. Thus observed CO levels were below the NAAQO.

The maximum 24-hour PM<sub>10</sub> and 24-hour PM<sub>2.5</sub> concentrations at the TSKLH Lodge were 13.1 and 26.3 µg/m<sup>3</sup>, respectively. The 24-hour PM<sub>2.5</sub> concentrations were below the CAAQS.

**Table 3-2. 2017 CO, PM<sub>10</sub>, and PM<sub>2.5</sub> Lodge Monitoring Results**

Sampling Event	Contaminant:	CO (µg/m <sup>3</sup> )		PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )
	Benchmark:	15,000 (1-Hour)	6,000 (8-Hour)	- (24-Hour)	28 (24-Hour)
	Sampling Dates				
1 <sup>st</sup> Sampling Event	March 2-4, 2017	0.0	0.0	8.3	-
	March 6-9, 2017	0.0	0.0	-	-
2 <sup>nd</sup> Sampling Event	June 3-4, 2017	2,249.2	1,154.9	13.1	-
	June 7-8, 2017	7,879.3	2,296.8	-	5.4
3 <sup>rd</sup> Sampling Event	July 2-3, 2017	1,146.0	474.1	-	0.3
	July 5-6, 2017	2,292.0	1,138.9	4.9	-
4 <sup>th</sup> Sampling Event	December 7, 2017	0.0	0.0	-	26.3
	December 9-10, 2017	0.0	0.0	-	-

Note:

Dash (-) indicates data not measured or insufficient data, as the monitoring equipment can only test for one measurement (PM<sub>10</sub> or PM<sub>2.5</sub>) at a time.

#### 4. CLOSING

Monthly PASS monitoring was conducted at the TSKLH Lodge from January 5, 2017 to January 4, 2018. The annual average concentrations for NO<sub>2</sub> and SO<sub>2</sub> were well below the respective benchmark concentrations. The TSKLH Lodge was moved to the Bowser West Camp in late July 2017.

CO, PM<sub>10</sub>, and PM<sub>2.5</sub> monitoring was conducted at the TSKLH Lodge in March, June, July and December 2017. All results for CO and PM<sub>2.5</sub> were below the respective benchmarks.

Prepared by:



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