



Economic Risk Analysis: KGHM Ajax Copper-Gold Mine Near Kamloops, BC, Canada



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For the Kamloops Area Preservation Association

The Canadian Environmental Assessment Agency (CEAA)

And the British-Columbia Environmental Assessment Office (BCEAO)

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Executive Summary

MiningWatch Canada has been engaged by the Kamloops Area Preservation Association (KAPA) to provide an economic risk analysis of the Ajax Copper-Gold Mine, based on the economic chapters of the Environmental Impact Statement (EIS) submitted December 2015 and an updated “Technical Report”, a feasibility study (FS) filed February 19, 2016 on the Securities Exchange Database.

The Ajax Mine is a large, low-grade copper mine (0.30% copper, 0.19 g/t gold and 0.40 g/t silver), with a stripping waste-to-ore ratio of 2.65:1¹. It is now expected to have an 18 year mine life, although it is described in the EIS as having a 23 year life. The Ajax process plant is designed to treat 65,000 tonnes per day (t/d) of a copper-gold ore, producing approximately 250,000 dry tonnes of concentrate per year grading 25% Copper and containing approximately 14.65 g/t Gold, as well as amounts of mercury and arsenic (considered as negative ‘contaminants’ by potential buying markets).² Concentrates will be trucked on BC roads and highways to the Port of Vancouver.³

The tailings impoundment is expected to be approximately 6 km² holding 440 million tonnes of tailings. The mine would also generate over 1 billion tons of waste rocks that would be piled up to 270m high. The open pit will be 2.7 km by 1.3 km and as much as 550 metres deep⁴. The pit’s high wall will be about 50 metres from Jacko Lake, known as *Pipseil* and sacred to the First Nations.

The entire project’s 15 km² footprint is located on lands to which First Nations have asserted Aboriginal title, and in places, abuts the boundaries of the City of Kamloops. It is also fiercely opposed by a significant proportion of residents in Kamloops.

The proponents for the mine – KGHM Ajax Mining Ltd (KAM) - are KGHM - an experienced Polish multinational copper producer with 83 subsidiaries⁵, which owns 80% and Abacus Mining and Exploration Corporation (AME) a Canadian exploration company which owns the remaining 20%. KGHM is listed on the Warsaw Stock Exchange, while Abacus is listed on the Toronto Venture exchange.

After a review of these documents and other filings by the proponents, it is our considered opinion that the proposed mine presents a serious financial and economic risk to investors, to the public and to governments. If it manages to go into production, we believe the owners will have real difficulty meeting their commitments, that the mine will be only intermittently operating and will be at risk of early closure, leaving the public and taxpayers to clean up the mess, and shareholders potentially liable for millions in damages.

In summary, this report describes the main risks to investors, governments and the public in regards to the financial viability of the mine:

- serious overestimation of long-term prices for copper and gold: the FS assumes that the long-term price of copper will average \$3.21 USD/lb, when the current price is \$2.09 lb and experts do not expect it to recover for at least a decade.
- no guaranteed access to land: First Nations have not consented to the mine and have an asserted title on the land
- lack of economically feasible confirmed markets for concentrates, with contamination from arsenic and mercury being problematic;
- no allowance for changing capital, operating, or sustaining capital costs over the 18 year mine life.⁶
- underestimation by at least \$10 million for annual corporate overhead costs.⁷

- failure to disclose to investors an increase by KGHM International to the discount rate for Ajax from 8 to 9% in 2016 to account for impairment charges due to lower copper prices
- no allowance for fluctuations in the exchange rate (CAD/USD/ PLN). It is assumed to be constant for 18 years at \$1.00 USD to 1.20 CAD.

Missing and/or underestimated costs in the Feasibility Study:

- \$53 million (USD) less in the feasibility study than in the EIS for reclamation and closure costs
- costs of potential delays in relocation of Trans Mountain pipeline; relocation requires hearings before the NEB⁸
- need for sufficient insurance against the consequences of potentially catastrophic accidents such as a collapse of the barrier between the pit and Jacko Lake, contamination of Peterson Creek and the Peterson Creek aquifer, or a tailings dam wall collapse (particularly vulnerable during the first few years of production).⁹
- no costing for delay and other costs associated for dealing with on-going opposition from area residents
- no costing for compensation for the City of Kamloops or the Thompson-Nicola region for coping with a possible housing crisis, sunk costs for planning that is now moot, greater costs for roads, recreation, health and social services, and adjustments when the mine closes.
- Costs of a potential class action suit to compensate owners of residential development whose property will not be developable due to downwind proximity of the mine, and whose land may become contaminated from mine dust.
- costs of perpetual care and maintenance post closure of the pit, waste dumps and tailings impoundment have not been included
- Dust suppression costs appear to be underestimated; nowhere in the FS or EIS is there a financial breakdown of the KAM dust mitigation strategy or of the financial consequences of underestimating the extent of the problem.

Inaccurate assessment of project benefits to First Nations, the public and governments

- Gross underestimation (likely tens of millions) of the potential restitution costs if they do agree (only \$333,000/annum in current budget)
- Taxation: as all mine taxation is based on profitability, and the company is unlikely to be profitable for at least a decade, the marginal effective tax rate is likely to be less than zero. Payroll remittances are reported in the EIS as “revenues to government”. The lack of transparency about the methodology used to model taxation is also an issue.
- Power subsidy: BC is charging \$52 MW USD for electricity,¹⁰ when it costs the province at least \$91.67 USD/ MW¹¹ to purchase new power. This is hidden cost to taxpayers of \$39.67 USD per MW. For KAM, this amounts to an annual subsidy of over \$30 million (USD).¹²
- The Statistics Canada input-output model used to estimate benefits has no debit column and is not the right tool for conducting a risk/benefit analysis of an environmentally destructive project such as a mine.
- Social, and environmental costs externalized to Kamloops and the Thompson-Nicola region are not monetized in either the FS or EIS. These include as much as \$30 million annually for air pollution, damage to grasslands of at least \$3.4 million, impacts on tourism of \$10 million annually, losses in real estate values for properties near the mine of \$155 million, and a myriad of other un-estimated costs.¹³

We attempted to provide more realistic cash flow estimations based on the graphs provided by KAM feasibility study, and considering more realistic costs and financial assumptions. Using the KAM analysis as a baseline, we recalculated a NPV based on the following assumptions:

- We adjusted commodity price assumptions to \$2.75/lb, using the same predictions that M3 Engineering used very recently for another copper mine project;¹⁴
- We then included the four reasonable costs listed below which are further explained in this report (cross-references provided).
 - Increase G&A from \$21 million/year to \$31 million/year. See section 0
 - Increase G&A by \$2 million/year to SSN (First Nations) from \$333,000. See section 2.4
 - Increase G&A by \$2 million/year compensation to the City of Kamloops. See section 2.6
 - \$53 million more in reclamation costs (to reflect EIS commitment) annualized over productive LOM. See section 2.1
- We used a 23% tax rate (but unlikely that any tax would be paid by KAM). See section 2

<i>Opex and Sustaining Capital Adjusted as per MiningWatch report</i>			
Copper \$2.75/lb (30% higher than current price)			
	Pre-tax \$M	After Tax \$M	Payback
NPV at 8%	-195.7	-258.4	14+ years
NPV at 9%	-263.8	-320.8	
NPV at 10%	-321.1	-373.3	

The result of the analysis was that, if the economic analysis in the KAM feasibility study is adjusted to include even a few of the costs, errors and changes discussed in this report, the NPV is clearly negative and the mine is obviously uneconomic.

At current metal prices, the mine does not make economic sense. The cost projections made by KAM are at best extremely optimistic (or severely underestimated), miss significant financial risks and costs, and do not cover an number of externalized “community/environmental” impacts. Even with higher copper prices, it is doubtful this mine will ever be profitable enough to be able to cover all of the costly social, environmental, and health protective measures that would be necessary due to its close proximity to fragile water ecosystems and a city of 90 000 people –let alone to provide any substantial taxable benefits to the City of Kamloops and the Province of BC. Why risk the multiple short and long-term downsides associated with such a marginal mine?

KGHM’s AJAX mine is not economic in the short and long-term, unless copper prices climb to, and are sustained to almost historic, unprecedented levels. It represents an unconscionable risk to investors, governments and the public. It should not receive an Environmental Assessment Certificate. This report also recommends that the KAM/M3 Feasibility Study be the subject of a complaint to the BC Securities Commission about inadequate disclosure of risks and costs.

1 Introduction

MiningWatch Canada has been engaged by the Kamloops Area Preservation Association (KAPA) to provide an economic risk analysis of the Ajax Copper-Gold Mine, based on the economic chapters of the Environmental Impact Statement (EIS) submitted December 2015 and an updated “Technical Report”, a feasibility study (FS) filed February 19, 2016 on the Securities Exchange Database. Any economic risk analysis also allows for better social and environmental risk assessments –*E.g. Is the proponent able to pay for the social, health, and environmental protective measures it claims it will put in place? Has the proponent detailed those risks and costs in its economic and financial analyses?*

The Ajax Mine is a large, low-grade copper mine (0.30% copper, 0.19 g/t gold and 0.40 g/t silver), with a stripping ratio of waste-to-ore of 2.65:1¹⁵. It is now expected to have an 18 year mine life, although it is described in the EIS as having a 23 year life. The Ajax process plant is designed to treat 65,000 tonnes per day (t/d) of a copper-gold ore, producing approximately 250,000 dry tonnes of concentrate per year grading 25% copper and containing approximately 14.65 g/t gold, as well as substantial amounts of mercury and arsenic (often considered to be important negative ‘contaminants’ by potential buying markets).¹⁶ Concentrates will be trucked on BC roads and highways to the Port of Vancouver.¹⁷ The tailings impoundment is expected to be approximately 6 km² holding approximately 440 million tonnes of tailings. The mine would also generate over 1 billion tons of waste rock that would be piled up to 270 metres high. The open pit will be 2.7 km by 1.3 km and as much as 550 metres deep.¹⁸ Its high wall will be about 50 metres from Jacko Lake known as *Pipsell* and sacred to the First Nation. The entire project is located on lands to which First Nations have asserted Aboriginal title, and in places, abuts the boundaries of the City of Kamloops (pop. 90,000).

The proponents for the mine – KGHM Ajax Mining Ltd (KAM) – are KGHM, an experienced Polish multinational copper producer with 83 subsidiaries¹⁹, which owns 80% and Abacus Mining and Exploration Corporation (AME) a Canadian exploration company, which owns the remaining 20%. KGHM is listed on the Warsaw Stock Exchange, while Abacus is listed on the Toronto Venture exchange.

After review of these documents and other filings by the proponents, it is our considered opinion that the proposed mine presents serious financial and economic risks to investors, to the public and to governments. If it manages to go into production, we believe the owners will have real difficulty meeting their commitments, that the mine will only be intermittently operating and is at risk of early closure, leaving the public and taxpayers to clean up the mess, and shareholders potentially liable for millions in damages.

The report is organized as follows:

1. Inaccurate valuation of mineral reserves, Net Present Value (NPV) and sensitivity analysis
2. Missing and/or underestimated costs in the Feasibility Study
3. Inaccurate assessment of project benefits/costs for First Nations, residents and governments
4. Conclusions
5. Recommendations for a complaint to the BCSC re: disclosure pursuant to NI43-101

1.1 Inaccurate valuation of mineral reserves, NPV and sensitivity analysis

The Feasibility Study undertaken by M3 Engineering and Technology Corp. is badly written and conceived, and fails to provide investors and the public with the information needed to properly evaluate the project. The Economic Analysis Sections of the Feasibility Study (Sections 21 and 22) fail to provide information about taxation, costs and annual cash flow adequate to enable proper review by investors and other interested parties. Instead of the tables showing this data, which usually accompany feasibility studies, the report substitutes three poor quality graphs²⁰.

The analysis of deficiencies and risks in this section set out below all impact on the Net Present Value (NPV) and the Internal Rate of Return (IRR) of the mine, as well as on the cut-off value for the mineral reserve estimates. Investors are advised to beware.

This section will address:

- Overestimation of long-term prices for copper, gold and silver
- Difficulty in finding markets for AJAX's product
- Access to the land where the project is located has been challenged by an assertion of Aboriginal title
- Failure to account for LOM changing costs for capital, sustaining and operating expenditures
- Serious underestimation of annualized corporate overhead costs
- Impairment of assets, a 1% increase in the discount rate, and a consequent inability of the parent company to continue to finance the operations to full production
- Failure to account for exchange rate fluctuations Canadian dollar / Polish currency / US dollar.

1.2 Overestimation of long-term prices for copper, gold and silver

The mineral reserve and the viability of the project rest on unrealistic assumptions about long-term copper, gold and silver prices. The only discussion in the FS about the choice of long-term prices is copied below. There is no detail describing how these prices were chosen, nor are the effects of alternate commodity pricing described.

On page 8: "Mineral Reserve are estimated based on long term metal prices of US\$3.21/lb Cu, US\$1200/oz. Au, and US\$17/oz. Ag." ²¹

On page 229: "19.3 Price Deck"²²

KAM's view on the commodity market in the short, medium and long term is reflected in its Price Deck that is produced at least annually. The Price Deck (Table 19-1) contains KAM's forecast prices for all metals as well as TC/RCs and these numbers will be used for the economic modeling of the project."

Table 19-1: KAM Price Deck

	Unit	2016	2017	2018	2019	2020	2021	2022	2023	2024	Long Term
Copper	\$/lb	2.54	2.90	3.18	3.40	3.40	3.36	3.32	3.29	3.25	3.21
Silver	\$/oz	14.00	14.00	15.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Gold	\$/oz	1,100	1,100	1,100	1,200	1,200	1,200	1,200	1,200	1,200	1,200
Concentrate TC/RC	\$/dmt	100	100	95	90	85	-	-	-	-	85
	US¢/lb	10.0	10.0	9.5	9.0	8.5	-	-	-	-	8.5

Considering that the price of copper is currently \$2.09 USD/lb²³, it takes a substantial leap of faith to think that \$3.21/lb is an appropriate price for the mineral reserve. The World Bank copper price forecast does not see a substantial upturn in copper prices until 2025 and even then, only to \$3.18/lb;²⁴ the Economist Intelligence Unit (EIU) price forecast does not see an increase beyond \$2.80 before 2019.

It is worth noting that the feasibility study consultant, M3 Engineering, used a very different price forecast for copper in another 2016 study it did for Excelsior Mining’s Gunnison Copper Project. For that project the USD long-term copper price is shown as \$2.75/lb.²⁵

The long term revenue projections for the mine should be re-run using World Bank figures.

1.3 Access to the land challenged by an assertion of Aboriginal title

The proposed mine is on the traditional territories of the Tk’emlúps te Secwépemc (TteS) and Skeetchestn Indian Band (SIB), jointly known as the Stk’emlupsemc te Secwépemc Nation (SSN).²⁶ There are also interests of the Lower Nicola band and the Ashcroft Indian Band. In September 2015, the SSN has filed a statement of civil claim asserting title to the lands where the mine is located.²⁷

The title assertion is now before the courts and the mine cannot proceed until it is resolved.

Although the federal and provincial governments and KGHM Mining Inc. have all asked B.C. Supreme Court to dismiss the lawsuit and award costs against the bands, SSN has not withdrawn the suit. The federal and provincial defence appears to be more concerned with the assertion of rights over fee simple properties in Kamloops than about the mine properties.

SSN claims the province completed a “strength of claim” reassessment of Secwepemc rights and title on the Ajax footprint in May, 2015, finding a strong case for aboriginal title. They will continue this dispute. SSN is holding its own environment assessment process on the proposed open pit copper mine, culminating in June in a decision whether to approve it.²⁸

The Feasibility Study summarizes the issue:

“ In June of 2015, the SSN declared Aboriginal title over Pípsell. If the courts find that the SSN’s claim has merit, there are potential implications for the SSN’s ability to allow or deny mining to take place in this area. It is not immediately clear when a legal decision will be reached. It is also not

immediately clear whether SSN would intend to block mining if its title is recognized. The SSN claim to Aboriginal title over Pipsell underscores the need for KAM to reach a negotiated agreement with SSN that provides assurance to both parties that the project is welcomed and mutually beneficial.”²⁹

1.4 Failure to account for LOM changing costs for capital, sustaining and operating expenditures

There is nothing in the Feasibility Study to account for changes in capital, sustaining capital and operating expenditures over the life of the mine except for Table 22.3. It is impossible to accurately calculate the yearly cost of production for copper, gold and silver from the data presented in the FS.

However, based on our analysis of the limited information provided in the KAM feasibility study, we attempted to create a cash flow model. Our model did not incorporate corrections for the FS inconsistencies, errors, or all missing costs identified in this report. As the KAM feasibility study did not state total yearly costs of production, we had to calculate them ourselves.

It appears that KAM estimated the total cash flow cost of production on a Cu/lb equivalent basis is underestimated at about \$1.97 for life of mine.³⁰

Although it is not usual for feasibility studies to estimate LOM cost changes outside of a sensitivity analysis, its absence represents a serious weakness in the practice, as the problems of myriad mine developments from 2009-2013 have clearly shown.³¹

1.5 Difficulty finding markets for the product

It is clear from the Feasibility Study that the company has not established markets for its product and is likely to have considerable difficulty doing so.³² Markets are discussed in *Section 19 Market Studies and Contracts*. The FS hopes that surpluses in copper and gold will peak in 2017, and markets will improve. However, there is no real evidence for this prediction.

It is anticipated that Ajax concentrates will be sold to copper smelters in Asia. The FS says that although Japanese smelters are the most likely to want copper concentrate with the best gold payable formulas, they will not take concentrates with more than 5ppm of mercury.³³ Some of the Ajax concentrate will exceed that limit.³⁴ The FS also says that the gold may also bar acceptance of the concentrate at Chinese smelters, because it ties up lines of credit. However, KAM expects to approach Chinese and Korean custom smelters first. “As a contingency, we will also maintain a dialogue with smelters in India and the Philippines”.³⁵

KAM hopes to tie up 85-90% of annual capacity to long-term (five year) contracts.³⁶ This may be a serious problem if they have to tie the contracts to the low copper and gold prices anticipated for the next ten years, as it will not allow the company to profit from potential price increases for their product.

The penalties foreseen for considerable amounts of mercury, arsenic and other impurities in the ore may be underestimated. The FS uses an amount of Mercury \$0.15/dmt for each 1 ppm above 20 ppm/dmt in the concentrate).³⁷ Treatment and refining charges may also be underestimated.

1.6 Impairment of assets and increase in the discount rate

KGHM, the mine's 80% owner, is a large corporation based in Poland with over 83 subsidiaries. The Ajax Mine is part of its KGHM International Ltd. Division.³⁸ So far, the mine has been completely financed by KGHM subsidiaries and it appears that the company has intended to self-finance Ajax development, as no financing charges appear in the FS. Although this is not unusual in the preparation of feasibility studies which usually assume 100% equity – it represents a serious risk to investors in this case.

The down turn in copper prices has deeply affected the valuation of overseas KGHM assets. In order to comply with International Financial Reporting Standards (IFRS), they have had to conduct "impairment testing" on all their properties.³⁹ *"The key assumptions adopted for impairment testing are the adopted price curves and the discount rate."*⁴⁰ The KGHM properties have been subjected to the fair value estimation. This included three mines in the Sudbury Basin (Morrison, McCreedy and the pre-operational Victoria Mine) and the Ajax Mine.

The macro economic assumptions for impairment testing were still very high, with the copper price set at \$7075 per ton USD (a figure that the World Bank thinks will not be achieved until after 2023). The applied discount rate after taxation changed dramatically: for the Sudbury operations, it went from 8%-12%; for Ajax it was reset at 9%.⁴¹

Although this change in the Ajax discount rate is not a cash adjustment, it dramatically affects the NPV of the project and should probably have been reported by the Canadian issuer, Abacus, to the Securities Commission. That has not been done.

There is a further concern for a company that largely self-finances massive projects such as Ajax. Since no financing charges have been integrated into the analysis, what happens if it can no longer afford to carry the project? In the last year, KGHM, like other copper producers, has taken a number of serious hits to its balance sheet, which the company says is only offset by the exchange rate difference between the zloty and the US dollar.⁴²

1.7 Failure to account for exchange rate fluctuations to the Canadian dollar/Polish zloty/US \$

Although the FS says that *"The model (referring to the model in figure 22-2) was built using various assumptions that are based on current and projected future expected economic conditions including, but not limited to, sales prices, operating costs, annual production, ore grades and exchange rates."* There is no attempt in the FS to account for exchange rate fluctuations.

The exchange rate is assumed to be \$1.00 USD to \$1.20 CAD throughout the entire LOM.⁴³ It should be noted however, that Table 14.5 – Assumptions Considered for Open Pit maximization shows an exchange rate US/CAD of \$1.06.⁴⁴

The sensitivity analysis (figure 22.3 in the FS) should account for the risks attendant on potential exchange rate changes. This has not been done.

For the sake of consistency, we have used the exchange rate of \$1.00 US to \$1.20 CAD throughout this report, even though at the time of writing, the exchange rate was \$1.00 US/\$1.31 CAD.

1.8 Serious under estimation of annual corporate overhead costs.

The annual allocated corporate overhead G&A costs shown in Table 1-6 page 17 of the Feasibility Study⁴⁵ are respectively estimated at \$100,000/year and \$21 million/year total. This latter number should likely be at least \$31M/year (\$10 million more). Detour Lake Gold Mine (which is 15% smaller in daily production) uses a total G&A cost of over \$50M/year (excluding any costs related to First Nation retribution).⁴⁶ At the very least the FS should explain how the charges are so low.

2 Missing and/or underestimated costs in the Feasibility Study

This section of our report will evaluate the underestimated and/or undisclosed costs in the Feasibility Study and the EIS which will affect investors, the public and governments. These include:

- Conflict between reclamation and closure costs in the EIS and the FS
- Difficulties obtaining First Nations' consent and a gross underestimation of the potential restitution costs
- Potential delays in approval for the Trans Mountain pipeline relocation
- Need for an emergency fund in case of catastrophic accidents: Jacko Lake, TSF, Peterson Creek, etc.
- Costs of delay caused by significant opposition from Kamloops area residents
- Compensation to the City of Kamloops and the Thompson-Nicola Region

2.1 \$52.3 million difference between reclamation and closure costs in the EIS and the FS

The reclamation and closure costs for this mine will be substantial, with its vast open pit, water diversions and 6 sq. km. tailings impoundment. The EIS (and the summary of EIS submissions in the FS) describe a reclamation and closure scenario and financial assurance regime that is industry standard. However, this is no longer the case in the Feasibility Study. The EIS and the summary of the EIS in the FS at section 20.5.3 both say that \$195 million CAD (\$147 million USD) are budgeted to close and reclaim the mine site. However, in Section 21.3.3. of the FS, it states:

21.3.3 Reclamation Sustaining Costs. A closure and reclamation cost estimate was developed by KAM using the State of Nevada Reclamation and Closure Cost Estimator (SRCE). The SCRE has been adopted by KAM for use across assets in estimating closure and reclamation costs. Unlike the estimate provided for the Application/EIS, the SCRE is based on an assumption that the work is undertaken by the owner, KAM, and not a third party. The cost of reclamation and closure as developed by KAM using the SCRE is US \$94.3M.⁴⁷

The change in reclamation and closure planning totals \$52.3 USD million, achieved by dropping the requirement for planning for the costs of a third party having to carry out mine closure and reclamation.

This substantially reduces the cash costs for the mining company, but increases the risk to the government and public.

Budgeting for third parties to carry out closure and reclamation is an important protection for the public in the event that a mine might go bankrupt or be abandoned/ orphaned at closure.⁴⁸ Costing for financial assurance in many jurisdictions, including BC, Ontario, the Yukon, NWT and Nunavut and the Bureau of Land Management in the US require the inclusion of this cost. The removal of third party costs from the reclamation and closure commitments made in the EIS is a material change of significant impact.

Given the risk due to the marginal nature of this mine and the substantial opposition to it, the province may very well decide to hold KAM to its earlier estimates of closure costs and demand a financial assurance based on third party reclamation.

2.2 Trans Mountain pipeline relocation

The existing Trans Mountain pipeline and right of way for the proposed twinned pipeline have to be relocated, as they currently run through the planned pit. This cost of the relocation will fall entirely to the Proponent, which the FS estimates at \$28.7 million US.⁴⁹ However, in the 2012 Feasibility Study (page26-1) it said that:

“The pit design is based on the assumption that the Trans Mountain pipeline is relocated away from the pit during the first years of operation. Although the pit has been designed and scheduled in such a way that no excavation is considered on the ground below the pipeline and its right of way, an agreement with Kinder Morgan and a detailed relocation plan of this pipeline is needed at the early stages of the project (estimated cost of US\$18 million).”

This means that the costs have escalated by more than \$10 million USD in three years.

To our knowledge, although the Ajax proposal was accepted by Kinder Morgan and is before the NEB,⁵⁰ an agreement fixing costs has not yet been signed with Kinder Morgan.⁵¹ Neither is the pipeline relocation - or the permitting required for it - mentioned in the EIS, although it has clearly become part of the project in the FS.

“Should the existing pipeline need to be relocated, it would undergo a separate regulatory process from the facilities application under consideration by the NEB for the Trans Mountain pipeline expansion”⁵²

This will necessitate further delays and costs for the proponent. A one year delay after an initial \$400 to 800 million investment at 8% interest can easily accrue from \$32 to \$64 million in unpredicted costs. This risk is not discussed in the FS.

2.3 Lack of sufficient insurance in case of catastrophic accidents: Jacko Lake, Peterson Creek, TSF

The project depends upon its ability to reroute Peterson Creek around the mine site and to prevent Pipsell (Jacko Lake) from emptying into the pit. Pipsell will only be 50 metres from the edge of the pit.

Several water management structures are required to be in place prior to production within Jacko Lake and Peterson Creek in order to facilitate the current mine plan. These include engineered dams on Jacko Lake (JLD1 to JLD4) and Peterson Creek Downstream Pond, a diversion system (Peterson Creek Diversion System) and a new pond within Peterson Creek (Peterson Creek Downstream Pond”).⁵³

At 3.4 in Appendix 3-f, Norwest indicates that all these dams will be designed with a Factor of Safety varying from 1.0 to 1.3, “to minimum FOS criteria”.⁵⁴ After the Mount Polley tragedy, MEM has been requiring mine dams to have an FOS of 1.5 or higher.⁵⁵

Norwest undertook a Risk Management workshop for the Proponent to identify and quantify the key risks occasioned by the project. The results are reported in a table in Appendix 3-f in the table. The possibility of “*high wall pit failure propagating into Jacko Lake*” is identified as “high” both during operations and after closure⁵⁶; that is, the pit wall could collapse, sending the waters of Jacko Lake into the open pit. The EIS consultant recommended that, prior to permitting, an independent, geotechnical expert should review the pit slope design, and that there be “close monitoring”.⁵⁷

No amount is shown in the FS or the EIS to reflect this risk, although its consequences would include the closure of the mine and the destruction of Pipsell – a lake of great cultural and spiritual importance to the SSN.

The risk management workshop table also rated as “medium” the following risks: underestimating contamination from the Peterson creek contribution to the aquifer; failure in ground water retention from Jacko Lake resulting in leakage into the pit; leakage from other water management structures on Jacko Lake; potential truck accidents causing spills into Jacko Lake or Peterson Creek. Any of these could destroy or limit fishing in the lake.

Peterson Creek is at risk. The MDAG group reviewed the EIS plans to protect the creek and the aquifer that lies east and downgradient from the mine, and found that the contamination from the waste rock at the mine site will be significantly greater than predicted and that the “*contaminant plume modelling in the Ajax EIS underestimated the much larger extent and severity of contamination reasonably expected in the Peterson Creek Aquifer.*”⁵⁸

The contamination of Peterson Creek will constitute a slowly evolving ‘catastrophic event’ with potentially huge costs to the environment and the people of the region.

The Tailing Storage Facility (TSF) will eventually contain 440 million tons of thickened paste tailings in a 6km² area. The Canadian Dam Association dam safety standards rate the North and East tailings impoundment dams as “Very High” consequence.⁵⁹ Although it appears that KAM is planning to do a credible job of preventing dam collapse and leakage over the long-term, there is a period of vulnerability in the early years of the mine life⁶⁰, when the waste rock piles are not sufficient to reinforce the dams effectively.

There are also long-term issues with other pit wall collapses, water management and so on.⁶¹ Although KAM has developed Risk Management Plans for the purposes of the EIS, there is nothing in the FS to indicate that the company has monetarized the consequences of a failure or miscalculation in a set aside or sufficient insurance to cover for the consequences of accidents of this nature.

A recent report for the Canadian Underwriters Association highlighted this problem:

“Since October 2013, there have been four high profile environmental incidents in the North American mining sector, three in the summer of 2014 alone...these events highlight the fact that catastrophic black swan events can occur regardless of the quality and thoroughness of on-site engineering and environmental management controls...in the event of a disaster, only a portion of the real economic losses can be transferred to insurance companies...”⁶²

Given the proximity of the mine to the city of Kamloops and to important rural activities, KAM must show that it has sufficient and easily accessed insurance to protect the tax-paying public and the residents from the consequences of future catastrophic accidents and miscalculations.

2.4 First Nations consent and restitution

The proposed mine is on the traditional territories of the Tk'emlúps te Secwépemc (TteS) and Skeetchestn Indian Band (SIB), jointly known as the Stk'emlupsemc te Secwépemc Nation (SSN) as well on that of as the Lower Nicola band and the Ashcroft Indian Band. The key First Nations interest is the SSN. The First Nation has not yet given its consent to the mine, and – if it does – it will demand substantial benefits from it. Nearby, New Gold's much smaller, underground New Afton Mine agreed to substantial benefits in terms of training, employment and services as well as a Net Smelter Return royalty of 2%; all this in addition to a share of the provincial mining tax revenue.⁶³

In the Feasibility Study economic analysis, the only reference to costs associated with First Nations is an allowance in the G&A costs for \$333,000 annually for “external affairs/first nations”.⁶⁴ Were the SSN to withhold their consent, or demand restitution, the legal costs and the payouts could be considerably higher than those reflected in the FS, more likely in the millions of dollars.

2.5 Opposition from the residents of Kamloops and others in the Thompson-Nicola region

The Ajax Mine is fiercely contested by many residents in the area. The FS discloses that the proximity of the mine to the City has raised a number of issues: ⁶⁵

- Public concern over proximity to the city boundary and the effects of dust, noise, water quality, ground tremors due to blasting, and other effects on their quality of life
- Public concern over these effects has resulted in citizens organizing to oppose the mine and to raise questions about it
- Public concern may increase costs to the company and may result in costly legal actions, both prior and/or after permitting

These potential costs, although raised in the FS are not monetarily quantified. Davis and Franks (2011) defined conflict costs as *“the negative impacts on a company’s tangible and intangible assets from failing to avoid, mitigate or resolve conflict with local communities at an early stage,”* and they define conflict *“broadly along a continuum, from low-level tension to escalated situations involving a complete relationship breakdown or violence.”*

From the research by Frank et al. (2014), mining companies identified the most important conflict costs as those arising from lost production as a result of delay. The opportunity cost from the inability to pursue projects, or to produce output, was the primary cost of conflict. Other costs include security spending, risk management, and personnel costs as well as costs associated with the outcomes of conflict. Examples of the latter include project modification, redress, material damages, lost productivity, impact on capital, reputational impact, and impacts on personnel. Costs also are defined in terms of loss of market value of the firm.

In one of the cases of the Franks et al. research, the cost of delay was incorporated into the budget as construction costs. A 50 percent margin on construction costs was included to account for delays due to conflict. Financial services companies are starting to factor in risk of delays in projects. The study reports that Credit Swiss in Australia applied a 2.9 percent discount on the valuation of AGL Energy (AGK) to account for regulatory approval delays due to conflict with community on hydraulic fracturing at one of AGK’s projects.⁶⁶

KAM should include at least a 0.5 to 1.0 percent conflict risk premium to the NPV calculations.

2.6 Compensation for municipal and regional costs for damage, stressed services etc.

There are legitimate concerns raised by the affected public that will create considerable costs to the City, the Thompson-Nicola Region and the public. Since the City will not be receiving municipal taxes to compensate for these extra costs (as the mine is located outside City limits), it is in the process of seeking compensation for them through a community Impact agreement. It has engaged SLR Consulting to review the EIS and make recommendations about the City’s position on the mine. It is not at all clear who is paying for ambulance, fire suppression, fire and flood response occasioned by an accident at the mine. The costs to the City and the Region in terms of business and job losses after closure are not taken seriously in the EIS. (These different municipal costs are further discussed in Section 3 to this report)

The city is currently working to get another nearby mine - the new Afton Mine - included in the city limits so that it can collect taxes from it.

2.7 Costs of perpetual care for the site after closure

The company only intends to provide monitoring of the closed mine site for ten years after closure, and has allocated \$10 million⁶⁷ towards this. However, the site including the pit lake, waste rock dumps and the tailings impoundment will require monitoring and maintenance in perpetuity. All tailings covers eventually need to be repaired and replaced. A financial security (of at least twice the estimated amount in the FS) should be in place to ensure that the public is not held responsible for this forever.⁶⁸

3. Inaccurate assessment of project costs/benefits to First Nations, the public and governments

In the EIS the proponent summarizes the project benefits as follows:

For the Construction phase, key economic benefits of the Project include the following:

- *total employment (direct, indirect, and induced) of approximately 9,725 person-years for BC, and 3,715 person-years for the rest of Canada;*
- *total gross domestic product (GDP) (direct, indirect, and induced) contributions of approximately \$873 million in BC and \$409 million in the rest of Canada; and*
- *total tax revenue (federal, provincial, and local) contributions of approximately \$354 million.*

For the Operation phase, key economic benefits of the Project include the following:

- *total employment (direct, indirect, and induced) of approximately 33,400 person-years for BC, and 12,400 person-years for the rest of Canada;*
- *total GDP (direct, indirect, and induced) contributions of approximately \$5.1 billion in BC and \$1.5 billion in the rest of Canada; and*
- *total tax revenue (federal, provincial, and local) contributions of approximately \$1.9 billion⁶⁹*

The economic analysis presented in Chapter 7 of the EIS and the accompanying appendices present a completely misleading picture of the risks and benefits of the project. They are nothing more than a marketing campaign to convince the government that this is a worthwhile project.

A proper economic and social cost benefits analysis requires the computation of the risks/benefits of the project including those that have been externalized to the natural environment, private citizens and businesses, governments and First Nations.

It is the responsibility of governments to pull these different ledgers together for the good of the people and the planet. Reflecting on the B.C. Government's responsibility to assess the financial ability of a Proponent to fund mitigation and compensation costs in the EA process, Justice Afleck wrote in 2013:

[126] I view the entire environmental assessment process, and the decision-making role of the ministers following receipt of a report, along with the executive director's recommendations, as a "risk/benefit" analysis. The ultimate task of the ministers was to make a decision about the certificate after taking into account the technical analysis of environmental effects conducted by the EAO; the views of those affected by the project, prominent among which was the objections of First Nations; the risk of long term environmental damage and very substantial remediation costs if mitigation measures were not entirely successful, as well as the benefits to the people of this province of an employment and wealth generating project. They were then to weigh the risks against the benefits and decide whether it was in the public interest that the risks were worth taking.⁷⁰

This section questions the companies' assumptions about economic benefits and will provide information about the externalized costs which should be included in the EIS Benefits analysis. It addresses:

- Inaccurate information regarding taxation and benefits to governments
- Subsidies due to the rate for industrial power
- Problems with the use of the Statistics Canada input-output model to measure benefits
- Social, environmental, economic costs to Kamloops and regional study area not included

3.1 Inaccurate information regarding taxation and revenues to governments

Perhaps the shoddiest and least transparent work in the FS and EIS Chapter 7 is in regard to taxation and payments to government. The FS (22.3) indicates a figure of \$718 million USD for income tax in its valuation table,⁷¹ but the number is not included in either the OPEX or CAPEX totals. It is anticipated elsewhere in the FS that there will be \$2 million for BC sales tax⁷² and a very minimal mineral lands tax.⁷³ These are the only mention of tax in the entire document. The EIS claims that in the construction phase the project will provide \$354 million total tax, \$162 federal taxes and \$115 million in provincial taxes. During the operations phase (which is wrongly said to be 23 years), the total contribution in taxes is estimated to be \$1.9 billion.

These figures bear no resemblance to reality.

Work by Duanjie Chen and Jack Mintz, respected economists at the University of Calgary, in 2013 have definitively shown that mining taxation in BC is the lowest in the country. Although the statutory federal and provincial tax rates look reasonable, the availability of deductions and the reliance of all these taxes on profitability means that the BC marginal effective tax rate (METR) is in fact **minus 9%** if one includes corporate income taxes and the mining tax, and, if only the BC mining tax (royalty) is considered, the rate is even lower – **minus 21.1%**.⁷⁴ Although companies might be required to pay some taxes in boom periods such as 2008-2010, they will pay no taxes in periods of economic downturn.

This results in the situation of the province and the federal government actually owing money to mining companies, and massive *tax assets* that mining companies accumulate and trade amongst their subsidiaries.

It is unlikely the company will pay any municipal taxes to Kamloops as it is situated outside the City limits.

The gross figures that are used in the FS and EIS are in fact payroll remittances to government from worker salaries, and property taxes paid by employees. Most of these workers are already employed and paying property tax elsewhere, and “remittances to governments” need to reflect that reality.

The EIS and the FS both indicate that the mine will produce 123 KT^{co2equiv} in GHGs annually.⁷⁵ This figure vastly exceeds the 50 KT reporting limit.⁷⁶ Although there is currently no charge for producing these GHGs, that situation is very likely to change in the near future. Nothing has been allowed for GHG offsets should this happen.

3.2 Power costs –a hidden cost to taxpayers

The rate for electrical power at the Ajax Mine is assumed to be \$52 USD /MW⁷⁷. This is the standard industrial mining rate in BC. New power in BC produced from the Site C dam is expected to cost \$110CAD/MW (\$91.67 USD/MW)⁷⁸ (a figure lower than other new sources). The industrial rate amounts to an enormous hidden cost to taxpayers of \$39.67USD per MW. When the number is calculated to recognize power needs for the Ajax Mine and Mill - 760,200 MW⁷⁹ annually - it means that power for KAM will cost the province (and households who pay up to \$0.08-0.11 CAD/ kwh⁸⁰ for their electricity) over \$30 million USD a year.

The BC Government has legalized this cost to taxpayers through the BC Hydro Public Power Legacy and Heritage Contract Act. While the pricing is “legal”, it is a subsidy from an economic perspective because the cheaper legacy power Ajax will use will necessitate this power being replaced by the newer more expensive power...the higher cost being passed on to other users.

BC Hydro’s rationale for the low industrial power rate for new industrial customers is that it is “fair” to supply new users, regardless of the amount of power they need, with average cost, rather than marginal cost prices. It makes sense that new, big power users are entitled to their fair share of the much cheaper legacy, or “heritage” power, as it is described in B.C., but that this entitlement should not be any more than the share a new household is entitled to. In the case of Ajax, their power use will equal the power needed for 66,000 new households, which is about 2 years of population growth in B.C.

3.3 Problems with the use of the Statistics Canada input-output model to measure benefits

Economic benefits from the proposed mine are described in Section 7 of the EIS and the economic baseline is in Appendix 7-1.B. The benefits are elaborated from using the Statistics Canada input-output model, and Appendix 7-1.B⁸¹ provides some information on the data that was entered into the system.

There are serious problems with using the input-output model and GDP to calculate project benefits of large resource extraction projects. Like GDP, the input-output model has no debit column and cannot account for negative externalities.

Gross Domestic Product was a system of accounting created by the Americans and the British during World War II, to quantify the monetary value of work during the war effort. The GDP became the

foundation of the United Nations System of National Accounts: the way work throughout the world is evaluated. The GDP has no debit column, so that wars and the BP Oil spill are shown only as contributing to the GDP in public accounts. In the GDP, most cultural and caring activities, subsistence fisheries and farming have no value; neither do services provided by the environment: water, waste disposal, provision of oxygen, and so on.

“Ecosystem services” definitions were formalized in the United Nations 2005 Millennium Ecosystem Assessment,⁸² a four-year study involving more than 1,300 scientists worldwide. This report grouped ecosystem services into four broad categories: *provisioning*, such as the production of food and water; *regulating*, such as the control of climate and disease; *supporting*, such as nutrient cycles and crop pollination; and *cultural*, such as spiritual and recreational benefits. Although there are debates about how to value these services monetarily, worldwide ecosystem services were valued at \$33 trillion in 1997 (more than twice world GDP).⁸³

For the purposes of evaluating an environmentally and culturally destructive project like a mine, GDP and the input-output model are not the proper tools.

In the EIS, although the risks and damage (both potential and certain) to society and the environment are carefully studied and catalogued, they are missing from the Economic Analysis in Chapter 7 because they are not measured in dollars. This creates a false dichotomy between the mine’s benefits and its externalized costs. This is unacceptable; it is the responsibility of the EA process to balance the risks with the benefits.

Among those externalized costs which the EA must internalize to the study are:

- impacts on nature: loss of habitat, threats to endangered species, loss of dark sky, damage to grasslands,
- impacts on human well-being: for example, more road accidents, drug use, housing crises
- costs to governments: for example, subsidies for electricity, increased costs for education, health and social services, interference with activities to build a sustainable and resilient local economy, road construction and maintenance, negative impact on recreational opportunities and the tourist economy in and around Kamloops
- impacts on First Nations.

There are other problems with the analysis based on the input-output model:

- the tax rates are based on general corporate tax, when mineral extraction in fact has the lowest marginal effective tax rate of any industry⁸⁴;
- the labour figures do not take into account that workers are probably already employed and paying income and property taxes elsewhere;
- there is no allowance for pressure on existing businesses as workers move to work at the mine (the Fort McMurray effect);
- the effects at closure are minimized.

- There is a discrepancy in the actual number of workers that are expected to be employed at the mine in the operations phase. The FS states that there will be 362 workers directly employed at peak production.⁸⁵ However the figure used by KAM for the input-output modelling is an average of 453 full-time positions for the life of mine.⁸⁶

3.4 Social/Environmental/Economic Costs Externalized to Kamloops and the Region

There are a number of costs that are specifically externalized to Kamloops and others in the Thompson-Nicola Region. Some of these are well-quantified in monetary terms, but others are not. It is to be hoped that the City and region will quantify these costs in order to negotiate a Community Benefit Agreement. All are important. Where we can, we have monetized the costs. The figures given below indicate the importance of these costs (with dollar values or not) to the risk-benefit analysis that is the EA process.

- Inability to control dust from the mine and its consequent effect on health of people in the region (asthma, cancers, hospitalizations, etc.) has been estimated to cost as much as \$30 million CAD annually.⁸⁷
- Ecological Damage to grasslands: A report in 2009 by Sara Wilson titled “The Value of B.C.’s Grasslands” placed the value of the scarce 740,000 hectares of B.C.’s grasslands between \$1 and \$4 billion per year. If we allocate this value proportionally to the 2,500 hectares of land where the KGHM Ajax mine will be operating, we arrive at a figure between \$3.4 and \$13 million CAD per year for their ecosystem services.⁸⁸
- Loss from tourism. The data suggests the city currently has 70-80,000 visitors annually and has a \$180 million market. The effects from the mine could cut the rate by at least 5-10%, given a dust laden environment and a new giant industrial neighbour with restricted access to fishing at Jacko Lake; that being so, this would account for a loss of about \$9-18 million CAD annually.⁸⁹
- The cost to the city of having to redirect residential growth due to the mine. The *Kamplan* of 2009 forecast expansion of the easily-accessed Aberdeen neighbourhood and this is now on hold. Residential development at alternative sites on the north shore would require a four lane bridge and a major upgrade of infrastructure (\$80-160 million).⁹⁰
- Compensation to land developers near the mine site whose property may be undevelopable because of the mine.
- Lowered property values for nearby homes and businesses, and damage to homes near the mine from shaking and dust. *“There will undoubtedly be some effect on real estate values once the mine begins its operations, certainly in the Aberdeen, Dufferin and Sahali sectors. The noise from explosions, the rumble of heavy equipment and the flow of noxious fumes across the area will do little to enhance property values. There are 8,100 homes in this area that are deemed to be those that will likely appreciate a decline in the value of their property by about five to ten percent. ...The average house value in Kamloops is \$385,000 and a loss of \$ 19,000 to \$38,500 in value would represent \$155 to \$310 million. The Kamloops Voter Survey showed most people felt real estate would be negatively affected by the mine. These are very conservative estimates”* ... Losses in real estate value \$ 155,000,000 CAD (5% drop for 8100 houses).⁹¹ These losses in value will have an annual cascading effect on property tax revenues in the City (approximately \$1.5 million/year CAD).⁹²

- Damage to municipal and provincial roadways from trucking concentrates and consumables for the mine. The FS indicates that special permits will be required to increase maximum loads for the concentrate trucks to 50 wmt from the current 42 wmt.⁹³ This will definitely impact road maintenance costs.⁹⁴
- Increased accidents on highways and roads because of increased truck traffic and travel to and from the mine.
- Increased social services, recreation, education and health costs, and a loss of doctors to the region.⁹⁵
- Increased drug and alcohol consumption and consequent social problems such as violence against women.⁹⁶
- Housing shortages, especially for low-income people as a result of new hires at the mine, particularly during the construction phase, and concomitant increase in social costs.
- Costs of labour force and business adjustments at closure. There are a number of excellent studies on the socio-economic costs of mine closure, starting with the Elliot Lake tracking studies. A 2007 study that provides a framework for estimating these costs is Research Paper 8 from the Centre for Social Responsibility in Mining (CSRM) in Queensland Australia. They write: *“If social aspects of mine closure are considered from the inception of a project, there may also be opportunities to design the mine and its associated infrastructure and community development programs in a long-term sustainable manner. Arguably, starting-up a mine without a closure plan that considers socio-economic impacts in some way flies in the face of the industry’s strong commitments to sustainable development and its ultimate goal of a ‘social licence to operate’.”*⁹⁷

4. Conclusions

We attempted to provide more realistic cash flow estimations based on the graphs provided by KAM consultants at 22.1, 22.2 and 22.3 of the feasibility study, and considering more realistic costs and financial assumptions. Using the KAM analysis as a baseline, we recalculated a NPV based on the following assumptions:

- We adjusted commodity price assumptions to reflect current prices and World Bank estimates. Current copper price of \$2.11 USD per lb., gold unchanged at \$1200/oz., and then assumed 30% increase in the price to \$2.75/lb, using the same predictions that M3 Engineering used very recently for another copper mine project (Excelsior Mining’s Gunnison Project);⁹⁸
- We then included the four reasonable costs listed below which are further explained earlier in this report (cross-references provided).
 - Increase G&A to show annual corporate overhead increase from \$21 million to 31 million. See section 0
 - Increase G&A by \$2 million/year NSR to SSN (First Nations) from \$333,000. See section 2.4
 - Increase G&A by \$2 million/year compensation to the City of Kamloops. See section 2.6
 - \$53 million more in reclamation costs (to reflect EIS commitment) annualized over productive LOM. See section 2.1
- We used a 23% tax rate, when in fact, it is unlikely that any tax would be paid by KAM (or very little), as almost all taxes to mining companies are based on profits. See section 2
- The effect of changes to the discount rate is shown at 8% discount rate as is in KAM analysis, at 9%, and at 10%. See section 0

Opex and Sustaining Capital Adjusted as per MWC report

Copper \$2.75/lb (30% higher than price April 11 2016)

	Pre-tax \$M	After Tax \$M	Payback
NPV at 8%	-195.7	-258.4	14+ years
NPV at 9%	-263.8	-320.8	
NPV at 10%	-321.1	-373.3	

The result of the analysis was that, if the economic analysis in the KAM feasibility study is adjusted to include even a few of the costs, errors and changes discussed in this report, the NPV is clearly negative and the mine is obviously uneconomic.

There are a number of other externalized costs that have been described in the report. Although they are not currently on the KAM ledger, they are clearly on the balance sheets of the public and governments who will have to live with it. Figures are based on low-cost estimates.

Costs not considered in Ajax Mine's Feasibility Study (US\$ - conservative estimates)

Potential risks and cost items	Amount (US \$)	Comments & cross references
Increased G&A costs	\$180 million (\$10 million/year)	See section 1.8
Reclamation costs not fully accounted for	\$53 million	See section 2.1
First Nations restitution, legal costs, etc.	\$36 million (\$2 million/year)	based on a 1% pre-tax net cash-flow (likely to be much higher). See 2.4
Compensation to City of Kamloops and TN Region	\$36 million (\$2 million/year)	based on a 1% pre-tax net cash-flow. See section 3.4
Delays or extra measures due to public concerns or opposition	\$36 million (\$2 million/year)	Less than 0.5% premium on NPV discount rate. See section 0
Increased costs of perpetual care	\$10 million (at least)	2x the FS estimate (likely to be much higher). See 2.7
Cost to suppress dust to 90% level	-	Unknown
Increase insurance for catastrophic damage ⁹⁹	\$63 million (\$3.5 million/year)	50% higher than current insurance/taxes in FS. See 2.3
Losses in property values that may have to be compensated if owners seek and win legal remedy	\$155 million	Using a 5% decrease in property value for the closest 8100 houses. See section 3.4
Externality - Losses in municipal taxes	\$23 million (\$1.3 million/year)	Using low estimates. See section 3.4
Externality - Reconfiguration of urban expansion	\$80 million	Using low estimate. See section 3.4
Externality - Power subsidy (cost to public)	\$524 million (\$30 million/year)	AJAX would pay about half the price of the predicted cost of production of electricity at Site C dam. See section 0
Externality - Air pollution costs	\$216 million (\$12 million/year)	Using 50% of predicted costs. See section 3.4
Externality - Damage to grasslands	\$50 million (\$2.8 million/year)	Using the lower estimate in the \$2.8 to 11 million/year See section 3.4
Externality - Impacts on tourism due to dust, impacts on the 'branding' of Kamloops, & damages to Jacko Lake area	\$135 million (\$7.5 million/year)	Using a low estimate of 5% decrease in tourism revenue. See section 3.4
Externality - Costs for road upgrades/maintenance	-	Not estimated
Externality - Increased health, social, and housing costs	-	Not estimated
Externality - Costs on labour & business adjustments at closure	-	Not estimated
Total estimate of unaccounted costs /risks/liability internal to project	\$569 million (\$31 million/year)	
Total estimate of unaccounted costs/risks/liability for externalities	\$1,014 million (\$56 million/year)	

At current metal prices, the mine does not make economic sense.

The cost projections made by KAM are at best extremely optimistic (or severely underestimated), miss significant financial risks and costs, and do not cover an number of externalized “community/environmental” impacts. Even with higher copper prices, it is doubtful this mine will ever be profitable enough to be able to cover all of the costly social, environmental, and health protective measures that would be necessary due to its close proximity to fragile water ecosystems and a city of 90,000 people – let alone to provide any substantial taxable benefits to the City of Kamloops and the Province of BC. Why risk the multiple short and long-term downsides associated with such a marginal mine?

KGHM’s AJAX mine is not economic in the short and long-term, unless copper prices climb to, and are sustained to almost historic, unprecedented levels. It represents an unconscionable risk to investors, governments and the public. It should not receive an Environmental Assessment Certificate. This report also recommends that the KAM/M3 Feasibility Study be the subject of a complaint to the BC Securities Commission about inadequate disclosure of risks and costs (see Appendix).

APPENDIX - Potential grounds for a complaint to the BC Securities Commission about inadequate disclosure in Feasibility Study

The FS does not meet NI43-101 standards for feasibility studies and should be reviewed by the British Columbia Securities Commission. The principal regulator for Abacus (AME) is the British Columbia Securities Commission¹⁰⁰. The standards for feasibility studies in BC are set out in form NI43-101F (https://www.bccsc.bc.ca/Securities_Law/Policies/Policy4/43-101F1_Technical_Report_F/)

We recommend that the KAM - M3 Engineering and Technology feasibility study be the subject of a complaint to the BCSC. The complaint could highlight the following:

- **First Nations Aboriginal title.** Given the fact that a land dispute is active in front of the courts, this FS has to be qualified and it should be explicitly stated that the project will not be able to proceed until this issue is resolved. According to NI43-101, the author of the Feasibility study, in this case, M3 Engineering and Technology Corp, has to qualify that this project can only proceed with a positive resolution of the Aboriginal title issue and unless an agreement is reached with SSN, this project cannot proceed.. The language in the FS does not clearly state this issue. BCSC should ask for a clarification of the legal status of the project's ability to proceed and a restatement of the facts in the FS.
- **Unrealistic short and long term commodity price assumptions and lack of justifying information.** No information is provided to justify the commodity price assumptions in the FS. Since the current copper price is \$2.09/lb, well below the \$2.54/ lb that KAM has used, and World Bank¹⁰¹ and other projections make it clear that the price will not rise much above \$3.00 for at least a decade. This is unacceptable. The price affects the mineral resources and reserves, and the estimates need to reflect it.
- **Failure to provide sufficient information about cash flow from year-to-year in order for an investor or member of the public to examine and evaluate company NPV and IRR assumptions.** Although the feasibility study does indicate the effects on NPV of changes to CAPEX and OPEX in table 22.3, it does not provide enough information in the FS to allow a careful analysis of these assumptions. The table is poorly signed and there are no cash flow projects on a yearly basis to assist and investor in understanding the means by which the figures were derived. In general, there is a lack of information regarding cost assumptions and the effects of possible capital and operating cost escalation.
- **Lack of transparency about methodology used to model tax assumptions**
- **Lack of, and conflicting information about, the impacts of exchange rate changes.** Table 22.3 should include the effects of exchange rate changes to the analysis. It does not.
- **Failure to disclose impairment re-evaluation of project by KGHM and resultant change to discount rate.** The discount rate for the KAM project has been changed by KGHM to 9% from 8% as a result of an impairment re-evaluation of their properties in order to comply with IFRS accounting standards; other KGHM Canadian properties have had their discount rate changed from 8-12%. This represents a substantial change to the NPV and should be reported.
- **Underestimation of annual corporate overhead costs**
- **Failure to adequately disclose and emphasize changes to reclamation and closure costs and possible implications for financial assurance requirements**
- **Gross underestimation of risk to investors from opposition to the mine from residents of Kamloops and the region and from First Nations**

APPENDIX - Professional Resume for Joan Kuyek

Joan Kuyek is a mining analyst, writer, researcher and educator living in Ottawa. She was the founding National Co-ordinator of MiningWatch Canada from 1999-2009.

She taught Mining Law, Policy and Communities at Queen's University Law School (Law 514), Community Development and Social Change (SW3206) at Carleton University and Mines and Communities at the CESD program at Algoma University.

She is the author of *Community Organizing: A Holistic Approach*, and a number of other books and publications. Some of her publications on mining and mine economics include the following:

Kuyek, Joan. *Pitfalls or Promises: Socio-economic Impact Analysis of the New Prosperity Mine for the Tsilhqot'in National Government*. 2012.

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Endnotes

- ¹ KAM Feasibility Study, completed by M3 Engineering, February 28, 2016 (FS), p.8
- ² FS, page 1.
- ³ FS, page 6
- ⁴ FS, page 120
- ⁵ KGHM Consolidated Financial Statements 2015, published March 2016. page 8
- ⁶ Although not standard practice in BC to include in a Feasibility Study, it should be.
- ⁷ FS Table 21-11. Normalized G&A Operating Costs, page 285
- ⁸ The cost of relocation itself is in the FS, in table 21-2, page 277
- ⁹ Norwest. Tailings Storage Facility design Report. EIS.Appendix 3D (part 1)
<http://ceaa.gc.ca/050/documents/p62225/104516E.pdf>.
- ¹⁰ FS. 21.4.2, page 283
- ¹¹ Based on the estimated cost of new power from the Site C dam project of \$110. CAD/MW
- ¹² Calculated at 760,200 MW/year * \$39.67/MW, using a \$1:1.20 exchange rate.
- ¹³ See Section 3 of this report.
- ¹⁴ <http://www.excelsiormining.com/index.php/projects/2-uncategorised/494-detailed-comparison-tables-of-the-2014-pfs-and-the-2016-updated-pfs-for-both-the-acid-plant-and-no-acid-plant-options>
- ¹⁵ FS, page 8
- ¹⁶ FS, page 1
- ¹⁷ FS, page 6
- ¹⁸ FS, page 120
- ¹⁹ KGHM Consolidated Financial Statements 2015, published March 2016, page 8
- ²⁰ FS, figures 22.1, 22.2 and 22.3, pages 288-291
- ²¹ FS, page 8, Table 1-2
- ²² FS, page 229
- ²³ World Bank average copper price for March 2016 was \$2.09 (\$4599US/mt)
<http://pubdocs.worldbank.org/pubdocs/publicdoc/2016/3/633811457027702995/CMO-Pink-Sheet-March-2016.pdf>
- ²⁴ The World Bank forecast for copper prices published in January 2016 can be found at
<http://pubdocs.worldbank.org/pubdocs/publicdoc/2016/1/548631453821462743/CMO-Jan-2016-Historical-Forecasts.pdf>. The high predicted for 2025 is still only \$7000/mt, or \$3.18 US
- ²⁵ <http://www.excelsiormining.com/index.php/projects/2-uncategorised/494-detailed-comparison-tables-of-the-2014-pfs-and-the-2016-updated-pfs-for-both-the-acid-plant-and-no-acid-plant-options>
- ²⁶ Aboriginal issues are discussed in the EIS in Part C, volume 6. The findings are summarized in the FS at page 15 and the "engagement process" with Aboriginal groups is summarized in FS pages 256 to 264
- ²⁷ http://www.firstpeopleslaw.com/database/files/library/Notice_of_Civil_Claim_Secwepemc_Nation_vs_BC_Sept_21_2015_.pdf
- ²⁸ <http://www.kamloopsthisweek.com/ottawa-launches-court-challenge-of-first-nations-land-claims-on-ajax-kamloops/>
- ²⁹ FS, page 15
- ³⁰ The text of this paragraph was modified from the initial version submitted to BCEAO and CEAA on April 11 2016, as it contained an error of interpretation, but the calculations and results from MWC financial model using KAM base case remain the same (no effect).
- ³¹ For further discussion, see Ernest Young (2013) Business Risks Facing Mining and Metals
[http://www.ey.com/Publication/vwLUAssets/Business_risks_facing_mining_and_metals_2013%E2%80%932014_ER0069/\\$FILE/Business_risks_facing_mining_and_metals_2013%E2%80%932014_ER0069.pdf](http://www.ey.com/Publication/vwLUAssets/Business_risks_facing_mining_and_metals_2013%E2%80%932014_ER0069/$FILE/Business_risks_facing_mining_and_metals_2013%E2%80%932014_ER0069.pdf) (pages 19-21) and
<http://www.theglobeandmail.com/report-on-business/industry-news/property-report/climbing-costs-make-mining-growth-problematic/article4184840/>
- ³² FS, Section 19 – Markets and Sales Strategy
- ³³ FS, page 210
- ³⁴ FS page 96 (Figures 13-1, 13-2; see also Table 15-1). Confirmation of the extent of mercury and arsenic contamination will depend on knowledge of the ore feed by rock type and mercury and arsenic grades on a quarterly basis
- ³⁵ FS, page 210
- ³⁶ FS, page 210-211
- ³⁷ FS, Table 15-1, page 113
- ³⁸ KGHM consolidated annual financial statements 2015, page 14
- ³⁹ The KGHM letter to shareholders March 2016 explaining this states: "*The low commodities prices also impacted the carrying amount of our assets. In accordance with International Financial Reporting Standards, the carrying amounts of certain assets, which, for mining companies, fluctuate together with changes in commodities prices, must be periodically reviewed. Pursuant to this requirement, impairment tests were performed on the value of our investment in Sierra Gorda SCM in Chile, as well as on the mines in the Sudbury Basin in Canada, the Robinson mine in the USA and the Franke mine in Chile. As a result of these tests, total impairment losses were recognised in the consolidated financial statements for 2015 which, after accounting for the tax effect, amounted to USD 1 294 million (or PLN 5 048 million). Impairment tests were also performed on the domestic production assets, but these*

tests did not indicate the need to revise their value. A positive factor impacting the value of the Polish assets is the substantial weakening of the Polish zloty as compared to the American dollar. It is important to point out that during the recent period many other companies in the mining sector in Poland and abroad have also recognised similar impairment losses. These impairment losses are of a non-cash nature.

⁴⁰ KGHM financials page 27

⁴¹ KGHM page 27

⁴² KGHM letter to shareholders March 2016 “For KGHM it was also of significance that during this same time the USD strengthened versus the PLN by almost 20%, which helped to mitigate the impact of the fall in the prices of our basic products.”

⁴³ FS, section 22.2.1, page 288.

⁴⁴ FS table 14.5, page 108. Although the difference with the exchange rate used in the analysis may be due to the timing of the cost analyses for the FS, it indicates quite clearly the volatility of exchange rates and their impact on costs.

⁴⁵ FS table 1-6, page 17

⁴⁶ http://s1.q4cdn.com/320803946/files/doc_downloads/2016-01-25-Mineral-Resource-and-Reserve-Estimate-for-the-Detour-Lake-Property.pdf

⁴⁷ FS, page 280.

⁴⁸ Miller, George. ICMM, Financial Assurance and Mine Closure and Reclamation. Pages 34-35.

<https://www.icmm.com/document/282>

⁴⁹ FS Table 1.3.

⁵⁰ NEB, page 5. Routing update 1. August 2014. <https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/548311/956726/2392873/2451003/2499084/B255-3 - Part 1 Routing Update - A4A4A5.pdf?nodeid=2498326&vernum=-2>

⁵¹ 2012 Feasibility Study (page26-1) states: “The pit design is based on the assumption that the Trans Mountain pipeline is relocated away from the pit during the first years of operation. Although the pit has been designed and scheduled in such a way that no excavation is considered on the ground below the pipeline and its right of way, an agreement with Kinder Morgan and a detailed relocation plan of this pipeline is needed at the early stages of the project (estimated cost of US\$18 million).”

⁵² Kamloops this Week, August 2014. <http://www.kamloopsthisweek.com/kinder-morgan-looks-reroute-pipeline-around-ajax/>

⁵³ EIS, Norwest. Tailings Storage Facility design Report. Appendix 3D (part 1)

<http://ceaa.gc.ca/050/documents/p62225/104516E.pdf> appendix 3-f, pages-1

⁵⁴ Norwest, EIS, 3.4

⁵⁵ Mount Polley report, Panel Observations, page 71

⁵⁶ EIS, Appendix 17.6-A. summary of Failure Mode and effects analysis, page 13.

<http://ceaa.gc.ca/050/documents/p62225/104596E.pdf>

⁵⁷ EIS, Appendix 17.6-A. summary of Failure Mode and effects analysis, page 13.

<http://ceaa.gc.ca/050/documents/p62225/104596E.pdf>

⁵⁸ Kevin A. Morin. Minesite Drainage Assessment Group. Ajax Mine: Review of Predicted Water Contamination for the Sierra Club of British Columbia. March 26, 2016.

⁵⁹ FS, page 171

⁶⁰ Norwest. Tailings Storage Facility design Report. Appendix 3D (part 1)

<http://ceaa.gc.ca/050/documents/p62225/104516E.pdf>. Confirmed by a communication between Ugo Lapointe and a KAM staff member at the Kamloops open house.

⁶¹ See EIS Appendix 17.6A, risks.

⁶² Canadian Underwriter. September 29, 2014. <http://www.canadianunderwriter.ca/insurance/major-mining-related-spills-highlight-that-catastrophic-black-swan-events-can-take-place-1003274285/>

⁶³ <http://www.bcabc.ca/content/tkemlups-indian-band-skeetchestn-band-and-new-golds-new-afton-mine-project>

⁶⁴ FS, Table 21-11: Normalized G&A operating costs, page 285. This item is discussed briefly at page 271 in the FS, which says that the \$333,000 amount is based on a NSR royalty.

⁶⁵ FS, 20.4.1, page 261

⁶⁶ Davis, R., & Franks, D. M. (2011, October). The costs of conflict with local communities in the extractive industry. In Proceedings of the First International Seminar on Social Responsibility in Mining, Santiago, Chile (Vol. 30) and Franks, D. M., Davis, R., Bebbington, A. J., Ali, S. H., Kemp, D., & Scurrah, M. (2014). Conflict translates environmental and social risk into business costs. Proceedings of the National Academy of Sciences, 111(21), 7576-7581.

⁶⁷ FS. 20.5.3

⁶⁸ For more discussion of perpetual care monitoring and maintenance issues see Kuyek, Joan. *Theory and Practice of Perpetual Care of Contaminated Sites*, July 2013. <http://www.sehn.org/pdf/Kuyek-theory%20and%20Practice%20final%20%28July%202011%29.pdf>

⁶⁹ <http://ceaa.gc.ca/050/documents/p62225/104461E.pdf>, Executive Summary, page 10-11

⁷⁰ Afleck, J. (obiter). Pacific Booker Minerals Inc. v. British Columbia (Environment), 2013 BCSC 2258 (CanLII), <http://canlii.ca/t/q29tr> obiter dicta

⁷¹ FS, Table 21-1. LOM capital and operating costs summary. page 276

⁷² FS, page 278,

⁷³ FS page 38

⁷⁴ Chen, Duanjie and Jack Mintz. Repairing Canada’s tax system to be less distorting and complex. The school of Public Policy. May 2013. <http://policyschool.ucalgary.ca/?q=content/repairing-canadas-mining-tax-system-be-less-distorting-and-complex> and Mining Effective Tax and Royalty Rate addendum. May 2013.

<http://www.policyschool.ucalgary.ca/sites/default/files/Mining%20Addendum.pdf>

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- ⁷⁵ FS, page 254
- ⁷⁶ <https://www.ec.gc.ca/ges-qhg/default.asp?lang=En&n=F3E7B38E-1>
- ⁷⁷ FS, page 283.
- ⁷⁸ Shaffer, Marvin. Net Economic Benefits of the Proposed Prosperity Gold copper Mine Project, Prepared for Mining Watch Canada, June 2013. And Stephanie Taylor and George Hoberg. How Electricity Pricing Works in BC. February 17,2011. <http://greenpolicyprof.org/wordpress/?p=508>
- ⁷⁹ FS page 283, Table 21-10
- ⁸⁰ <https://www.bchydro.com/accounts-billing/rates-energy-use/electricity-rates/residential-rates.html>
- ⁸¹ EIS, Volume 18, Appendix 7-1. B
- ⁸² <http://www.unep.org/maweb/en/index.aspx>
- ⁸³ Costanza, Robert; Ralph d'Arge, Rudolf de Groot, Stephen Farberk, Monica Grasso, Bruce Hannon, Karin Limburg, Shahid Naeem, Robert V. O'Neill, Jose Paruelo, Robert G. Raskin, Paul Suttonk & Marjan van den Belt (15). "The value of the world's ecosystem services and natural capital". Nature 387: 253–260.
- ⁸⁴ See Chen and Mintz at endnote 74
- ⁸⁵ FS 16.6
- ⁸⁶ EIS Appendix 7.1-b. page 8
- ⁸⁷ Tsigaris, P. (2014), "An economic assessment of the possible health impacts from deteriorating air quality in Kamloops", Clock Theatre, Thompson Rivers University, Kamloops, B.C., sponsored by TRUFA Human Rights and TRU ECO.
- ⁸⁸ Wilson, Sara, (2009). "The Value of BC's Grasslands: Exploring Ecosystem Values and Incentives for Conservation." Report submitted to Grasslands Conservation Council of British Columbia. Access at: <http://www.bcgrasslands.org/learn-more/our-publications>
- ⁸⁹ Dr. Dennis Karpiak, M.D., FRCPC, FCCP.; Ken Blawatt, B.Sc. (M.E.), MBA, Ph.D., (P. Eng.); et al. Economic, Health and Environmental Evaluation At Full Cost for the Proposed Ajax Mine. Kamloops British Columbia, August 30, 2014. page 13
- ⁹⁰ Personal communication with ANDA staff member.
- ⁹¹ Ibid. page 15
- ⁹² <http://tempestlivesvr.kamloops.ca/online/taxestimator/pte-process.asp>
- ⁹³ FS, page 9-6, page 211
- ⁹⁴ For a discussion of potential costs to roadways caused by slurry trucks, see: <http://www.thesudburystar.com/2015/02/21/critics-express-doubts-about-maley-road-project>
- ⁹⁵ A survey of 100 doctors in the region with a 75% response rate, indicated that 50% would move away if the mine were built.
- ⁹⁶ Social effects from mine activity including increased alcohol consumption and drug use have been well-documented. Shandro, Janis A, Marcello M. Veiga, Jean Shoveller, Malcolm Scoble. Perspectives on community health issues and the mining boom–bust cycle. Resources Policy: The International Journal of Minerals Policy and Economics. 25 January 2011. "During bust times, mental health issues such as depression and anxiety were reported. Overarching community health issues prominent during both boom and bust periods include burdens to health and social services, family stress, violence towards women, and addiction issues." <http://www.infomine.com/library/publications/docs/Shandro2011b.pdf>
- ⁹⁷ CSRM. Research Paper 8.2007. http://www.csrminf.com/docs/SEIA%20for%20Mine%20Closure_Final%20Draft.pdf. See framework for costing in the Appendix.
- ⁹⁸ <http://www.excelsiormining.com/index.php/projects/2-uncategorised/494-detailed-comparison-tables-of-the-2014-pfs-and-the-2016-updated-pfs-for-both-the-acid-plant-and-no-acid-plant-options>
- ⁹⁹ Premium calculated at 50% higher than the current \$7 million in the FS for insurance and property taxes. FS pages 284-285
- ¹⁰⁰ <http://sedar.com/DisplayProfile.do?lang=EN&issuerType=03&issuerNo=00002894>
- ¹⁰¹ World Bank average copper price for March 2016 was \$2.09 (\$4599US/mt) <http://pubdocs.worldbank.org/pubdocs/publicdoc/2016/3/633811457027702995/CMO-Pink-Sheet-March-2016.pdf>
- ¹⁰¹ The World Bank forecast for copper prices published in January 2016 can be found at <http://pubdocs.worldbank.org/pubdocs/publicdoc/2016/1/548631453821462743/CMO-Jan-2016-Historical-Forecasts.pdf>



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