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Attached is the submission from the Kamloops Area Preservation Association for the proposed Ajax Copper-Gold Mine. Given our experience with the environmental assessment process for the Ajax project to date, KAPA wishes to take this opportunity to suggest an amendment to the B.C. Environmental Assessment Act and Regulations regarding the disclosure of baseline environmental and geological data by a proponent.

In the case of the Ajax project, the only substantive information about the project that the proponent has submitted, without request, to the BC EAO was the Project Description, submitted on February 25, 2011. Due to requests by KAPA, the proponent finally agreed to submit a copy of the Orca Blast Report on January 24, 2012, and a copy of the Feasibility Study for the project on February 14, 2012. In total, these reports probably represent only a small proportion of the total information the proponent has in its possession about the project. According to the Feasibility Study (page 20-1): “Environmental studies were initiated for the Ajax Project in 2006, including ground and surface water quality and quantity, climatology, fish and fish habitat, wildlife, and vegetation studies.”

Much of the baseline environmental and geological information for the project likely is contained in Appendix C ‘Mining’ and Appendix H ‘Environmental’ listed in the Feasibility Study. The Feasibility Study states that these appendices are “available at the Abacus Mining & Exploration Corp. Vancouver Office.” In order to understand the nature of the project and to craft questions about the project for the environmental assessment, KAPA requested that the Feasibility Study Appendices be made available for public viewing at the KGHM Ajax Office in Kamloops. A set of Appendices was apparently delivered to the Kamloops Office for this purpose, but the proponent decided to deem all information in the Appendices as “proprietary” and therefore decided not to allow the public to view this information.

It has now been thirteen months since the rather general Project Description was submitted. In this time frame, two public meeting and comment periods have been held: the first in June of 2011, and the second in February 2012. Despite the lengthy period of time the proponent has been compiling baseline data, during and prior to these public comment periods, very little, if any, baseline environmental and geological data was presented to the public at these meetings.

One of the proponent partners, Abacus Mining & Exploration Corporation, did submit a 28 element mineral analysis assessment report for the project to the B.C. Ministry of Energy and Mines, but this report was submitted for exploration regulations purposes, and not to the environmental assessment process. In addition, it is unlikely

that a 28 element analysis can provide the detailed assay information that KAPA believes is required to rigorously assess the possible health and environmental impacts of a proposed mine that is located within 1.6 kilometres to the edge of the City of Kamloops, a population of about 90,000 people when the population of the adjacent Tk'emlups First Nation lands are included.

In summary, even though baseline environmental information has been collected by the proponent since 2006, the public has been invited to attend public meetings where virtually none of this information has been disclosed, and has also been invited to submit questions to the proponent and government agencies without the benefit of being able to review the baseline information. To provide for meaningful public participation in the environmental assessment process, KAPA therefore believes that the B.C. Government should amend the B.C. Environmental Assessment Act and Regulations to require that mining projects that are reviewable under this legislation submit specified baseline environmental and geological data as part of the Project Description.

Complying with this amendment should not be onerous for the mining industry. A retired executive with a senior mining company informed KAPA last year that it was standard practice for his company to collect four years of baseline data before submitting a project for approval. Nearly all major mines take years, even decades, to develop, from the exploration stage to construction and operation. A major phase of the development process is the feasibility study, done for financing purposes. Such studies take several years. Part of a feasibility study is an environmental component. Therefore, for nearly all mine developments, it is likely that several years of environmental baseline data already has been compiled before the project is submitted to the environmental assessment agencies. The suggested amendment may seem like an added piece of “red tape” but in reality, most mine developers should have already collected this baseline data, during the detailing drilling, engineering and feasibility study phase of mine development. If they haven't done so during these phases, they should not be allowed to submit a project a project for assessment until an acceptable set of baseline data is compiled.

Prescribing the baseline data requirements for water, air, and terrestrial parameters for application purposes should not be a difficult administrative task. This prescription should not extend to the interpretation of such data.

It is a daunting task for a volunteer community organization like KAPA to perform a meaningful review of a major mine proposal but the task becomes almost impossible when access to crucial measurements made by the mine is not provided in a timely manner. It is in the best interests of the people of Kamloops and area that full disclosure is made of all relevant baseline data already held by the proponent.

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## AIR/EIS Questions

### 2.0 PROJECT OVERVIEW

1. Throughout the AIR/EIS documentation, the term “mitigate” is used in respect of how the proponent will deal with long term or short term adverse effects. Mitigate simply means “to make less.” In terms of dust suppression, noise mitigation and long-term health concerns, what degree of mitigation is required?
2. Are there specific standards of mitigation which must be met, or must the proponent simply show that the effects being considered have been lessened compared to what they might otherwise have been?
3. Where are the standards to which the proponent will be held, published?

Throughout the proponent documents, Abacus Mining Exploration (AME), states that it will provide most of the expertise in the extraction of minerals in the proposed mine, and KGHM is described as a financing partner. In the event that the presence of the mine causes negative affect, remedies for which must be sought in the courts, the people of Kamloops **have** a right to know whether KAM has the resources to pay judgments or whether KGHM is carrying on business in Canada in a manner which will make it subject to the jurisdiction of our courts.

1. Under which corporate enabling legislation will KMGH operate, provincial or federal?
2. Will KGHM continue its incorporated structure into this province?
3. Will KGHM and KAM both be required to post bonds with the government to ensure proper reclamation?
4. Will KGHM and KAM be required to post bonds with the government to ensure proper compensation in the event that the mining operation result in environmental degradation or damage to property?
5. If so, in what amounts and by what process?
6. If not, why not?
7. Have any individuals (elected officials, ex- elected officials, current or past civil servants) with ties to the federal or provincial government, sought or been offered positions on the Board Directors of KGHM/AJAX or Abacus?
8. If so, who and when?
9. Have KGHM/AJAX or Abacus provided written prospectuses, statements of intent, financing statements, Appendices to all reports, assays or any other documents in support of the proposal, that have not been disclosed publicly or made available to the public?

10. If so, what are these documents, and why have they not been disclosed?

#### **2.2.4 Proposed Project Schedule**

In the Knight Piesold project description report, section 9.1 describes the “permitting process” at page 50/56. In that document, baseline studies are described as being complete by October 2011.

1. Have the baseline studies **been** completed as per the project description report?
2. If not, why have they not been completed as projected?
3. If so, has that information been made available to either the provincial or federal government body reviewing the proposed project?
4. If not, when will the study be completed and will the approval process the state pending their provision and analysis?
5. Section 9.1 of the Knight Piesold project description report, project approval by the provincial government by March 2012. As the actual application has not yet been delivered, what are the revised projections for completion of the approval process?

#### **2.4 Federal Scope of the Proposed Project**

1. Please confirm in writing, that in respect of supervision, inspection, protection and recourse to legal remedies, KGHM and Abacus will be held, at a minimum, to standards as strong as those articulated in the Canada –Chile Agreement on Environmental Cooperation and without limiting the generality of the forgoing, to Articles 3, 4, 5, 6 and 7, which assure the right to legal recourse for damages caused by mining activity?
2. If standards as strong as those articulated in the Canada-Chile Agreement are not contemplated as a mechanism for protection of the health, safety and recourse to legal remedies by the citizens of Kamloops, please provide details of the level of protection that will be provided and the manner in which compensation will be assured.

#### **2.6 Project Land Use**

On page 8 of the AIR/EIS it is stated: “Identification of future developments which are reasonably foreseeable and sufficiently certain to proceed.”

1. Do future developments include other mineral deposits in the “historic Afton Mining Camp?”

2. If so, where are these **deposits** located?

## **2.7 Project Benefits**

There is no commitment by the proponent to identify and measure the project costs to the Kamloops region. Out-migration by people who believe they will not benefit, but may suffer, from the impacts of the mine is very likely. This out-migration could have significant effects on health services if a large number of doctors leave Kamloops, for example. Kamloops may also be perceived to be a less attractive retirement community, with consequences for businesses and community organizations that rely on support from retired people.

1. The proponent should provide a matrix describing the benefits and costs that will accrue to different socio-economic groups in the Kamloops region.

A pre-tax economic model has been developed by Wardrop from the estimated costs and the open pit production schedule. The base case has an internal rate of return (IRR) of 14.5% and a net present value (NPV) of US\$416 million at an 8% discount rate for the 23-year LOM. The payback of the initial capital is within 7.8 years. Wardrop conducted a logistics study to determine the options available and associated costs for transporting copper concentrates from the project site to a port facility for export and the results were used to the financial model preparation.

1. Why was a 10% discount rate not used?
2. What would be the NPV of the project if a 10% discount rate is used?

## **SECTION 3.0 – DETAILED PROJECT DESCRIPTION**

### **3.1 Geology**

There is no reference to geotechnical studies which address the possible effects of the massive weight of the waste rock piles on the substrata, and possibly on the ground water in the Aberdeen area.

The Project description (PD) states that the North Waste Dump (NWD) will contain 728 million tonnes of rock, and the East Waste Dump (EWD) will contain 420 million tonnes. In addition, there will be 2 overburden stockpiles (adjacent to the waste rock dumps) which will contain a total of 7.5 million tonnes. This gives a total of 1 billion, 155 million, 500 thousand tonnes of rock pressing down on the substrata immediately uphill of Aberdeen, which already has significant excess groundwater and ground slippage problems which require the operation of a number of wells, and the

monitoring of piezometers registering ground movement.

1. What studies have been done to address the above noted? These geotechnical studies should be done and the results made public before the application is allowed to proceed.

Geology maps in the Afton Mining Camp area indicate potential for mining of additional copper deposits.

1. What is the spatial extent of the mining claims in this area?
2. Does KGHM Ajax have further plans for developing other mineral claims in the area?

### 3.3 Site Geochemistry

Considering the extremely close proximity of the proposed very large open-pit mine, and its related facilities, not only to the City of Kamloops but to other populated and agricultural areas and sensitive and/or recreational natural environments also, wherein in each or other live not just full-time residents and year round resident wildlife but also from time to time, including but not limited to, non-resident students ( both domestic and foreign ), visitors ( recreational and business, both foreign and domestic ), and migratory wildlife species (both domestic and foreign) –

**Will the Proponent(s) and the Governments, both of BC and Canada:**

#### **1) Provide to the Public:**

i) a comprehensive, **all-inclusive inventory of the elements**, and the minerals which they comprise, as are contained within each of the following categories of raw mine rock and processed mine rock, per each category:

a) ore; b) low-grade to be stockpiled; c) waste rock; d) concentrate (both shippable and/or to be reduced to metals on-site), and e) tailings; and, in the case of the waste rock provide also the lithologies, their proportions within the waste rock dumps, and the above-requested information per each lithology comprising the waste rock dumps, potentially?

ii) a **comprehensive list of the concentrations of elements**, and the minerals which they comprise, as contained within each of these categories of raw mine rock and processed mine rock, per each category:

a) ore; b) low-grade to be stockpiled; c) waste rock; d) concentrate (both shippable and/or to be reduced to metals on-site), and e) tailings; and, in the case of the waste rock provide this information per each lithology comprising the waste rock dumps, potentially?

iii) a **comprehensive, all-inclusive review of the known toxicity information** regarding each element and mineral species, per each element and mineral, contained within:

a) ore; b) low-grade to be stockpiled; c) waste rock; d) concentrate (both shippable and/or to be reduced to metals on-site) and e) tailings; and, in the case of the waste rock provide this information per each lithology comprising the waste rock dumps, potentially?

iv) access to the most up to date **3-D geological model ( block model) and geological sections** showing drill hole locations, directions and attitudes, and distribution of ore elements and elements of health/environmental concern?

iv) further opportunities both to require specific **follow-up analytical and/or toxicological studies**, and to submit further concerns/enquires that may arise once the above-requested information is available?

**2) Allow access to statistically representative numbers of pulps**, as residual from the Proponent(s)' commercial laboratory analytical work and metallurgical studies, per each of the above-listed categories, as applicable, for **the purpose of independent analytical cross-checking** of the Proponent's analytical results, with the selection of the required pulps to be re-analyzed, the methods by which they be re-analyzed, and the laboratories to be engaged to conduct these analytical cross-checks to be specified by researchers associated with KAPA and/or CAG?

**3) Provide industry-standard quality, environmental baseline data** regarding the present concentrations of **hexavalent Chromium [Cr (VI)]** in the surface waters and ground waters, as resident and as migrating through the Project area, presently?

4) Provide a) the **chemical composition, and source, of any binding agent** to be used in conjunction with tailings dry-stacking, b) the acid rock drainage / metal leaching (ARD/ ML) characteristics of the tailings both with and without the use of the binder, and c) the expected pH's of both the interstitial solution within the tailings pile and as run-off from the tailings pile?

### **3.4.3 Drilling and Blasting**

The test blast performed by Abacus was very limited in size, and performed under ideal conditions.

1. Why has the proponent not been required to perform a blast test of the size that will be used during normal mine operations in order that a true assessment can be made of the noise and vibration produced? That should be a requirement which must be met and the results made public before the application is allowed to proceed.
2. Would daily notification and posting of blasting times and duration that will impact public utilization of Goose Lake road, (Sound, ground vibration/air over pressure

and particulate/emissions fallout) be forthcoming and user friendly to the local and community population?



3. When will “Production Blasting” differences from the documented test blast study of Feb. 2011, sound, ground vibration and air over pressure be demonstrated and documented? Will this be required prior to the EAO final review of same?
4. Will the proponent also be required to perform the above noted test blast on a day when the prevailing wind is blowing from the southwest in order that the amount and dispersion of fugitive dust produced by the blast can be measured?
5. Would daily notification and posting of blasting times and duration that will impact public utilization of Goose Lake road, (Sound, ground vibration/air over pressure and particulate/emissions fallout) be forthcoming and user friendly to the local and community population?
6. When will “Production Blasting” differences from the documented test blast study of Feb. 2011, sound, ground vibration and air over pressure be demonstrated and documented? Will this be required prior to the EAO final review of same?

“A mix of ammonium nitrate/fuel (ANFO) and emulsion explosives will be used for blasting material.

1. What do emulsion explosives include? This should be covered in Section 3.11: Explosives Manufacturing and Storage
2. What chemical compounds are used in the original chemical reactions as reactants?
3. What compounds are produced at each stage throughout the chemical reaction process?
4. What chemical products are produced in the final stages of the process?
5. What is the particulate matter size of these products from the drilling and blasting process?
6. Will ultra-fine aluminum powder be used in the explosives?
7. Will the explosives log that records the amount and types of inputs be disclosed to the public?

### **3.6 Process Plant and Ore Processing**

Page 16, SECTION 3.6: States crushing and processing are 7/24/365. 3.6 also describes the coarse ore stockpile cover will be a large dome structure.

1. What are the dimensions of the coarse ore stockpile, and what is the dome structure built out of?
2. Could specific construction material be specified?

#### **3.6.7 Flotation and Regrind Circuits**

This section states: “The rougher concentrate will constitute approximately 7.2% mass of

the plant feed.”

1. How many tonnes per day constitute ‘plant feed’?
2. What is the percentage distribution of the size of the tailings from the rougher regrind and cleaner regrind circuits?
3. How many tonnes per day of tailings each will be produced by the rougher regrind and cleaner regrind circuits?

### **3.7 Tailings Management**

When Arctic air outbreaks occur in the Kamloops region, sublimation occurs due to the low humidity of the air. Temperatures in the mine area will typically fall to minus 20 to 30 C, accompanied by strong northerly winds. When these weather conditions occur, control of tailings dust may face operational problems due to the frigid conditions.

1. What is the TSF constructed out of?
2. What materials are used and how it is constructed?
3. Will the outer rim of the tailings facility be built up as the tailings are added, or will the rim be constructed to its final height during the early stages of the mine?
4. If tailings dust cannot be controlled during Arctic air outbreaks due to sublimation and strong northerly winds, will the tailings dust be deposited on the south or lee side of the tailings facility similar to the way snow drifts build up behind lee areas?
5. How will the fugitive dust from the tailing storage facility be controlled prior to the tailings being covered when the mine closes?

In the July 11, 2011 letter from the City of Kamloops, the following questions were asked. The issues raised by these questions have not been sufficiently reflected in the draft AIR/EIS Guidelines:

1. We are concerned about evaporation and leaching from the tailings pond. Does this have the potential to vaporize chemicals?
2. Is there the potential for acid rain? Is there potential for leaching?

### **3.8 Waste Rock Storage and Ore Stockpiles**

1. What geotechnical studies have been required or will be required of the proponent designed to determine the effect on the substrata of the weight of the waste rock storage and ore stockpiles, the total of which is estimated by Abacus to be 1 billion, 155 million, 500 thousand tonnes over 23 years? Bearing in mind the existing water and ground shifting problems already present in the Aberdeen area immediately below the mine site, the consequences of the pressure of this vast amount of rock could prove disastrous for the infrastructure, and for the residents

living in this area.

2. Have any geotechnical studies been done regarding the stability of the slope between the proposed East Waste Rock Facility and the community of Knutsford and Highway 5A and how this stability might be affected by this waste rock facility?

### **3.11 Explosives Manufacturing and Storage**

1. How many tonnes of ANFO and other explosive material will be stored at the Ajax mine?
2. If there is a catastrophic explosion in the explosives storage bunker, what will be the extent of the blast zone?
3. What distance is required of an explosives storage facility from a public road?
4. What type of storage facility construction is required for the ANFO and where would the “watergel” (Tovex? sodium nitrate, aluminum nitrate), a water pollutant, be stored that is documented as being used to increase the demolition power?
5. Where would the assembling and blending of Ammonium Nitrate and Fuel Oil as well as “watergel” additive take place? Waste deposited?
6. Since the transportation of explosives daily is across Goose Lake road and Peterson Creek and this public road access is between the storage facility and the open pit for use therein, how will the mine provide public/water safety?

### **3.12 Site Water Management**

The annual total of 14 billion, 690 million, 520,000 litres of water supplied to the mine site is approximately 15 million cubic meters of water a year. This large volume of water being added to the site year after year must be accommodated. Only a small fraction can be held in enclosed storage for mine use. The concept of “zero discharge” as stated by KGHM to mean “all water that comes in contact with the mine is captured on site and recycled back to the mining and milling process” is impossible to achieve because the system is not closed.

1. What fraction of the nearly 15 million cubic meters of water will be stored as new surface water at the site? What fraction will seep into the aquifers? What fraction will evaporate into the air? If more and more water is stored each year in enclosed tanks at the site, what fraction is this?
2. The annual precipitation amount of about 200 mm falling on 25 square kilometers of surface will yield a yearly water input of 5 million cubic meters. Rain and snow falling on the site will interact with all materials stored on the surface at the mine site.
3. What program is proposed to measure the chemistry of the precipitation induced runoff from waste rock and ore piles to monitor for heavy metals and other hazardous materials?

4. How much water will be removed from Kamloops Lake?
5. Will the amount removed be measured?
6. Will the amount of water used be open to the public?
7. Where is central water pond?
8. How will the proponent achieve the "zero discharge" claim for the mine site?  
How will KGHM prevent water contaminated with toxic elements from leaking into Peterson Creek, a source of water for Knutsford residents? Both Peterson Creek and Cherry Creek could drain such toxic contaminants into the Thompson River, a source of fish and drinking water for downstream residents.
9. Why is there is no reference to a practical attempt to manage the underground water systems while the mine is being operated and the water being drawn down, or when the mine is closed the new water table is being established?
10. Drainage is a problem common to the type of mine proposed by Ajax. Given the huge amount of water to be pumped to the mine site 24/7, 365 days per year, how will KGHM prevent the escape of water from the mine site toward Kamloops thus worsening the situation in Aberdeen? Any additional water entering the Aberdeen area could prove disastrous. This area already has significant excess groundwater and ground slippage problems which require the operation of a number of wells, and the monitoring of piezometers registering ground movement.

### 3.15 Power Supply

The project description does not state who will pay for the proposed transmission line from the tap-in point (Valleyview?) to the mine site.

1. Will KGHM pay for it, or will BC Hydro simply consider it an extension of the grid, thus requiring the taxpayer to pay for it, as has happened with other mining projects in BC?
2. BC Hydro does not have a surplus of energy. New energy acquired by BC Hydro from private power producers will cost something in the range of 12.4 cents per Kwh according to the government's own Review of BC Hydro released last August (and possibly higher today) Site C, if it were to go ahead, might reduce that cost, but still in the 8.0 to 9.0 cent per Kwh range. BC Hydro does not have a surplus of its own cheap hydro based energy. Hence, to supply new mines it will have to acquire additional energy at the prices just noted.
3. The Abacus Feasibility study cites the cost of power to the project of 3.5 cents per KWh. If this is the cost of BC Hydro energy to Ajax, why should the taxpayer subsidize the proponent's energy costs? If you take this subsidy and apply it against the tax collected under the BC Mining Act, the subsidy is greater.

### 3.18 Closure and Reclamation

1. When considering the impact of the proposed mine (should it be approved) will the government require the establishment of a *compensation fund* to be used to cover

adverse socio-economic impacts caused by the mine. This fund would cover such things as (but not limited to):

- **environmental damage** to water flows or pollution leaked into Peterson Creek, Kamloops Lake and the Thompson River.
- **health effects**. The mine is certain to release quantities of dust into the air which will be blown over Kamloops. Dust causes respiratory diseases.
- **the costs of air monitoring** on a continuing basis both of the Kamloops air shed in general, and of monitors at schools, hospital, seniors residences etc.
- **damage to the infrastructure of Kamloops**. This could be significant given the existing water and land slippage problems in Aberdeen.
- **declines in real property values**. There is already scholarly evidence that the closer residential properties are to a surface mine site (e.g. open pit) the greater the decline in property value.

2. How much will the bond be?

3. How is the amount of the bond determined?

### **3.18.1 Tailings Storage Facility Closure**

SECTION 3.18.1: TSF Reclamation: Describes the tailings stack will be covered with a "closure dry cover", which is placed over the entire tailings surface area.

1. What is the detailed description of this?
2. It doesn't state it will be covered with top soil. Only the Waste Rock Management Facilities will be graded and covered with topsoil, seeding and mulch (Page 26, SECTION 3.9). Could more information about the closure dry cover be provided?
3. How long will the "closure dry cover last"?
4. Will it require maintenance after a few years?
5. There is no reference to plans to enclose this mine site with a fence. Such a fence is critical to ensuring the safety of people, cattle and wildlife.

## **SECTION 4.0 – ASSESSMENT PROCESS**

### **Assessment Methodology**

#### **Criteria for Evaluating the Significance of Adverse Effects**

In the *Proposed Ajax Mine Project Booklet*, on page 8, the six factors used for evaluating the significance of adverse effects of the proposed mine are described.

1. What criteria are used to determine **what** in fact **is** low **magnitude** or high magnitude?
2. What published criteria will be utilized to measure the magnitude of effects?
3. Who will provide the data that **are** considered when determining the magnitude of effect?
4. If **these** data are determined directly by the EAO, what testing methodologies will be utilized?
5. If **these** data **are** provided by the proponent, what means will be used by the EAO to determine whether the data **are** accurate and complete?
6. In respect of determining the **probability** that adverse effects will occur if the mine is approved, I repeat my questions (1-5), posed in respect of magnitude.
7. In respect of the geographic extent over which the proposed mine may have adverse effects, how is “local extent” and “regional extent” defined?
8. In the sixth listed factor for evaluating significance of adverse affect, under the heading “Context”, the author refers to the ability of the environment to accept change and its resilience to imposed stresses. Has the resilience of population bodies to imposed stresses been studied? If not, why not?

### **EAO and CEAA Environmental Assessment Framework for Determining and Assessing Project Effects**

At page 8A in the Booklet, a nine step algorithm has been set out.

1. Is the proponent still at step number one, in determining (and reporting ) the environmental effects of the proposed project?
2. Will this information be included in the actual application?
3. Will the mitigation measures in step number 2 also be included in the application tendered by the proponent?
4. If so, what degree of study is required of the proponent in order to determine the residual effects of the project described in step number 3?
5. Over what period of time will the EAO measure the environmental effect and the mitigation measures proposed by the proponent?
6. What independent data will be EOA rely upon?
7. After the residual effect of the project have been determined, what data will be required of the proponent in order to determine the cumulative effect described in step number 6?

8. What will be the source of information required for step 5 in the process, and in particular, will there be detailed data of the current particulate and toxic elements in Kamloops airshed, caused by automobiles, home heating and by light and heavy industry currently located in this community?
9. If not, why not?
10. In determining the “residual cumulative effects” described in step 9 in the process, will the mitigation measures be the same as those described in step number 2?
11. If the mitigation measures used in step 2 and step 8 are the same, what are the criteria used by the EAO to ensure that the mitigation measures are not weighted twice?
12. Having regard to current status of the application (not yet quantified or submitted) over what period of time will the assessment continue?
13. Will all interested members of public be given an opportunity to participate in this process?
14. If not, why not and who will be consulted?
15. When assessing direct and indirect effects as described in step 1, will indirect effects include reduced property values and lifestyle issues?
16. If so, what objective measures of value will be utilized?
17. If not, why not?

### **Environment Valued Component: Assessment of Potential Effects**

On page 9 of the Booklet, it is stated that the Application/EIS will identify and analyze and describe potential effects resulting from the project construction operation decommissioning and closure.

1. Does this mean that these important elements are dependent upon information provided solely by the proponent?
2. If so, what steps will be taken by the EAO to ensure that the data provided is complete and accurate?
3. Who are the “qualified professionals” who will collect the data?
4. By whom will be qualified professionals be employed?
5. Over what period of time will they collect data to support the assessment?
6. Will the data be collected over a sufficient period of time to predict the effects of the mine in all seasons and in all weather conditions?
7. If the qualified professionals will be seeking knowledge from “potentially affected First Nations”, will they also be seeking information and consultation with potentially affected members of the community of Kamloops, given the much closer proximity to the mine site, of that population group?
8. If not, will the EAO and/or the CEA Agency require that potentially affected members of the Kamloops community be consulted in a manner equal to, or greater



than, the consultation accorded to members of affected First Nations?

9. If there will not be consultations with members of the Kamloops community, why not, having regard to their constitutionally entrenched rights to be treated equally, as articulated in section 15 of the Canadian Charter of Rights and Freedoms?
10. Will the provincial and federal governments consider such consultations and if so, at what stage in the assessment?
11. If not, why not?

## **SECTION 6.0 – ASSESSMENT OF POTENTIAL ENVIRONMENTAL EFFECTS**

### **6.1 Weather and Climate**

The shape of the terrain on the mine site and to the north will strongly influence the path of the surface winds. Prevailing winds from the west, southwest and south will have a tendency to flow northwards through lower elevation locations such as where Lac Le Jeune Road and Highway 5A enter the urban areas of Kamloops. In the specific cases when inversions are present, the dust and gases generated at the site will be trapped and not mix into higher parts of the boundary layer. These contaminants will be pushed preferentially through the natural openings in the terrain.

As is discussed elsewhere (Section 3.12) there will be a massive influx of water to the proposed mine site and this will likely lead to an increase in fog (Section 8.3) at and around the site. This flux of water vapour from the site combined with the dust generated from the site will also likely contribute to increased haze and cloudiness downwind of the site. With winds from the west, south and around to the east the low cloud would directly impact residential and commercial areas of Kamloops. With winds from the west, to north and around to the east, the impacts would be experienced in rural parts of the region. Both haze, resulting from dry and wetted aerosol particles, and low cloud will reduce the solar insolation to Kamloops. This reduction in solar radiation will occur over a range of wavelengths and be most likely in areas close to the site such as upper Aberdeen.

1. Will KGHM establish meteorological stations to measure and record, on at least 5 minute intervals, primary parameters including wind speed and direction at sites near Lac Le Jeune Road and Highway 5A?
2. Will KGHM establish a monitoring site with remote sensing capability to determine the frequency and duration of atmospheric inversions at the site?
3. Why has the proponent not taken any steps to establish met stations elsewhere on the mine site? They have had years to do so. Will KGHM Ajax be required to establish such met stations, and obtain meaningful monitoring data from them before the application is allowed to proceed?
4. Why is the proponent relying on meteorological information from areas well away from the mine site which have no relevance to the closeness of the proposed mine to the city?
5. Will the establishment of a met station on the top of Coal Hill or Sugarloaf Hill

be required, and data obtained from that station be analyzed before the application process is allowed to proceed?

6. What climate station data will be used for the air quality modeling?
7. What is the estimated reduction in insolation, due to increased haze and low cloud, downwind from the proposed mine site at distances of 1 km, 2 km, 4 km and 8 km?
8. What will the effects of this reduction in insolation be on living conditions in Kamloops, e.g. normal melting of snow and ice on roads; growth of trees and plants; operation of solar panels; and the general enjoyment of the climate in the city by the residents?
9. Where is the Golder Meteorology Station located, cited in page 20-4 of the Ajax Feasibility Study?

## **6.2 Geology, Landforms and Soils**

### **6.2.4 Potential Effects of the Proposed Project and Proposed Mitigation**

1. With respect to concerns about slope stability in the Aberdeen area, have there been seismic tests or other tests to determine the natural fracturing and faults in the Iron Mask Batholith?
2. What effect will the weight of overburden from the East and North tailings piles have on slope stability, either alone, or in conjunction with groundwater effects on properties in the mine study area?
3. Have any independent building studies been undertaken, determining whether the vibration from equipment and from blasting have the potential to cause homes in the Aberdeen and Pineview subdivisions, to settle, for foundations to crack or for improvements such as pools or landscaping, to fail?
4. If so, **are** there sufficient data on which to predict that this will not transpire?
5. If so, please disclose publicly, any studies pertaining to groundwater, overburden and the potential for damage to improvements in these communities.
6. If there are none, why not?
7. If there are none, will the proponent give the citizens of Kamloops assurance that this testing will be completed, measured against the claims of the proponent and disclosed publicly before any approvals are granted to the proponent?
8. If testing of the nature and extent described above has not been undertaken to date, what is the period of time over which testing or calculations must be completed, in order to safely predict the effect this mine will have on safe drinking water, groundwater and slope stability?
9. In the event that adjacent property owners experience a drop in their property values that are attributed to the mine operations, will there be any legal rights to compensation under the law of negligence; nuisance or such civil remedies

for damage as may be available under the Mines Act?

10. If so, what scheme of compensation does the proponent, intend to apply?
11. Will be proponents be required to post a bond to compensate homeowners in the event they are able to prove a diminishment of property value?
12. Will affected property owners have the right to seek injunctive relief against the mine in the event that the mine operations damage house foundations or other structural aspects of their homes?
13. Will the proponent be required to do a baseline geotechnical assessment of the foundations of all the properties in the Regional Study Area as defined in Figure 10.3-1 *Noise and Vibration Effects Study Area* before any blasting is permitted?
14. Has the slip surface for the slope west of the Knutsford Community Hall and Highway 5A been studied to determine if the increased vertical load pressure placed on this slope by the East Waste Rock Facility will trigger slope instability?

#### **6.4 Surface Water Quantity**

The proponent claims that the mine will be a ‘zero discharge facility.’ This implies that runoff from the mining area that now enters Jacko Lake will be retained by the mine.

1. What will be the decrease in runoff to Jacko Lake and how will this impact the lake?
2. From a hydro-geological point of view, the conceptual diversion of Peterson Creek may not be achievable as the creek most likely is interconnected with the unconfined sand-gravel aquifer underneath. Even if the creek is diverted there will still be underground flow towards existing domestic water wells near Highway 5A in the east. How the proponent is planning to achieve the diversion of Peterson Creek?
3. What is the drainage plan for the East Waste Rock Management Facility?

#### **6.4.2 Background**

At paragraph 6.4.2 in the AIR document, the proponent proposes to provide “...a summary of the surface hydrology of the project area and is the source of the information.” With respect to surface hydrology and all hydrology issues being considered, please confirm that the proponent is **not** required to simply provide a **summary of surface hydrology** and please also confirm that subsurface details will be explored to determine the long-term effects of the mine on the down slope community.

#### **6.5 Groundwater Quality**

1. Are there any independent studies being relied upon by the proponent to determine

the potential for leaching into the drinking water table used by ranchers in the area for their own use and for livestock, and for the drinking wells in and around the Knutsford area?

2. Appendix 1 of the AIR document lists water quality analysis parameters. What does the acronym 'MDL' mean?
3. How is the proponent planning to mitigate contamination of groundwater from acid rock runoff and seepage? The main mineral of the rock to be mined is chalcopyrite which will have the potential to release sulfates into the aquatic environment, which would also increase the leaching potential of heavy metals into the surface water and groundwater.
4. The proposed location of the East Waste Rock Management Facility is on top of unconfined Sugarloaf Sand-Gravel Aquifer, which would likely help spread of contamination through the flowing groundwater first east towards Knutsford, and then south towards the City of Kamloops and Thompson River. Is there a monitoring program to determine the groundwater background chemistry?
5. What is the assessment of groundwater contamination from acid rock leaching?
6. If so, what are the specific monitoring and mitigating plans?
7. Is there an estimate for how long it would take for contamination from the mine site to reach South Thompson River?

## **6.6 Groundwater Quantity**

1. What will be the effect of groundwater runoff into the Ajax open pit on the quantity of water in the nearby Peterson Creek aquifer (AKA Sugarloaf Sand Gravel Aquifer)?
2. What will be the subsidence effects on surface landforms over the Peterson Creek aquifer, if mine operations decrease the amount of water in this aquifer?
3. If mine operations result in a drawdown of the Peterson Creek aquifer, what will be the effects on licensed users of this aquifer?
4. Has the proponent determined whether the volume of water used (or its potential escape) has the potential to freeze inside of the natural fracturing and fault system and undermine the stability of the Aberdeen slope in that manner?
5. What will be the effect of geostatic load pressure from the East Waste Rock Facility on the pore pressure of the groundwater in the slope above the Knutsford Community Hall and Highway 5A?
6. Will the increase in geostatic pressure on the Peterson Creek Aquifer (officially known as the Sugarloaf Hill aquifer) decrease the capacity of this aquifer?

## **6.7 Fish Populations and Fish Habitat**

“Because of the potential adverse environmental effects of ANFO, its use in

Canada is regulated by Section 36(3) of the Fisheries Act (1985), which prohibits *the deposit of deleterious substances into waters frequented by fish, unless otherwise permitted by regulation. There is no regulation pursuant to the Fisheries Act that permits the deposit of by-products resulting from the use of ammonium nitrate-fuel oil mixtures.* Also, the use of ANFO near bodies of water is not recommended by the Institute of Makers of Explosives, which stipulates that *No use of ammonium nitrate-fuel oil mixtures occurs in or near water due to the production of toxic byproducts (ammonia)* (Wright and Hopky, 1998).”

From: Technical Memorandum, DRDC Valcartier TM 2009-195, January 2010

1. Given the proximity of Jacko Lake to the open pit, where ANFO will be used, how will the proponent prevent the deposition of ANFO by-products and residues into Jacko Lake?
2. If this cannot be prevented, what will be the chemical composition of these emissions?
3. What will be the impact on aquatic habitat of these emissions?

Water withdrawals from Kamloops Lake are projected to be approximately 1.7 million litres per hour. This means that nearly 15 billion liters of water will be pumped to and used by the mine each year.

1. What is the projected decline of flow in the Thompson River during extreme low water periods?
2. What are the effects on water temperatures and oxygen levels in the Thompson River during extreme low flow periods due to water withdrawals by the mine?
3. Given the past failure of Fisheries Canada to protect cod stocks off Newfoundland and salmon stocks off the B.C. Coast, what improved fish management protocols will be utilized to ensure the protection of freshwater fish and the Adams and Thompson River salmon runs?
4. In the event that water supply is reduced during summer months, such that continued drawing of water will be damaging to fish stocks or to the river ecosystem, does the EAO, the CEA Agency or Fisheries Canada have authority to order the mine to cease drawing water from Kamloops Lake until the water levels are replenished?
5. In the event that an order compelling the proposed mine to cease drawing water is issued, will **the** proposed mine still be authorized to conduct mining activities?
6. If so, will the mine be excused from using water for dust suppression during the course of any order?



7. If so, under what published regulations or enactments will the proposed mine be allowed to ignore dust suppression and over what period of time?

#### **6.14 Raptors**

1. Will bald eagles be added as a Valued Component?

#### **6.15 Forests and Vegetation**

The proposed Ajax mine will generate aerosol particles, which when wetted at humidities below 100% will form haze, and when the humidities are 100% the aerosol particles will serve as nuclei for fog droplets (see Section 6.1). All three categories of particles will move with the wind. When the wind is from the SE, S, SW or W these particles will move downwind towards the forest on the ridge above Aberdeen. Both dry deposition of aerosols and wet deposition of haze and fog droplets will take place on the foliage of the trees and other vegetation and will move into the residential area of upper Aberdeen. As previous studies in Canada have shown (Schemenauer, 1986; Schemenauer et al., 1995) when the pH of the fog droplets is very acidic or the concentrations of major ions are high there can be acute damage to foliage and chronic changes to soil chemistry that in turn negatively affect the health of trees. Schemenauer and Cereceda (1992) also looked at major ions and trace elements including heavy metals, in aerosols and fog droplets, at a site near an abandoned iron mine in Chile. They found elevated levels of some heavy metals in the dry deposition and in the fog water.

Schemenauer, R.S., 1986: Acidic deposition to forests: The 1985 Chemistry of High Elevation Fog Project. Atmosphere-Ocean, 24, 303-328.

Schemenauer, R.S. and P. Cereceda, 1992: The quality of fog water collected for domestic and agricultural use in Chile. J. Applied Meteorology, 31, #3, 275-290.

Schemenauer, R.S., C.M. Banic and N. Urquizo, 1995: High elevation fog and precipitation chemistry in southern Quebec, Canada. Atmospheric Environment, 29, 2235-2252.

1. What measurements have been made and/or are planned to be made to monitor the health of the forests outside of the proposed mine property (in all directions) in order to detect possible negative impacts of the mine on the forests and other vegetation?
2. What measurement programs will be instituted to measure the chemistry of rain, snow and fog before and after the mine is constructed?
3. What would the impact be of the death of the forest above Aberdeen on soil erosion, surface and subsurface runoff, cost in lost timber, and aesthetics?

4. What mitigation plan is in place to preserve the health of the forest above Aberdeen?

## **SECTION 7.0 ASSESSMENT OF POTENTIAL ECONOMIC EFFECTS**

In the right-hand column of the *Proposed Ajax Mine Project*, under the heading... "Information Sources and Assessment Methods," the proponent describes "economic information that will be collected." The third bullet point under this heading makes reference to one source of this information as being a... "Literature review of similar studies and projects."

1. What literature is being referred to?
2. What communities are being referred to and what information has been learned in this regard?
3. If literature of this kind has not been provided as yet, what follow-up is anticipated to ensure any models relied upon by the proponent, reflect real life circumstances and experience in similar situations?

### **7.1 Labour Force**

1. Of the 395 jobs which the mine promises to deliver to this community, how many jobs will be dedicated to professionals such as chemists, geologists, engineers etc.?
2. How many of the jobs promised will require previous experience, training or certification in various aspects of hard rock mining?
3. How many jobs will actually be provided to residents of Kamloops with no previous experience in mining?
4. What are those jobs?
5. Komatsu has begun marketing GPS systems for ore carriers and excavators, which operate in a closed environment without human drivers or operators.
6. Will KGHM Ajax commit in writing, that they will not replace any drivers or operators with GPS or computerized operating systems and thereby commit to protect all of the jobs that they currently promise to bring to the Kamloops economy?
7. If not, how many workers would be displaced in the event that computer/GPS operating systems are employed?
8. Of the jobs projected, have any been promised to members of the Kamloops Indian Band or other members of the aboriginal community, and if so, what percentage?

## **7.4 Employment**

A total of 145 of the 395 direct jobs to be created during the operation of the mine are haul truck drivers. The Rio Tinto West Angelas Mine in Australia is operating driverless haul trucks by remote control, and the mining industry in general is looking at the use of remote control haul trucks as a means of reducing labour costs and labour shortages.

1. Is KGHM Ajax considering the use of remote control haul trucks?
2. If not, why not?

## **7.5 Business**

Many people living in Kamloops are not dependent on local employment, by virtue of being employed elsewhere, or being retired.

1. How many residents in Kamloops will relocate from the city due to the construction and operation of the mine?
2. What will be the effects on business due to this relocation?
3. How will this affect population growth projections?

## **7.7 Housing**

1. A study in Tennessee concluded that property values tended to decrease as the proximity to open pit mines decreased. With regard to similar open pit mines in Canada and the United States, what is the spatial relationship of residential property values for similar homes (age, size, construction cost) and property sizes in relation to distance from the mine?
2. What other existing communities have had new open pit mine development occur within 5 kilometres of these communities?
3. What have been the effects on property values in spatial and temporal terms for these communities?

## **7.8 Infrastructure**

### **Electricity Supply**

With respect to power costs, on February 20, 2012, the Kamloops Daily News stated, in an editorial, that B.C. Hydro rates will rise by 7% ( more than double that what promised by the provincial government.) The B.C. Auditor General reported that this was

due to questionable accounting by B.C.Hydro and the provincial government.

There is also a great deal of information showing B.C.Hydro being compelled to purchase privately produced power (run of river hydro and gasification projects) at non economic prices with the price to be made up by consumers.

Smart meters are being introduced to better manage the losses being incurred by B.C. Hydro. KAPA has concerns that the people of our community, indeed the entire province, are being forced to subsidize the cost of electrical power for KAM and other mining developments, i.e., the mine will use power at or below the combined cost of generation, transmission and distribution production.

1. Is it correct that the mine, assuming it is approved, will receive electrical power from B.C. Hydro at well below the generation, transmission and distribution cost of this power?
2. If so, what is the breakdown of generation, transmission, and the distribution cost of electricity provided by B.C. Hydro to the Ajax project per kilowatt hour?
3. How does this rate of electrical charge compare with other large industrial users of electrical power in British Columbia?
4. What is the legal basis for below cost 3.5 cent kilowatt hour power for the Ajax mine? (e.g., Orders in Council, statutes, regulations, B.C. Utilities Commission decisions, B.C. Hydro pricing decisions)
5. Do the provisions of the B.C. Hydro Power Legacy and Heritage Contract apply to Ajax?
6. Is this Heritage Contract expected to be in effect for the entire lifetime of the Ajax mine?
7. When and with whom was any agreement for cheap electrical power negotiated, and what documents were provided to B.C. Hydro and /or the provincial government in support of this agreement?
8. What is the current cost of generation of this electrical power, expressed in kilowatt hours?
9. Assuming that the electrical power being sold to the mine at 1/3 of the retail costs charged other consumers, what is the value of lost revenue to B.C. Hydro, expressed in dollars, annually AND over the projected life of the mine?
10. What is the economic loss of this lost revenue to the Province of British Columbia?
11. Will the increased costs of electrical power production over the life of the mine, be passed on to the mine or does the mine have a fixed cost of

electricity for the lifetime of the mine?

12. In the event that power is sold to the mine, how will B.C. Hydro make up lost revenue, and what increases in public utility rates are projected?
13. Is a copy of the agreement for provision of electrical power, a public document and can it be inspected by interested members of the public?
14. If not, why not?
15. Have any economic studies been undertaken, measuring the projected benefits of the Mine against the projected benefit of the sale of the electrical power at fair market value?
16. If so, where is the study and is it available to public viewing?
17. If not, why not?
18. What would be the cost of electricity for the Ajax mine if natural gas generators were used to provide power to the mine?
19. The Feasibility Study states that the total electricity cost per tonne of ore is \$0.75 US (Table 21-9, page 21-12. Does this include the cost per tonne for the waste rock?
20. If not, what is the electricity cost per tonne of processing the waste rock?
21. Does any similar agreement exist, with regard to the provision of natural gas to the mine at favored rates?
22. If so, I repeat questions 6b. through 6n., modified to seek details expressed in kilojoules or such other unit of measurement as is appropriate to the sale of natural gas.

### **Power Cost and Requirement Comparisons to Other Proposed Copper Mines**

The Technical report and Preliminary Assessment of the Harper Creek Project near Vavenby, B.C. states that the power cost for this mine will be 0.049 cents Kwh (page 18-65). Total annual power consumption for this mine is calculated to be 553 Gwh. For the Prosperity Mine, total power consumption will be 693 Gwh. For Ajax, total **annual** power consumption will be 472 Gwh, which the proponent states will cost 0.035 cents Kwh.

Together these three mines will consume 1,721 Gwh. Estimated annual power generation from the proposed Site C project will be 5,100 Gwh, which according to B.C.Hydro would provide electricity for 450,000 homes. Given that there is approximately 38,000 dwellings in Kamloops, total residential power consumption in Kamloops is about 430 GW a year, which is less than the power Ajax will be using. These three mines alone will consume 33.7% of the power to be generated by Site C. The cost of power from Site C is estimated to range between 0.087-0.095 cents kwh.

The B.C. Government has established a policy in perpetuity that established industrial users are entitled to below cost power under the provisions of the B.C. Hydro Power Legacy and Heritage Contract.

1. Is the low cost of the power Ajax is stating it will pay due to the provisions of this contract?
2. Will all future large industrial users be entitled to below cost power under the provisions of this contract?
3. If the cost of new power in B.C. is at least 0.087 cents/kwh and Ajax is going to pay 0.035 cents kwh, then the subsidy to Ajax from other Hydro users is 0.052 cents kwh. Based on the stated annual power consumption of 472 Gwh, the power subsidy to Ajax will be approximately \$24.5 million a year, or about \$15.30 for each of B.C. Hydro's 1.6 million residential customers. What is the economic impact on the B.C. economy of this loss of discretionary spending power by B.C.residents?

### **Kinder Morgan Oil Pipeline**

1. What will be the effect of geostatic pressure of the North Waste Rock Facility on the nearby Kinder Morgan pipeline?

### **City of Kamloops**

Section 7.8.2 Background does not sufficiently describe the issues and questions submitted by the City of Kamloops July 11, 2012 letter to the assessment agencies. Ground stability problems in the Aberdeen area are of foremost concern. The following excerpts from the City letter address this issue.

“The City of Kamloops has existing groundwater and slope stability issues in close proximity to the mine. This groundwater causes concerns with respect to slope stability and is constantly mitigated utilizing a network of more than 100 piezometers controlled through 30 dewatering wells operated by the City. Both the piezometers and the dewatering wells are monitored generally weekly by the City and some critical wells are hard wired to the City's SCADA system allowing for continuous monitoring. Additionally, alarms are set up for the piezometers to detect piezometric pressures which dip or rise sharply. All dewatering wells have backup power in place or have hookups for backup generators in the event of power failure. Some wells pump a few hours per week while others pump continuously. As noted above, there is also a continuous alarm system for the critical dewatering wells and a weekly alarm generated for wells where it is assessed that their failure for a short period of time would be acceptable. The piezometer/dewatering system is of sufficient importance to the City that it is administered through a formal Risk Management Plan. We will be meeting with representatives of KGHM-Ajax

and Orica (their consultant) during early July to discuss this matter in person. However, due to the serious nature of our concerns in this area, I thought it reasonable to repeat in this letter the questions that we will be seeking answers to during our July meeting:

i) Precipitation falling onto waste rock management facilities will penetrate below the evaporative zone more quickly than if it was falling onto native grasslands. Does the proponent have any information pertaining to what kind of increase in groundwater recharge this will result in and what is the impact on the Aberdeen neighbourhood?

ii) What is the peak ground acceleration in the Aberdeen area from blasting? We will have our consultants put this information into their stability model to ensure that blasting will not negatively impact stability.

iii) The air blast tests that were conducted were done during clear sky conditions. What are the results of air blast during adverse weather conditions, specifically conditions that would exacerbate the magnitude of the air blast at the receptors?

iv) We would like to have advanced notification of the exact timing of future limited scale tests or full-scale test blasts so that we can utilize our existing vibrating wire piezometers to determine if impacts are felt in the areas of slope stability. Please provide us with information (exact date and time) for the next round of test blasting and detailed information about the blast size and how and where it will be conducted.

v) We understand that a number of boreholes have been drilled around the proposed mine area. In order to help us determine what impact the proposed de-watering activities will have on our Aberdeen neighbourhood, we ask that the proponent provide borehole drilling data including logs, water levels and other hydro-geological information. Our consultants will utilize this information in our groundwater models to determine whether or not there will be impacts to the southwest sector.

vi) A number of residents in the areas surrounding the proposed mine to the south, west and east rely on groundwater wells for their potable water. As part of the environmental assessment process, the proponent should conduct baseline sampling of those existing wells (including quantity, groundwater level and quality). Please confirm that this will occur.

vii) At the end of the operations (23 years from now), is the open pit going to be filled with water? If so, what is the impact of that on the groundwater regime specifically in the Aberdeen neighbourhood?

Once we have received and reviewed the provided information, we will be in a better position to discuss the possibilities of sharing costs for the existing groundwater monitoring network, cost sharing for a permanent solution to the groundwater and stability issues and contingencies for problems which may arise in the future.”



**1. Economic Diversification (or Economic Concentration and Additional Costs to the Community)**

There are potentially large negative impacts on the health of the forests and other vegetation surrounding the proposed mine (see Section 6.15) resulting from either acute damage to foliage or soil contamination.

1. What would be the economic costs related to the death of the forest above Aberdeen including factors such as dealing with soil erosion, dealing with surface and subsurface runoff problems, loss of timber value, and changes in property values?
2. Kamloops presents a more arid image due to the loss of forests from the pine beetle attacks only a few years ago. What would the economic impacts be on tourism should the remaining forest in upper Aberdeen be lost as a result of the construction of the mine?

Construction of the proposed mine will bring in vast amounts of water, add huge amounts of aerosols to the boundary layer, significantly change wind patterns in and around the site, and most probably lead to increased fog frequencies on the Coquihalla Highway and more frequent traffic disruptions due to blowing and drifting snow (see Section 8.3).

3. What are the economic costs to the City of Kamloops resulting from increased slowdowns and interruptions to the movement of people and goods into the city from its southern approaches, namely the Coquihalla Highway, Highway 5A and Lac Le Jeune Road?
4. What are the economic costs to the community health care and policing budgets associated with higher traffic accident rates resulting from lower visibilities and poorer traction on the Coquihalla and other highways?

## **SECTION 8.0 ASSESSMENT OF POTENTIAL SOCIAL EFFECTS**

### **8.2 Community Health and Well Being**

1. Will KGHM Ajax be undertaking regular (e.g., every six months) blood and urine tests of its work force?
2. Will KGHM Ajax be required to disclose to the Public Health Authorities the aggregate results of these tests?
3. Will KGHM Ajax be willing to fund regular blood and urine tests of school children in the three elementary schools closest to the mine (Pacific Way, Aberdeen, McGowan) to determine if the possible health effects of mine dust?
4. Is the EAO currently studying any other large copper gold mine near large population centers to determine the effect of those mines upon lifestyle, health and property values?
5. If so, which communities, which mines and what data has been compiled, against

which to measure the proponent's model predictions?

6. If not, why not?

When the social effects consultant retained by the proponent arrived in Kamloops several weeks ago, he stated Kamloops was known to be an industrial town, and asked why there would be opposition to more industrial activity. Kamloops has spent many years working to dispel an image of our city as an industrial town.

Furthermore, there are activities such as home building in the Aberdeen, Pineview and North Sakhalin areas that may be undercut if demand for homes in this area decline. Should this transpire, property values may fall and homes may become difficult to sell as a result.

To the extent that the mine will undermine these endeavors, KAPA wishes to know whether this issue has been studied to determine the likelihood that it will occur, and the cost it may have on existing businesses in the community.

1. Have there been any economic studies or community surveys been undertaken, to determine the potential loss of jobs in the agricultural, construction, tourism or professional sectors in the event that the mine decreases the attractiveness of Kamloops as a place to live, work and play during the course of its lifetime?
2. If so, what is that study, who is the author and what are the projections?
3. If not, why has such a study not been undertaken?
4. If a study of this nature has not yet been undertaken, will such a study be undertaken by the Ministry of Environment or any other government ministry, prior to completion of the assessment process?
5. If not, why not?
6. Have there been any economic studies undertaken, to determine a mine related diminishment in enrollment at Thompson Rivers University, in the event the mine is allowed to proceed?
7. Have there been any economic studies undertaken, to determine the extent of mine related reduction in Tournament Capital Activities in the event that the Mine is approved?
8. If so, what is that study, who is the author and what are the projections?
9. If not, why has such a study not been undertaken?
10. If a study of this nature has not yet been undertaken, will such a study be undertaken by the Ministry of Environment or any other government ministry, prior to completion of the assessment process?
11. If not, why not?

### **City of Kamloops Concerns**

On July 11, 2011, Ms. Jen Frets, sustainability and environmental services manager for the city of Kamloops, delivered a detailed letter to the EAO, seeking answers to numerous questions and assurances on numerous points, articulated in her 11 page letter. This letter was also delivered to the proponent, MLA Kevin Krueger, MLA and B.C. Minister of Environment Terry Lake, MP Cathy MacLeod and the Mayor of Kamloops.

To date, there has been no reply to Ms. Frets' letter or to any part of it, from any of the recipients of her letter.

1. If replies have been made, please advise where the replies can be made available to the public and where the models Ms. Frets requested can be viewed.
2. If there have been no replies to Ms. Frets' letter to date, why have replies not been made?
3. When can replies be anticipated and will they be made available to the public?
4. The City of Kamloops represents the largest single stakeholder in the mine. Why, when a detailed letter has been in the hands of the proponents, all affected politicians and the EAO for over seven months, have no replies been received or made public?
5. It is requested that each of the questions or concerns articulated in Ms. Frets' July 11, 2011 letter be answered, and that no further steps in the approval process be taken until after the answers have been made public and been made subject of public comments and hearings.
6. Please confirm that this request will be honored forthwith.

### **8.3 Public Facilities and Services, Including Transportation**

#### **Coquihalla Highway**

The more rain, snow, or hail falls, the less the friction of the road surface. Rain can lead to dynamic aquaplaning. A layer of water on the road surface can cause the vehicle to lose contact with the road surface and to skid. The chance of aquaplaning depends on the skidding resistance of the road, but of course also on the vehicle's speed and tire tread depths (Elenchus, 1983; Torstar, 1995; Van Ganske, 1981). When it has been dry for a long time, a drizzle can lead to viscous aquaplaning if drops of oil and dust, together with water, produce a thin liquid film on the road surface. When the rain gets heavier, the chance of viscous aquaplaning lessens because the road surface is swept clean (Torstar, 1995; Eisenberg, 2003). Source: [www.swov.nl](http://www.swov.nl)

The Tailings Storage Site will be located within 100 meters of the Coquihalla Highway. During the morning hours the ultimately 150 metre high tailings site will shade a section of the highway.

1. What will be the effects on driving conditions when tailings dust is blown on to the highway?
2. Have any studies been done to estimate the amount of decreased traction due to fine rock dust on asphalt?
3. What will be the effects on driving conditions due to shading of the highway?
4. If a court of law determines that tailings dust is responsible for accidents on the Coquihalla Highway, will KGHM Ajax have sufficient liability insurance to cover the judgment?
5. What are the possible effects of geostatic pressure from the tailings area on the Coquihalla Highway?
6. Will the weight of the tailings area cause shifting in the engineered banking of the highway?
7. If the engineered bank of the highway shifts over time, how will this affect the stability of transport trucks?

The KGHM proposal states that water will be brought to the site at a rate of 1688 m<sup>3</sup>/h. This massive amount of water will either be stored in a central pond or otherwise dispersed into the land and air at the site. There is a high likelihood this will lead to an increased frequency of fog at the site, especially in the cold period from fall to spring.

8. What procedures are planned to measure changes in fog frequency and changes in visibility at the site, and in the area, due to the increased water vapour supply that results from mine operations?
9. What will be the effect on visibility on the Coquihalla Highway due to an expected increase in fog frequency and density?
10. How will KGHM mitigate serious safety and congestion problems on the highway and surrounding roads should the fog frequency increase?

Surface winds from all directions will have their direction and speed modified by the presence of the massive tailings and waste rock storage hills (Jackson and Hunt, 1975; Snyder et al. 1985; Pindar, 1999; etc.). This in turn affects the distribution of snow on the surface. The magnitude of the effects will depend on the wind speed but may be expected out to a distance of at least five times the height of the tailings hills. The heights are proposed by KGHM to be up to 150 meters high and so changes to wind speed and direction at distances out to about 750 meters may be expected. Factors such as the slope of the tailings hill will influence the effects on the wind (Ian et al. 2011).

11. What effects will there be on the frequency and severity of blowing snow on the Coquihalla Highway and other major roads such as Highway 5A and Lac Le Jeune Road due to changes in the normal surface winds in the vicinity of the proposed mine site?
12. What changes will there be to snow depths on the Coquihalla Highway?

13. What mitigation plans are proposed to prevent snow accumulating on the top and sides of the tailings storage facility blowing off the hill onto the Coquihalla Highway?

14. What discussions have taken place with the British Columbia Ministry of Transportation and Infrastructure regarding safety and traffic disruption on the Coquihalla Highway due to changes to weather, visibility and surface conditions on the highway resulting from the mining operation?

15. What are the economic costs to the City of Kamloops resulting from slowdowns and interruptions to the movement of people and goods into the city from its southern approaches, namely the Coquihalla Highway, Highway 5A and Lac Le Jeune Road?

#### References

Jackson, P.S. and J.C.R. Hunt, 1975: Turbulent wind flow over a low hill. *Quart. J. R. Met. Soc.*, 101, pp 929-955.

Snyder, W. H. and seven co-authors, 1985: The structure of strongly stratified flow over hills: dividing-streamline concept. *J. Fluid Mech.*, 152, 249-288.

Pindar, J.P., 1999: Computer models for wind flow over mountainous terrain applied to the Yukon. EAS 521 - Final Report, pp 45.

Ian, G. Q. and four co-authors, 2011: Airflow patterns upwind of obstacles and their significance for echo dune formation: a field measurement of the effects of windward slope angle. *Science China Earth Sciences*, doi: 10.1007/s11430-011-4248-4.

#### **Goose Lake Road Community**

1. What would be the Environmental impacts of the installation of an over head transportation route across the Goose Lake road if this method is chosen by the mine and what local traffic problems would be involved during installation?
2. What regulation regarding the distance of inset from the immediate edge of the Goose Lake Road is required for the continuous haul trucks dumping waste rock and consequently impacting the traffic due to the particulate/emissions/vibration? What studies have been done to indicate the degree of potential for road bank shifting/sliding during this working process?
3. What tests have been done in the east waste rock area shadowing the Goose Lake Road to ascertain the ground stability when under compaction/pressure and vibration of waste rock and equipment over time and depth?
4. What studies have been done to determine how the Mine Site Activities will impact the use of Goose Lake Road as an Educational Facility? Goose Lake Road

is currently used by TRU and School Buses/cars to transport students a number of times a year to study the beaver and bird population and habitat? Goose Lake is designated an Educational Resource B.C. Lake (Victoria Information Guide)

5. What studies have been done to determine the impact on the recreational individuals and clubs utilizing the Goose Lake Road on a regular basis for, personal fitness? (Bikers, joggers, walkers, bird identification groups, Orienteering club, etc.)
6. What study has been done to insure the safety/health and time schedule of the two Elementary School children that are transported to the Pacific Way School each morning at 7:50 and return home between 2:50 and 4:00P.M.?(Week days). This is deemed by Gov. as a School Bus Route. What studies are being conducted to provide documentation as to the possible health issues the impact may impose over their school years?
7. What study has been done to confirm safe/healthy access on Goose lake Road for many (six in our family) working adults, allowing them to maintain normal traffic flow for job locations as well as Kamloops businesses several (often in access of 14 times in our family) times per/day?
8. What Studies document the sustainability of the introduced Burrowing Owl population, the raptor population, the Beaver population and other birds and wildlife common to the Goose Lake Road environment and its educational benefits when impacted by the Mine site and waste rock production?
9. What drainage/sloughing measures have been studied to balance the height, width and composition of the waste rock area when it has been sprayed with water or the rains or snow melt cause runoff down slopes toward the public Goose Lake road and Peterson creek?
10. What noise levels from equipment and activity: to include “constant back up loud beeping signals”, blasting, vibration and air over pressure, crushing and grinding operations, construction and truck hauling, on a 24hr. 23 year schedule are deemed by Gov. to be acceptable for a **rural population? This includes the public Goose Lake Road and home locations.**

### **Lac La Jeune Road**

The draft AIR/EIS reflects none of the concerns raised by the July 11, 2012 City of Kamloops letter about the mine impacts to the Lac La Jeune Road. To ensure that these concerns are not forgotten, following is an excerpt from this letter about these concerns.

“a) We require confirmation and details of the route that the proponent plans to use for hauling the concentrate to Vancouver. We have concerns about haul trucks using Lac Le

Jeune Road north of the proposed mine site as this road was not built to a standard which would accommodate this type or amount of traffic. To the best of our knowledge, Lac Le Jeune Road is not built to a highway standard on any portion of the road regardless of whether or not it is in the City of Kamloops or the Thompson-Nicola Regional District. It is simply a rural road.

b) Additionally, Lac Le Jeune Road is used by school buses and residential traffic and does not seem the best option for a haul route. We strongly suggest using Inks Lake Road as much as possible and then rebuilding that road once the tailings storage facility is built over top. This route would alleviate any conflict between large haul trucks and residential/school bus traffic and would be the most direct route to the Coquihalla interchange.

c) We require that the proponent complete a Traffic Impact Assessment. Given the proximity to and use of BC Ministry of Transportation Infrastructure (BC MOTI) controlled access highways, it is recommended that a meeting be held between BC MOTI, the City and KHGM-Ajax representatives to determine a terms of reference for this study. For your information, the City is currently conducting a study with the MOTI and ICBC to determine short-term and long-term improvements at most of the interfaces between MOTI and City infrastructure, including the Copperhead Interchange with the Trans Canada Highway. Currently, we are in the data collection phase of the project and moving into the identification of short-term improvements. Dependent upon the impact of the mine, there may be an opportunity to tie in the traffic impact assessment into this study.”

### **City of Kamloops Official Community Plan**

The present Kamloops OCP envisions that the area between the existing Aberdeen and Pineview Valley neighborhoods and the mine will accommodate the largest proportion of growth in the city to 2036.

1. In the event that residential developers are unable to attract residents to this area due to the mine, what will be the costs to the city for revising its OCP and for providing infrastructure elsewhere to accommodate future city growth?

### **8.4 Dark Sky/Shading**

In the July 11, 2011 letter from the City of Kamloops, the following questions were asked. To ensure that the issues raised by these questions have been sufficiently reflected in the draft AIR/EIS Guidelines, they are included below:

1. What will be the impact of 24-hour operations on the surrounding neighborhoods (existing and proposed) with respect to mine lighting?
2. What level of light during the non-daylight hours can residents expect and what mitigation measures will be used?



3. Our understanding is that the waste rock and tailings piles will extend above the height of the current hills in the area. If this is correct, we anticipate there will be lost sunlight during the winter months to those residents in the Upper Sahali and Knutsford areas. Information is requested regarding how much sunlight will be lost to these neighbourhoods.
4. What will be the impact of the shadowing from the tailing and waste rock piles?
5. We ask that the proponent conduct a shadow impact study of these facilities.
6. The Kamloops Astronomical Society has an observatory at Stake Lake which was put there specifically due to the quality of the dark sky. They are able to maintain their dark sky designation due to the cooperation of the residents of Stake Lake. We would like confirmation that the proponent will work with the Kamloops Astronomical Society to reduce the impact of the proposed mine on their observatory and implement some of their recommendations for types of lighting.

### **8.5 Land and Resource Use**

On page 14 of the *Proposed Ajax Mine Project* booklet, reference is made, in the last bullet point on the left-hand column, to interviews with potentially affected landowners.

1. Who are the potential landowners?
2. How were they identified, and by whom?
3. Is there an economic or pecuniary threshold which must be shown in order for the potential landowners to be heard on the issues?
4. If so, what is it and who determined this threshold?
5. What is the purpose to which the proponent proposes to put economic information that will be collected?
6. What conclusions are expected to be drawn from this information, and by whom?
7. If the conclusions are drawn by the proponent, what steps will the EAO or the CEA Agency take to ensure that these conclusions are accurate and reflect the view of all interested parties?
8. Will an individual or group of individuals be free to seek standing before the EAO and CEA Agency to ask questions and make suggestions in this regard?
9. If so, at what stage in the process will individuals be invited to make representations in this regard?

### **8.7 Visual Impacts**

On page 16 of the *Proposed Ajax Mine Project* booklet, the proponent states that this section of the application will ...” Assess the potential direct and indirect effects of the proposed project on visual and aesthetic resources.”

1. Who will assess these potential direct and indirect effects?
2. When will this be done?
3. What steps will the EAO or the CEA Agency take, to assess the accuracy and completeness of information provided by the proponent?
4. Will the proponent be using models in order to assess this information and these effects?
5. As models will not be able to predict the emotional, psychological or social response of the community at Kamloops to the presence of the mine, will the EAO require comparative studies taken in respect of: Highland Valley Copper and Logan Lake; The Rio Tinto Mine and Salt Lake City; The Pima Mission Mine and Phoenix; and any large mine complexes near large communities in Australia or South America?
6. If not, why not, in light of the inability of models to predict these effects?

## **SECTION 9.0 – ASSESSMENT OF POTENTIAL HERITAGE EFFECTS**

### **9.1 Heritage Objects**

1. What archaeological resources, in the form of sites or objects, were found to be valued components in the proposed Ajax mine development area?
2. What will be the method of mitigation used to preserve the found resources for the historical, scientific and educational worth under the BC “Heritage Conservation Act”?

## **SECTION 10.0 ASSESSMENT OF POTENTIAL HEALTH EFFECTS**

1. Can the deposition of particulate matter be estimated and how?
2. If none has been done, why not? It is industry practice to conduct such monitoring for at least three to 5 years before developing an open pit mine. The proponent has been planning the proposed Ajax mine for years, so there is no reason for Abacus or KGHM not having placed such monitoring systems in place. Please identify all existing dustfall monitoring locations, the length of time they have been in operation, and the findings.
3. What up to date data are being used to track the particulate matter in the very diverse geographic area that will address the complex flow and dispersion patterns that are unique to the Kamloops and Knutsford region?
4. What models of equipment and methods for prediction have been used and are being used to provide baseline and continual accuracy when inversions and low wind speeds are present? What are the large and small particulate measurements registered?
5. Where are the locations of each monitor in distance from and in relation to the proposed tailings storage facility, the proposed open pit, the proposed mineral

- crushing equipment and the west and east proposed waste rock sites?
6. What specific short term and long term instruments are to be placed to monitor the continual emission factors associated with dust from the mineral crushing equipment/facilities?
  7. What are the multiple variables that have been addressed in the estimation of fugitive emission sources and what sources have been identified?
  8. Over what years was the baseline data collected and to what measure of certainty can these be attributed to the development location, size and components?
  9. What methods determined the individual Point source predictions and the variable certainty of fugitive particulate predictions, large and small particulate and emission fumes?
  10. What models have been used to measure and what specific studies to predict the suspended particulate and include the condensable fraction? Were the studies used relevant to the location, size and mining components of this proposed development?
  11. From what height was the upper air data recovered and where in Kamloops is this equipment/instruments located to provide information accuracy? Was this instrument relevant to the distance and geographical location of the proposed mine development?
  12. What measures have been in place, where and for what time period, to determine the “Keeping-Clean-Areas-Clean Guideline measurement data for the Upper Aberdeen, Pineview Valley, Knutsford, and Proposed Mine Site immediate south area, also Goose Lake Road, Inks Lake and the Lac Le Jeune Road as indicated in the AIR as reference?
  13. What are the Legal obligations documented for the KGHM/Abacas mining companies to follow the MOE2008 B.C. guidelines and the KCAC guidelines as enforceable by the Federal Gov. of Canada and B.C. Gov.?
  14. How has the Proposed Kinder Morgan Pipeline rerouting/double tracking proposed process and the established two railway stations and routes been included in the measured Air Quality and environment adverse impacts studies?
  15. What chemical material is in the dust and emissions from each area, Tailings compound, Waste rock, Flotation process, Blasting detonations? What amount of chemical and toxic level of each individual identified chemical has been measured and by what method?
  16. To what degree have the potential for, local/ area invasive, forest fire, slash burning and grass fire emissions been taken into account when the air quality predictions are being determined? (Study released 2011 from Kelowna Health) What are the proposed mitigation measures at these times, being presented by the proponent in the event of the air quality being effected by these sources?
  17. What studies have been done to determine the air quality condensable fraction on the toxicity of the soil in the immediate as well as dispersion areas? What would the condensable fraction be of open water sources over time?
  18. What instruments have been used and prediction studies used to determine the impact on the air quality and therefore soil and open water quality that will adversely effect the existing insect population, especially the pollinating bee population, in the proposed mine development area and what distances of impact

have they been adequately considered?

## 10.1 Air Quality

Section 10.1.1 states that "Air quality has been identified as a valued component (VC) because of the potential risks to human health from the consumption of country foods directly exposed to metal-contaminated dustfall or soils. Criteria air contaminants (CAC), which includes particulate matter, have been identified as a VC because of the potential risks to human health from reduced air quality. Federal and provincial governments have ambient air quality objectives to ensure long-term protection of human health, an especially important issue for the Ajax Project due to its proximity to Kamloops."

The Feasibility Study states that "Dust fall monitoring stations have been sited to collect representative data for the Project, taking into consideration existing disturbance and potential sensitive receptors in the area."

1. Where are these monitoring stations located, and what are the raw data from these stations?
2. What baseline data are being used to track the particulate matter in the Kamloops region?
3. Where is the location of each dust monitor in relation to the mine?
4. What is the estimated annual tonnage of particulate matter from the wear and tear of mine truck tires?

### 10.1.1 Rationale

1. People in surrounding neighborhoods grow vegetables in their gardens. Can the particulate matter in the dustfall from the mine be measured and how?
2. If there are measurable effects on plants in residential gardens, what will be the effects on the consumers of this food?
3. Effect on cattle? Will KGHM test my vegetables for contaminants?
4. Can Pacific Way Elementary school playground be tested for contaminants?
5. Could these contaminants be ingested if a child did not wash his hands after playing at the school?
6. To what extent have the drilling cores sampled by the proponents, been **assayed** in order to determine the precise amount of dangerous trace elements, including, but not limited to chromium, lead, mercury, uranium, etc?
7. If these values have been determined, please confirm which drilling holes have been sampled, at what depths and by whom?
8. If these values have not been determined, please explain when this will transpire and by whom?
9. If these values have not been determined by the proponents, please explain why.

10. Are the drilling cores made available for similar testing by the Environmental Assessment Office, and if so, has this been done independently by the EAO?
11. If the drilling cores are made available to the EAO, are there plans to independently assay the drilling core in order to test these values and compare them with those of the proponents?
12. Within the Kamloops airshed, what are the allowable limits for each element that may have negative effects on human health?
13. Are there any studies on the effect on human health of ambient mine dust or the trace elements projected to be suspended in the fugitive dust likely to be thrown up by the Ajax mine?
14. What are these studies, and have they been incorporated into the environmental assessment process to date?
15. If so, what are these results and what are the projected health issues which may affect the residence of Kamloops?
16. If not, why have studies of this nature not been undertaken or required of the proponents?
17. If not, will studies of this nature be demanded of the proponents prior to completion of the environmental assessment process?
18. What is the projected consumption of fossil fuels in the operation of the mine, expressed in litres of fuel burned during each day of production?
19. Has the proponent or the government conducted studies on whether the consumption of fossil fuels by the project will further degrade the air quality in the Kamloops area?
20. If so, is this information available to the public?
21. If not, why not?
22. What baseline air or dustfall monitoring has the proponent done TO DATE on the mine site, or on the perimeter of the mine site?
23. If none has been done, why not?
24. It is industry practice to conduct such monitoring for at least three to 5 years before developing an open pit mine. The proponent has been planning the proposed Ajax mine for years, so there is no reason for KGHM not having placed such monitoring systems in place. Please identify all existing dustfall monitoring locations, the length of time they have been in operation, and the findings.
25. Is the proponent currently engaged in measuring noise, dust, dust cloud foot print from the nearby Highland Valley Copper Mine, in order to gain actual reading against which to measure the proponent's modeling processes?
26. If not, why not?

#### **10.1.4 Potential Effects of the Proposed Project and Proposed Mitigation**

KGHM acknowledges that there will be fugitive dust generated during all phases of the project, and that dust from the TSF and waste rock management facilities could also be mobilized on windy days. There is then a reference to a discussion of mitigation measures to minimize the release of fugitive and PM dust during all phases of construction, operation and decommissioning.

1. How does the KGHM propose to control fugitive dust when one considers the following facts obtained from the Abacus Feasibility Study? This study states that the East Waste Rock Facility will be entirely built up using trucks. There will be 6 years where the tonnage moved by trucks to the EWRF ranges from 55 to 69 M tonnes a year. Each truck hauls 218 tonnes of crushed aggregate sized rock. The number of trucks per day hauling waste rock will range from 550 to 600, at least 22 to 25 trucks per hour. This crushed rock will be dumped and then spread out, flattened, and contoured by heavy machinery 24/7. There will also be trucks hauling the 60,000 tonnes of ore per day. The questions regarding fugitive dust control given below apply also to the north waste rock facility and the tailings storage facility.

2. What quantity of fugitive dust does the proponent anticipate will be produced each year (in tonnes).

3. What will be the principal sources of the dust, and what percentages will be emitted by each, e.g. blasting, the pit (drilling, crushing), the waste rock dumps, truck traffic, excavators, conveyor belts etc.

4. How will the dust be controlled (i.e. kept on site) in both summer and winter?

5. If water is used to control the dust, how much water will be used, bearing in mind the location of the waste rock dumps above Kamloops, and Aberdeen in particular.

6. Since it will not be practical to use water in winter, what will be used? KGHM cannot rely on snow cover, as was suggested at the Ajax Open House. What are the health implications of using dust-suppressant substances which can be carried in fugitive dust over Kamloops?

7. The use of many heavy trucks and other mining equipment will result in the production significant diesel exhaust emissions. What is the total volume of those emissions and how will they be measured?

#### **10.1.6 Cumulative Effects Assessment**

1. Why are the CN and CP rail yards and railway operations not included in the list of activities that currently contribute to background PM in the Kamloops area?

#### **10.3.2 Noise and Vibration**

Regarding the blasting report from the KGHM website:

<http://www.ajaxmine.ca/pdfs/Abacus-MSW-Report-10-May-2011.pdf>

Note page 23 (Table 9) and page 24(Map) shows 19 perimeter points and the estimated BOP- Blast Over Pressure in dB.

Note perimeter point 9 and 2. Point 9(Sahali) is predicted at 114.2 dB at 6.4 km from test blast site, yet Point 2(Aberdeen) is predicted at 113.6 dB at 3.7 km.

The closest perimeter point #5 is 2.4 km away, yet is estimated at 108.2 dB.

1. Why are the closer perimeter points showing a lower BOP strength?
2. Is this a common occurrence?
3. Could the topography of the area cause this to occur and if so are there other locations not indicated on the map that could have higher BOP values than those shown in the table? If so, what locations, including those not shown on the map, had the highest calculated BOP values?
4. What are the probable random and systematic errors in these calculations for the BOP dB?
5. What is the expected uncertainty in the values presented in Table 9?
6. What impact do these uncertainties have on the conclusions presented regarding the BOP values?

The following is written on page 22 (note the term "PREDICTED"):

"Table 9 shows the predicted air over pressure at all the perimeter points from the two small blasts. Again, the predicted over pressure is well below 120 dB that begins to cause complaints (Persson et al, 1994)."

1. Why are the blast vibration levels being predicted?
2. Why didn't they use real monitoring instruments for a real blast?
3. The report quotes "two small blasts". If the blasts were larger ones, would it exceed the 120dB level that causes complaints?
4. What are the probable random and systematic errors in the calculation of the PPV values?
5. What is the expected uncertainty in the values presented in Table 8?
6. What impact do these uncertainties have on the conclusions presented regarding the PPV values?
7. The test blast undertaken by Abacus was limited in size to the blast sizes that will occur during mining. Why has the proponent not been required to perform a blast test of the size that will be used during normal mine operations in order that a true assessment can be made of the noise and vibration produced? That should be a requirement which must be met and the results made public before the application is allowed to proceed.
8. The full test blast should be measured with sound level meters and PPV

- monitoring devices to record actual data at the 19 perimeter points. Estimated data is not as accurate.
9. Will the proponent also be required to perform the above noted test blast on a day when the prevailing wind is blowing from the southwest in order that an accurate measurement can be made of the noise levels created by the blast in Aberdeen, Pineview Valley, Sahali and points north? And will the proponent be required to perform this blast before the application is allowed to proceed?
  10. How will the proponent control the noise created by the continuous use of heavy equipment so close to residences and schools. The Abacus feasibility Study states that the East Waste Rock Facility will be entirely built up using trucks. There will be 6 years where the tonnage moved by trucks to the EWRP ranges from 55 to 69 M tonnes a year. Each truck hauls 218 tonnes of crushed aggregate sized rock. The number of trucks per day hauling waste rock will range from 550 to 600, at least 22 to 25 trucks per hour. This crushed rock will be dumped and then spread out, flattened, and contoured by heavy machinery 24/7. There will also be trucks hauling the 60,000 tonnes of ore per day. This crushed rock will be dumped and then spread out, flattened, and contoured by heavy machinery 24/7, 365 days per year. Both the huge trucks and other equipment emit a great deal of noise (engine noise, back-up alarms etc.).
  11. How will the proponent comply with the City of Kamloops Noise Regulation By-Law No. 24-42, 2007? I refer in particular to section 6 (a) which construction hours are restricted to the period 07:00 hours to 22:00 hours.
  12. Ref. "Guidance for Evaluating Human Health Impacts in Environmental assessment (Jan. 2011)" Page 11, "----rural areas have a greater expectation of peace and quiet" When the heightened sensitivity, add 10dBA is factored in will the mitigation level be exceeded for the areas outside the city boundary?
  13. Will the differences in the seasonal levels be evaluated and appropriately decreased to conform to the "Quiet Rural" guidelines?
  14. How were these sound/noise levels measured? Were dwellings and land receptors considered in the assessment or was noise impacts, using the average across locations, the method?
  15. Were the sites for sound identification representative geographically and was the distance from each individual piece of operating equipment measured for variances to each individual receptor?
  16. What instruments and studies have been used to determine the health impacts relating to discrete noise events when evaluated over the long term, 23years and at 1year/24hrs.per day, increments to the total of 23years? Was the use of additional methodology used in sleep disturbance guidelines as referenced in page 2, 6.1 AIR Canadian Guidelines, implemented?
  17. How has the avoidance of tonal/impulsive construction noise levels to be adjusted and avoided at night? Quiet rural adjustments must be added to the highest source adjustment as referenced in page 19 Canadian Guidelines (day adjustment +10, night from 10pm to 7am adjusted by +20).
  18. Will all noise level adjustments indicate the +5 adjustment for back up alarms and the fluctuation of background noise levels as they modulate?
  19. How have the Low Frequency noise levels been measured in the receptor areas?



- References specified on page 24, 7.3 Air Canadian Guidelines, annoyance are greater with LF especially during sleep cycles.
20. What mediation measures were predicted for the summer “Open Window” valued component for the “Quiet Rural” areas?
  21. Has each piece of equipment and sound generating factor been assessed separately and at individual receptors as required?
  22. Were receptor residences of similar rural geography used, as explained in the AIR cited Canadian Guidelines, 5.5, to develop High Annoyance measurements appropriate for “Quiet Rural”, outdoor to indoor?
  23. What plan and research will be in place to take into account relative change in the noise environment from the prior levels that will consider all Human Health Endpoints?
  24. Will the “Quiet Rural” criteria maximum be applicable as referenced in the methodology from the Health Canada document “Guidance for Evaluating Human Health Impacts in EA(January 2011) as the “Oil and Gas Commissions noise guidelines are not appropriate for an operating mine site?
  25. Will “C weighting” tests be used to evaluate the Low Frequency noise/vibration, not “A weighted”?
  26. Where are the sensitive receptors located and what data has been collected?
  27. Was the data from an active production blast evaluated or simply the test blast area documented in Feb. 2011?
  28. Was the over-air pressure factored into the vibration effects in the 3km site boundary area and recorded at sensitive receptors?
  29. Were the absence of environmental clues, [daylight/darkness, noise/quiet, variations that suppress a number of brain functions (psychological, cognitive and emotional) during the first two hours and last two hours of sleep] that are clinically shown to have the greatest effect on the sleep cycle even if the sleeper does not waken, been evaluated within the 3km site for anticipated adverse health effects? Will the environmental impact of the absence of these clues be instrument monitored on a continuous basis?
  30. Will the goal to eliminate or reduce noise be appropriately controlled at the source, putting buffers in place? To what extent will the reliance of mitigation methods such as “buffers” near the receptors be used to support the decrease of sound?
  31. How is the proponent adjusting the noise decibels to accommodate the children in the immediate area when it is documented that sound can translate as much as 20-decibels in difference between the acceptable adult measure and that which is appropriate for a child as sounds entering the smaller ear canal become louder?
  32. Since the health effects of noise exposure depend on the level of the noise and the length of time of the exposure, how will the proponent’s responsibility for causing stress, lack of concentration and chronic health problems in individuals be determined? What measures will be put in place by the B.C. Government to hold the proponent accountable and to continue monitoring individuals who are not mine workers but are residing in noise sensitive areas?
  33. During the winter months, low cloud due to inversions is frequent in the area between the proposed mine and the residential areas in Kamloops. What will be

- the effect of this low cloud on the conductivity of noise from the mine to the city of Kamloops?
34. Where will the data logging sound level meters be installed?
  35. How many data logging sound level meters will be installed?
  36. Also, it appears the data loggers log in 1 minute intervals. Is this correct?
  37. What are the intervals the noise will be logged? Could accurate dBA data be skewed?
  38. Would it be possible that blasting may not fall within the data logger log interval?
  39. How will vibration be measured?
  40. What would be the impact of vibration on the homes and nearby properties?
  41. Does this 40dBA include blasting as well?
  42. Also states a noise modeling domain 3km by 3km from the site boundary. There is no map showing this boundary. Could a figure be created for this?
  43. Mitigation measures could include construction of a buffer between mine/ neighborhoods.
  44. What type of buffer?
  45. Low frequency and very low frequency sound generated by turbines and other large machinery can carry great distances and affect both quality of life and human health. What monitoring is being or will be done of sound in the sub-audible frequency range?
  46. What impact will the blasting have on the proposed Coal Hill water reservoir?

### **Noise from Trucks**

The proponent says that it will provide a list of mining equipment, explosives and storage for same, infrastructure and power supply, the capacity and source, hours of use and fuel requirements as a component of the application. However, as the proponent as already stated it has completed an economic feasibility study, this list should already exist. The Knight Piesold preliminary report stated that the ore carriers would be capable of carrying 240 tons of rock. Accordingly, it is assumed that details pertaining to this equipment must already be known.

1. Has this information been provided to date?
2. If so, to whom has it been provided?
3. Is this information available for public scrutiny?
4. If not, why not and when will this information be made public?
5. How many ore carriers will be used by the proponent to transfer rock from the pit to the “in pit” crushing systems?
6. How many ore carriers will be used by the proponent to transfer crushed rock from the “in pit” crushing systems to the permanent secondary crusher?
7. How many ore carriers will be used by the proponent to transfer waste rock and process raw to the waste rock management facilities?
8. What is the horsepower rating of each of these pieces of equipment?

9. What is the sound output of **each piece** of equipment described above, expressed in decibels?
10. How many trucks will be utilized in the movement of all rock, or bearing rock and all waste product used by the proponents?
11. Will these trucks be powered by diesel engines or by electric motors?
12. If the trucks are powered by diesel engines, what is the noise each will generate, expressed in decibels?
13. If the trucks are powered by electric motors, what is the noise each will generate, expressed in decibels?
14. How many excavators will be used in the movement of ore and waste rock during the operation of the mine and what is the noise level projected for each, expressed in decibels?
15. How many pieces of road construction or maintenance equipment will be used on a daily basis, and what is the noise level of each, expressed in decibels?
16. What method of drilling will be used, and what will the noise value of this process be, expressed in decibels?
17. What method of crushing the rock and processing the ore will be utilized, and what is the projected noise level of this process (motive power and processing) expressed in decibels?
18. What is the total noise projected to rise from all facets of the mine expressed in decibels?
19. What is the projected carrying distance of ambient noise expected to be generated by the mine?
20. What is the projected ambient noise expected to be generated by the mine, as measured within the communities of Pineview, Aberdeen, Upper Sahali, Knutsford and Rose Hill?
21. If studies of these ambient noise values have not been undertaken, why have they not been undertaken and when will they be undertaken?
22. If a license to operate a mine is granted to the proponents, what are the allowable levels of ambient noise within the communities listed above in paragraph 5 k?
23. What is the projected high frequency noise anticipated from public address systems and safety systems (such as backup beepers on heavy equipment) utilized by the projected mine?
24. Have other methods of ensuring safety of mine workers without projecting high frequency noise, been considered, and if so, what are these?
25. If GPS operation systems are used, will this negate the need for auditory safety mechanisms?
26. If alternate means of ensuring Mineworkers safety without creation of high frequency noise have been considered, will these be approved by Work Safe BC?
27. Have applications been made?

28. When will each controlled explosion be detonated, and what is the noise expected to arise each time, expressed in decibels?
29. What is the extent of vibration and noise that can be expected by the explosion in each of the adjacent communities and any others that may be affected?

## **10.5 Healthy Living**

### **10.5.4 Potential Effects of the Proposed Project and Proposed Mitigation**

1. Will people still be allowed to skate on Inks lake in the winter?
2. Will it be safe to eat fish from Jacko Lake after 20 years of the mine being in production?

In the July 11, 2011 letter from the City of Kamloops, the following questions were asked. The depth and substance of these questions have not been sufficiently reflected in the draft AIR/EIS Guidelines:

1. What are the health impacts to residents within the vicinity of the proposed mine?
2. The project summary document does not go into details regarding the types of chemicals that will be used and by-products that will be formed during the various mining operations including, but not limited to, blasting, crushing, concentrating, etc. We would like to know the details of those chemicals and by-products.
3. What are the levels of dust going to be on existing and proposed neighbourhoods?
4. Specifically how much additional dust is going to fall in the surrounding neighbourhoods (Aberdeen, Upper Sahali, Pineview Valley, Dufferin and Knutsford) in any given month and what mitigation measures will be utilized? Will an increase in dust levels result in increased health problems for the general public and/or those with pre-existing respiratory conditions?

## **17.7 Mitigation Measures**

In the second column on page 14 of the *Proposed Ajax Mine Project Booklet*, the proponent states that the information collected “will be analyzed” and goes on to state that “measures will be identified by the proponent to avoid or mitigate for potential adverse effects...”

1. Who will analyze this information?
2. At what stage in the process will the information be analyzed?
3. How will the methods of analysis and the sources of information be reported to the EAO?
4. Where the proponent states, on page 14 of the booklet, that measures will be identified by the proponent to avoid or mitigate potential effects, what standards will be required of the proponent to ensure that the mitigation is appropriate and

workable?

5. What standards will be required of the proponent by the EAO to ensure that any mitigation standards agreed to will be met by the proponent?

### **Dust Control**

1. How many employees will be involved in dust suppression?
2. How much water will be used to suppress dust?
3. How much calcium chloride and magnesium chloride, and any other dust suppressants or binding agents will be used per year?
4. How much has been budgeted per year for dust control?
5. How much dust (expressed in tons) is expected to be generated on a daily basis from the mining operation (including blasting, transport, waste dumping and processing)?
6. What percentage is likely to escape mine site?
7. What data has been gathered in support of this?
8. What comparison studies have been made with the Highland Valley Copper Mine to determine the dust footprint from that mine?
9. Studies of Mine dust from Arizona ( YOU TUBE ) – what dust suppression mechanisms used there
10. Given the reported lack of success in controlling dust in Arizona, what improved or enhanced dust suppression mechanisms are being proposed by the proponent?
11. What communities, as close as Kamloops to a mine of this scope, have been studied
12. Have there been studies to determine the size of the dust particles, and if so, what are these values?
13. What are the projected dimensions of the dust plume expected to rise from the mining operation (expressed in volume and in distance covered)?
14. What is the source of this information?
15. If this information does not exist, why does it not exist, and when will this information be available for environmental assessment?
16. Have the proponents or the environmental assessment offices modeled the dust cloud to determine its likely location, extent and effect upon the population of Kamloops?
17. If so, how does one access this information?
18. If not, why not?
19. What are the allowable limits of ambient mine dust in the Kamloops airshed, expressed in parts per million, and how were these limits determined?
20. What are the current levels of ambient dust in Kamloops airshed, expressed in parts per million, and how are these levels measured?
21. By who are they measured?
22. Are there weather conditions which will require the mine to cease operations, and if so, what are they?

### **17.12 Follow-up Programs**

1. Once allowable levels of fugitive dust and trace elements within fugitive dust have been determined, how will these be monitored for ongoing compliance by the mine?
2. What kinds of data collection devices are being contemplated?
3. Who has tested the proposed data collection devices for accuracy?
4. Who will be responsible for their calibration from time to time?
5. Who will be responsible for measuring these values and how often will this be done?
6. How many of these devices will be utilized, and where will they be located?
7. How will these devices be secured against tampering?
8. What devices are contemplated for the measurement of compliance with noise levels as stipulated under the mine license?

### **Sanctions for Non Compliance**

1. Significant portions of the waste dump facilities are within the city limits of Kamloops. Will the mine be subject to the municipal noise bylaw?
2. If not, why not?
3. If a complaint is made as to the level of ambient noise, to whom must it be reported and who will investigate the validity of the complaints?
4. In the event that ambient dust, trace elements or ambient noise limits are exceeded, will the mine be required to halt operations until such time as compliance can be assured?
5. If not, after what period of time or after what level of noncompliance will the mine be required to curtail mining operations until compliance can be assured?
6. In the event that ongoing noncompliance arises, what sanctions are contemplated?
7. What level of proof is required, and will the mine be allowed to lead evidence of its own in such hearings?