MEMORANDUM

To: Anne Neave **Date:** March 31, 2017

From: KGHM Ajax Mining Inc.

CC: B.C. Environmental Assessment Office, Canadian Environmental Assessment Agency

Subject: Response to Ajax Project Application/EIS Public Comment Period Submissions

1. INTRODUCTION

As part of the environmental assessment review process for the Ajax Project (the Project), the BC Environmental Assessment Office and the Canadian Environmental Assessment Agency held a 75-day public comment period from January 26 to April 11, 2016. You made the following submissions:

- Email dated March 29, 2016 re: Public Comment submission – Air-blast and attached document

KGHM Ajax Mining (KAM) appreciates the level of effort you have put into review of the Project, and is pleased to provide the following response, which outlines KAM's understanding of your key issues, and summarizes how KAM is addressing these topics.

2. KEY ISSUES

Consistent with the direction provided by the EAO, KAM has taken the time to review all of the 3,845 public submissions received, has analyzed and sorted them into 177 issues (see attached Document Map), and then developed responses to these issues. Specific to the submissions from your association, we have identified that the comments were related to the following key issues:

- Attenuation of air-blasts
- Meteorological influence on air-blasts

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3. RESPONSE

The concerns you raise appear to be based on a Golder Associates technical memorandum dated May 21, 2013. Please be advised that subsequent to the May 21, 2016 memorandum, Golder Associates issued a statement of clarification. The original technical memorandum was also withdrawn and superseded. The following documents should be considered in conjunction with the original memorandum:

- Technical Memorandum dated September 6, 2013, 2016 re: Statement of Clarification Regarding Comments on Exclusion or Inclusion of Air-blast from Ajax Environmental Assessment
- Technical Memorandum dated September 6, 2013, 2016 re: Opinion Regarding The Relevance of Air-blast for the Ajax Environmental Assessment

These documents are attached for your reference.

3.1 Attenuation of Air-blasts

Comments in the original Golder Associates memorandum regarding modeled air-blast overpressures as modelled by Orica do not appear to be entirely valid. The measurements used to develop predicted air over pressure levels were taken within a relatively close test distance range relative to how far the City of Kamloops was located. Due to this, it is not unusual for the air-blast data to end up clumped together, and thus any statistical analyses and extrapolations into the far field would be questionable. But, given the same test parameters and atmospheric conditions, air-blast amplitudes will always attenuate with distance. These conclusions are based on KAM's blasting specialist who has designed, monitored, analyzed, audited, and supervised over 7,000 full scale blasts around the world.

3.2 Meteorological Effects on Air-blasts

Cloud coverage is not included as a factor in the air-blast prediction under the standard prediction methods. Meteorological conditions are very complex and the prediction algorithm only accounts for several factors such as blast charge and distance. KAM acknowledge that weather condition is one of the important factors in blast effects. KAM has committed to an extensive monitoring program to ensure that blasting activity does not negatively impact our neighbours. Vibration monitoring is proposed once blasting begins. Six seismograph stations will verify predictions and ensure those levels are below guidelines. Three seismographs will be arranged in a linear array from the pit edge towards the Aberdeen neighborhood. Portable Seismographs will monitor vibrations levels toward residences to the east and west of the blasting areas. In consultation with regulatory agencies, KAM will identify appropriate trigger levels. If the monitoring results indicate that noise or vibration effects approach or exceed the trigger levels, site activities or blasts design will be adjusted accordingly. Section 11.22 of the Application/EIS further outlines the vibration management plan.

In addition, a permanent weather station will be installed in Aberdeen allowing KAM to monitor meteorological conditions in advance of blasts. Blasting operations will only be conducted if weather conditions are conducive to the control of air-blasts. Under certain meteorological conditions, blasts may be postponed until more favorable weather conditions exist.

3.3 Other Considerations

KAM is in agreement with the opinion of Golder Associates regarding the inclusion of air-blasts in the Environmental Assessment. As such, air-blasts have been included in the Assessment. Vibration and overpressure guidelines at Jacko Lake guided the blast design and effects assessment. This approach was selected because fish habitat in the lake governs the strictest vibration and over pressure constraints. Figure 5-4 of Appendix 10.5-A shows the modeled air-blast effects during operations from blasting in Zone 1. In this figure, you will notice that the predictions are modeled such that the distance from each point of concern was taken from the final pit boundary. In effect, this methodology is conservative and shows the air-blast effects from blasts occurring along the pit boundary. This is the same approach as you suggest for modelling a blast located on the eastern edge of the pit such that a worst case scenario for Aberdeen and Knutsford is shown.

It is important to remember that the mine will have offices, plant facilities, utilities, power lines, electrical substations, and sensitive electronics equipment, among others, directly on the mine site. Since the mine facilities will always be closest to the blast zones, they, along with Jacko Lake fish habitat, must be protected from vibration and air-blast effects. Any structures beyond the mine property will always receive less vibration and air-blast amplitudes as a result of the additional separation distance from the blasts. Therefore, homes in surrounding communities will be much safer than the mine infrastructure and Jacko Lake fish habitat. Nevertheless, a linear array of three permanent seismographs will be installed from the mine pit edge towards the outer limit of Aberdeen. These units will operate 24 hours/day, monitoring both ground vibrations and air-blast. Monitoring results will be shared with those interested in the data.

4. CONCLUSION

KAM is committed to ensuring that blasting operations are done safely and that noise and vibration levels do not exceed regulatory thresholds. The Application/EIS is currently undergoing regulatory review by subject matter experts to determine adequacy of the noise and vibration assessment, among others. We are confident in the information provided in the Application/EIS and are engaging with the Working Group to justify the work done in the assessments. We are committed to undertaking any additional requirements and/or conditions which may arise as a result of the review.

We hope that the information provided in this letter, and in the larger public response memos, continues to demonstrate our commitment to being an accountable, transparent, and credible operator of an environmentally responsible mining operation.

KAM appreciates your comments and looks forward to continued collaboration. Thank you for taking the time to contribute to the EA/EIS process and providing input to support our goal for continuous improvement.

5. USEFUL LINKS

The responses provided in this document make reference to a range of other related materials. For ease of reference, links to the following materials are provided. Specific cross-references are also provided in the text.

KGHM Ajax Mining Inc.

http://ajaxmine.ca

EAO e-PIC site for the Ajax Mine Project

https://projects.eao.gov.bc.ca/p/ajax-mine/detail

Ajax Project Application/EIS

https://projects.eao.gov.bc.ca/p/ajax-mine/docs?folder=161

Plain Language Summaries of the Application/EIS

http://application.ajaxmine.ca/Home.aspx

Responses, including supplemental technical memorandum, provided to the Technical Working Group

https://projects.eao.gov.bc.ca/p/ajax-mine/docs?folder=220

Figure 1-2
Document Map

Project & Proponent

Project Design and Location (Section 2.1)
- Disclosure of assay results
- Tailings storage design ("wet" vs. "dry stack")
- Design/engineering of TSF and other components
- Peterson Creek diversion and its implications
- Previous mining at the Ajax site does not justify the Project
- Plans for future expansion of the Project
- Request for other specific information
- The Project is located too close to the city

Proponent – KAM/KGHM (Section 2.2)
- Lack of trust in proponent
- Reputation of KGHM globally, and experience with other KGHM mines
- Allocation of liability between KAM and KGHM
- Proponent has not earned social licence to operate
- Proponent should be held accountable for impacts

Economic feasibility of the Project (Section 2.3)
- Uncertain economic feasibility/profitability due to mineral prices
- Proponent's ability to pay for mitigation (including financial costs, feasibility study)
- Critique of feasibility study

Environmental Assessment Process

Assessment Methodology (Section 3.1)
- Definition of footprint/infrastructure disturbance area
- The assessment methods (including models and other tools) are not adequate
- The EA should not rely on 'best-case' scenarios
- Consideration of cumulative effects

Consultation and Engagement (Section 3.2)
- Public consultation process has not been effective
- Post-EA community engagement processes (including complaints)
- Question about how public comments will inform decisions

Management, Monitoring, and Follow-up (Section 3.3)
- Mitigation measures (in general) are not sufficient
- Need to establish baselines for monitoring
- Disclosure of monitoring results/reports
- Community Liaison Group
- Will mining activities change in response to environmental conditions (e.g. air quality exceedances, drought restrictions)?
- Potential changes to EA conditions/permit limits in the future
- Detailed comments regarding management plans, monitoring, reporting

Aboriginal Interests (Section 3.4)
- Aboriginal culture and history
- First Nations rights, title, land claims
- Consultation with Aboriginal groups

Regulatory Process

Comments in relation to the "regulatory process" are beyond the scope of KAM's influence and authority.
The public comments related to the EA process, administration of the process, and compliance and enforcement of government policies and acts, were deferred to the EAO for their consideration.

Environment

General (Section 4.1);
- Environmental risks/impacts (general)
- The Project will lead to contamination of soil, water, air, plants, etc.

Climate Change and GHGs (Section 4.2)
- Project's contribution to climate change and greenhouse gases
- Future climate change, drought, and/or storm events are not accounted for in Project planning, design, modelling, or assessment

Geology, Landforms, and Soils (Section 4.3)
- Potential effects on land stability in Aberdeen
- Soils/silt and related studies
- Critique of geochemical model/calculations (including 'acid test')
- Critique of Geology, Landforms and Soil assessment

Surface Water and Groundwater (Section 4.4)
- Adverse effects to water quality (general)
- Effects to Peterson Creek, Anderson Creek, and Jacko Lake (including water quality and heavy metals)
- Downstream water quality (lower Peterson Creek, Thompson River)
- Concern for the broader Thompson area watershed
- Effects on groundwater including Peterson Creek aquifer
- The Project will use/consume too much water
- Community/household water supply
- Critique of water modelling/calculations

Fish and Fish Habitat (Section 4.5)
- Effects on fish and fish habitat
- Impacts on salmon
- Effects of blasting/vibration on fish
- Inks Lake, including fish stocking
- Critique of Fish and Fish Habitat assessment

Vegetation and Ecosystems (Section 4.6)
- Effects to plants and ecosystems
- Effects to rare plant species
- Effects to grassland ecosystems
- Effects to wetlands (including Goose Lake)
- Invasive plants

Wildlife (Section 4.7)
- Effects on wildlife and wildlife habitat
- Effects on protected birds and wildlife species
- Effects on birds and nesting grounds
- Effects on bears
- Effects on bees/pollinators
- Effects on reptiles, amphibians
- Wildlife/bird mitigation and restoration of habitat

Economy

Economic Benefits (Section 5.1);
- Retention of economic benefits in the community
- Economic benefits are short-term/ unreliable/ boom-and-bust
- Economic benefits do not offset other impacts

Labour Force, Employment, and Income (Section 5.2)
- Accuracy of employment/labour market predictions
- Uncertainty about locally available jobs and hiring practices

Business (Section 5.3)
- Adverse effects on local businesses and economy

Economic Growth, Development, and Diversification (Section 5.4)
- Tax contributions of the Project
- Economic effects of population change/out-migration
- Concerns regarding mining as the focus of the Kamloops economy
- Project will adversely affect tourism and other sectors/ Industries

Property Values (Section 5.5)
- Concern that property values will decline
- Critique of property values assessment

Other Economic Concerns (Section 5.6)
- Financial costs related to impacts will be borne by the City/taxpayers
- Critique of economic modelling/assessment
- Request for cost-benefit analysis (or similar valuation analysis)

Social & Community

The Kamloops community (Section 6.1);
- Project will alter the community's image/reputation
- Tournament Capital brand
- Project contributes to social divisions in Kamloops
- Changes in local population and demographics
- Compliance with KAMPLAN and other municipal plans/investments

People living near the Project (Section 6.2)
- Effects on nearby residences, schools and other facilities
- Blasting and other noise will disturb people living nearby
- Blasting/vibration may damage buildings and infrastructure
- Compensation/mitigation for people living near the Project
- Comment about a specific property/landowner

Infrastructure, Public Facilities, and Services (Section 6.3)
- Effects on TRU and student recruitment
- Housing affordability and availability
- Use of existing roads and highways
- Road access in case of emergency

Visual Impact and Dark Sky (Section 6.4)
- Light pollution from the site
- Views and visual impact of the Project

Agriculture and Ranching (Section 6.5)
- Agricultural Land Reserve (ALR)
- Effects on ranchers and ranchlands
- Water Licences

Recreation (Section 6.6)
- Effects on recreation near the mine site
- Effects on fishing activities
- Closure of Goose Lake Road
- Environmental impacts will affect enjoyment of community and outdoor/natural areas

Social Assessment Methods (Section 6.7)
- Critique of social assessment

Health

General (Section 7.1);
- Health assessment should be more holistic, including pathways such as income, recreation, stress, and other factors
- Prediction of health impacts and risks

Air Quality – General (Section 7.2)
- Adverse effects on air quality (general)
- Kamloops' air quality is already poor, and the Project will make it worse
- Air quality in southwest Kamloops neighbourhoods (Knutsford, Aberdeen, Pineview Valley, Upper Sahali)
- It is unacceptable to exceed air quality standards
- Effects of diesel emissions on air quality
- Use of water will create haze/fog

Air Quality – Dust and Particulate Matter (Section 7.3)
- Increased levels of dust/particulate matter (general)
- Increased levels of $PM_{2.5}$
- Mineral content of dust and particulate matter
- Environmental implications of dust (e.g. contamination of soil and water)
- Dust control/management measures
- Particulate matter won't stop at Aberdeen Drive

Air Quality – Studies and Models (Section 7.4)
- AQ data collection/monitoring stations and available baseline data
- Critique of air quality modelling and calculations

Health and Air Quality (Section 7.5)
- Health effects of air quality (general)
- Health effects of $PM_{2.5}$
- Health effects of air quality exceedances during winter months
- Health effects of air quality in valley/lower elevations.
- Health effects of diesel emissions

Health and Water Quality (Section 7.6)
- Safety and quality of drinking water

Country Foods (Section 7.7)
- Effects on country foods (including cattle, gardens, wild foods)
- Critique of country foods assessment/assumptions

Noise and Vibration (Section 7.8)
- Blast tests have not been conducted
- Critique of noise and vibration studies

Health and Noise/Light (Section 7.9)
- Noise may result in sleep disturbance and annoyance
- Effects of light pollution on human health

Other Health Risks and Concerns (Section 7.10)
- Health risks for workers at site
- Health impacts related to transmission line
- Exposure to 'toxic' substances (e.g. heavy metals, uranium, asbestiform, carcinogens) through dust or other pathways
- Impacts on health of vulnerable groups (including children and seniors)
- Critique of health impact assessment, including HHERA

Healthy Living and Health Education (Section 7.11)
- Critique of Healthy Living assessment

Community Health and Well-Being (Section 7.12)
- Perception of risk can affect land use and well-being
- Concern about stress and mental health effects
- Concern that doctors and other professionals will be less likely to choose (or stay in) Kamloops as a place to live and work
- Effects on healthcare costs/capacity as a result of health issues
- Community well-being effects commonly associated with mining
- Adverse effects to quality of life
- Critique of Community Health and Well-being assessment

Heritage

Archaeological Sites (Section 8.1)
- St. Peter's church and cemetery

Closure & Reclamation

Closure and Reclamation (Section 9.1)
- Concern about what will remain after closure
- Closure and long-term management of tailings storage facility
- Post-closure responsibilities for environmental management (including financial costs)
- Restoration of grasslands
- Quality of environment (including metal concentrations) after reclamation
- Request for Care and Maintenance Plan in the event of temporary/permanent closure

Safety

Safety, Accidents, and Malfunctions (Section 9.2)
- Downstream risks/impacts of an accident at the mine site
- Experience with Mt Polley and other mining incidents
- Financial (and other) responsibilities in the event of a major incident
- Geotechnical/ground stability risks at the mine site
- Emergency response/remediation plans in case of an accident or incident
- Critique of Accidents and Malfunctions assessment

Miscellaneous

Miscellaneous (Section 9.3)
- Community benefit agreement / community investment
- Concern about Malartic experience
- Comparison to other projects
- Concern about interaction with TransMountain Pipeline
- Comment about quality/completeness of the Application
- Claims of "Zero Harm" and "No Significant Impact"

TECHNICAL MEMORANDUM

DATE September 6, 2013 **REFERENCE No.** 1214930010-004-TM-Rev0

TO Jen Fretz, P.Eng.
City of Kamloops

CC

FROM Bruce Bosdet, P.Eng. **EMAIL** Bruce_Bosdet@golder.com

STATEMENT OF CLARIFICATION REGARDING COMMENTS ON EXCLUSION OR INCLUSION OF AIR-BLAST FROM AJAX ENVIRONMENTAL ASSESSMENT

On May 14, 2013 the City of Kamloops requested that Golder Associates Ltd. ("Golder") provide an opinion on whether the potential affects of air-blast should be considered in addition to the affects of vibration in the Environmental Assessment of the proposed KGHM AJAX mine. Golder prepared a memorandum for the City of Kamloops dated May 21, 2013.

The memorandum was intended to provide our opinion that the potential impact of air-blast from AJAX's proposed blasting operations should be included in the AJAX Environmental Assessment / Environmental Impact Statement. The memorandum presented examples of considerations which could theoretically be associated with air-blast in support of our position that air-blast should be investigated as part of the Environmental Assessment. There was no intended implication that such considerations, provided as examples, would apply.

To avoid potential misinterpretation, we withdraw the May 21, 2013 memorandum. The May 21, 2013 memorandum is superseded by doc 1214930010-003-TM-Rev0 dated September 6, 2013. Our opinion that the potential impact of air-blast should be included in the AJAX Environmental Assessment / Environmental Impact Statement remains unchanged.

GOLDER ASSOCIATES LTD.

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TECHNICAL MEMORANDUM

DATE September 6, 2013 **REFERENCE No.** 1214930010-003-TM-Rev0

TO Jen Fretz, P.Eng.
City of Kamloops

CC

FROM Bruce Bosdet, P.Eng. **EMAIL** bbosdet@golder.com

OPINION REGARDING THE RELEVANCE OF AIR-BLAST FOR THE AJAX ENVIRONMENTAL ASSESSMENT

This memorandum has been prepared in response to the City of Kamloops' request for Golder Associates Ltd. to provide an opinion on whether the potential affects of air-blast should be considered in addition to the affects of vibration in the Environmental Assessment of the proposed KGHM AJAX mine. The request was made in an email dated May 14, 2013.

Air-blast, also known as air overpressure, is "the additional pressure generated from a blast above normal atmospheric pressure". At large receptor distances from a large blast, it is often air-blast, rather than ground vibration, that can be felt and can potentially cause distress and damage. Air-blast generated from a blast can potentially be disturbing to persons and wildlife and has the potential to initiate allegations of blasting damage from the public.

The magnitude and impact of air-blast is subject to many factors, including the blast design and the blast management practices that consider environmental conditions.

It is our opinion that air-blast is a key issue that should be included in the AJAX Environmental Assessment, considering the blast management plans that will be applied.

GOLDER ASSOCIATES LTD.

Bruce Bosdet, M.A.Sc., P.Eng.
Principal, Senior Geotechnical Engineer

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Reference: ISEE Blasters' Handbook

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