Economic, Health and Environmental Evaluation

At Full Cost for the

Proposed Ajax Mine

Kamloops British Columbia, August 30, 2014

Submitted by Advisory Team;

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Preface

The report is the result of careful deliberation by qualified professionals who have spent considerable time studying the potential effects of an open pit mine next to Kamloops. Hundreds of documents and interviews were considered in compiling the report; the result of hours of research into the consequences of open pit mining on communities.

The economic evaluation was developed using governmental, industry and individual data with the intention of spanning the range of values and making conservative estimates of wages, economic contribution, pollution clean-up costs for AMD, site remediation and other reconstruction costs.

Health data were extracted from national and international studies that tracked the effects of airborne particulate, chemical air contamination, dust accumulations and the deleterious effects on pulmonary as well as cardio systems. These coalesced in the cost evaluation set out in Dr. Peter Tsigaris' report of March 10th, 2014, at Thompson Rivers University which has been incorporated into the report.

Environmental issues relied on studies on riparian systems, ground water contamination and the destruction of natural habitat including fauna and flora effects.

This report takes into account the announced changes to the layout of the Ajax Mine. However the shifting of the rock stock piles will likely have little effect on the dust and environmental pollution factors. Moreover there is some question about the burial of the Kinder Morgan pipeline under a mountain of tailings that may cause future concern unless it is relocated as Kinder Morgan have recently suggested.

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Table of Contents

Preface	2
Executive Summary	4
1.0 Economic Benefit from Ajax	6
2.0 Economic Cost of Cleanup	7
3.0 Economics Costs of Health & Welfare	8
4.0 Economic Costs in the Environment	11
5.0 Tourism and Recreation Costs	12
6.0 Urban Costs	12
7.0 Governmental Costs	14
8.0 Corporate Governance - KGHM	16
9.0 Conclusion	17
Appendix A – Issues OF Concern at the Health & Welfare Level	20
Appendix B - Summary of Concerns Regarding Effects of Mining	20
Appendix C - Concerns At Environmental Level	22
Smithsonian Article Gold Mining	23
Appendix D - Faro Mine Site Remediation	25
Appendix E - Analysis of Electrical Requirements	28
Appendix F – Real Estate Comments	31
Appendix G – Ajax Mine Site and City of Kamloops.	32
Endnotes - References	33

Economic, Health and Environmental Evaluation
Of the Proposed Ajax Mine Operation in Kamloops B. C.

Executive Summary

The proposal to develop an open pit mine immediately adjacent to the City of Kamloops, on the southern boundary of the Aberdeen community presents a number of challenges along with disparate opinions in regard to the value of the operation to people in the city and immediate region.

The mine promises some economic benefit to the area which may improve the local employment and add to the region's economy. Commensurately, there are negative aspects in the form of costs that will likely accrue to the region because it may be taking most, if not all of the responsibility for the clean-up from the operation. Moreover, there will be ongoing negative effects and costs that will arise from social, health and welfare issues. To this can be added the environmental losses that will affect the region for centuries to come.

On balance the mining operation will cost more than it is worth. The net economic benefits are out-weighed by a heavy total cost to all residents even as it generates billions of dollars in profit for the promoters and owners of the mine.

The problem arises from what will be created during, and will remain after the operation is finished. Mining companies leave behind devastated landscapes that for centuries to come, remain an eyesore and serve as a source of pollution harmful to natural life around it. There is a concern the Ajax mine site will follow that model. It is an historical fact in Canada that as a mining operation closes out its operations it takes on the status of an abandoned, orphaned mine at which point its detritus becomes the responsibility of people in the region, and Canadian governments. The Giant Mine in Yellowknife for example, left behind 237,000 tonnes of arsenic trioxide stored in underground chambers[1]. It will cost billions of dollars to address the situation[2]. Then there is the Faro Mine Site in the Yukon that will require a clean-up at a cost of $2.4 billion[3]. Closer to home and seventeen years after the Tech-Afton ceased operations the remediated tailings remain a concern regarding dust contamination.

The economic facts of the proposed Ajax mine are as follows; the operation is expected to provide a total of $2.195 billion in economic benefits, primarily from the jobs that are promised by KGHM. However this will be offset by the $6.147 billion that will be absorbed by the public through indicated subsidized electricity, clean up and site mediation costs, lost real estate values and lost property tax revenues as the mine expands its output and seriously begins to impact on the health and well-being of citizens in the city of Kamloops.

There is no valuation in the analysis for costs that would be attributed to the premature deaths of several people each year. These adverse effects will persist long after the term of the mine ceases. Nor is there an economic value placed on the long term effect on the health of the population, particularly of young children as they play and go to school in the shadow of the mine. And of course there is no valuation set out to cover the “cost” of an environmental scar that will forever mar the southern edge of the city.

1.0 Economic Benefit from Ajax Mine

The primary benefit will be the employment that is provided by the operation and the support services for its maintenance. The company states that the "Ajax Project will contribute up to $550 million dollars in federal and provincial taxes, $210 million in British Columbia Mining Act tax, and $110 million in municipal taxes. Additionally, all levels of government are expected to benefit from increased indirect taxation arising from income, property and consumer taxation from business and employees working for or servicing the Ajax Project." Much of the contribution to federal and provincial coffers will be reflected through payroll tax and is represented in the wage contribution to the economy. However the corporate taxes that are implied are different. Mining companies do not have much success in contributing to the corporate tax load. In most cases they avoid paying any corporate taxes[4].

The company's feasibility study expects it will hire people for $110,000 annually[5] which is applied to the 500 jobs that Ajax estimates will be provided from the operations. The assumption is that this is an averaged figure that includes administrative, transport, maintenance and direct support labour. It should be noted that the Ajax 2012 study pegged the wages closer to $90,000 per annum. However the $110,000 figure will be used to reflect benefits and other considerations.

A 2011 analysis of the economic impacts of mining in British Columbia[6] found that 21,112 people were employed directly in mining (2% of BC's labor force), with an additional 16,590 jobs indirectly created. On this basis Ajax will produce 393 indirect jobs. Currently the Kamloops annual wage rate is $29.00 per hour.

It should be noted that these benefits are likely overstated. The analysis does not take into account the opportunity cost evaluation. By including the wages and salaries there is the assumption that the workers who would be employed at the mine will be drawn from the individuals who are not presently working or are chronically unemployed in the Kamloops area. It is likely people who are already working will leave jobs they now have at other locations and move back closer to home. However for purposes of the report the employment factor is taken at face value.

The mine anticipates a three year construction program that will employ as many as 680 people taken at $70.00 per hour averaged and including benefits. The estimate here is conservative since the number of workers will vary considerably, depending on what phase is being constructed. The estimations include startup conditions and assumes full employment from the fourth year on.

Finally assuming a multiplier effect from the construction work as equivalent to the construction estimate provides a further benefit estimate.

The total estimated benefit is:

Direct employment, $55,000,000 annually over 20 years -	**$1,200,000,000**
Indirect employment, $22,800,000 annually " " " -	**$ 456,000,000**
Design & Construction jobs = 680 x $140,000 over 3 years -	**$ 286,000,000**
Construction creation of additional temporary jobs	**-$ 143,000,000**
Mining Tax benefits*	**-$ 210,000,000**
Municipal taxes paid*	**-$ 110.000.000**
Total benefit	**$2,195,000,000**

***See 7.0 Governmental Costs**

2.0 Economic Cost of Cleanup

The major cost to the citizens of Kamloops and the region will come from the need to clean up the effects of poisonous and toxic materials that are a part of the operation. Mining operations in Canada have had a very costly and disastrous effect on the country's environment. "Abandoned mines are a major concern in Canada. Mines for which the owner cannot be found, or for which the owner is unwilling or financially unable to carry out clean-up, are a key source of pollution in Canada. There are at least 10,000 of these "toxic orphans" leaching often-acidic mixtures of cyanide, lead, cadmium, mercury and radioactive wastes.[7]"

On an international scale the mining industry has had a devastating impact on ecosystems worldwide[8]. The U. S. Environmental Protection Agency has reported that 40 percent of watershed headwaters in the western United States have been contaminated by mining operations[9]. For example, the EPA is spending $30,000 per day to treat contaminated mine drainage at the Summitville Mine in Colorado, which will cost an estimated $170 million to clean up. Remediation of the half-million abandoned mines in 32 states may cost $35 billion and more.

A considerable report[10] on the "environmental, social, and economic problems posed by orphaned and abandoned mines summarizes the state of Canadian law on the issue. As already noted there are an estimated 10,000 such mines in Canada and more than 5,700 in Ontario alone, with cleanup costs expected to be in the billions of dollars, paid for predominantly by

taxpayers. Current laws operate on the assumption that a responsible person is available, upon whom regulators may impose obligations. Under these laws, an orphaned or abandoned mine, which by definition has no responsible person, is implicitly presumed not to occur." Since Ajax principals, KGMH specifically have not revealed how they will deal with clean-up of the area after the mine is exhausted it might be assumed they will allow the operation to fall into the abandoned and orphaned condition. While the company may post a performance bond regarding cleanup the amount will not likely cover the full cost and most cleanup costs would be borne by Canadians.

The Faro Mine in the Yukon[11] serves as a model of remediation costs. "The mine processed between 5,000 and 9,300 tonnes of ore per day for 29 years at the Faro site. More than 320 million tonnes of waste rock are piled around the mine. Of the 70 million tonnes of tailings at the mine, 55 million remain in the Rose Creek Valley. The problem with tailings is acid-rock drainage, a set of chemical reactions that create acid when sulphur-containing rock contacts water and oxygen. The acid dissolves metal in surrounding rocks and leaches into the ground and surface waters, harming fish and wildlife.

This operation is about one seventh the size of the Ajax site. Ottawa will spend upwards of $900 million over several decades to clean up the Faro mine. After that, it's estimated up to $3 million will be spent annually for an estimated 500 years to ensure the damage is contained." The total expected cost for this operation will probably reach $2.4 billion in current dollars.

The Ajax mine has two conditions that will require treatment. The first is the site itself which may include a large water filled hole in the ground, devoid of any marine life, acidic as a lemon, surrounded by a moonscape of acid draining rock piles with dust generating fields. The second will be tailings, the source of acid mine drainage[1] (AMD) that is a major issue regarding ongoing pollution and environmental damage. The mine is expected to have a large man made containment pond that will hold the half billion tons of tailings from the process. This method is arguably considered to be the safest method for dealing with the contaminating effects from spent leaching operations. Wet drainage ponds are, however subject to leakages[12], spillages[13] and require maintenance long after the mine has closed down. A risk assessment of the two types of treatment – dry tailings storage or wet storage in a lake or containment area – indicates that in the long term dry storage is preferred, particularly in a populated area[14].

Nevertheless the most positive manner of treating the material is remediation. In either case this requires the treatment of the tailings material. The method is to remove water from the stored tailings rendering it into a "wet tailings" condition, then to stabilize the 500 million

[1] Also referred to as acid rock drainage, ARD.

tons and cap it to prevent water getting in and thence into the environment from seepage and so on. Treatment calls for a "wicking" of the material which can cost[15] as much as $25 per cubic metre to stabilize the material followed by capping. According to McKenna,[16] "Water capping of soft tailings is probably the least expensive alternative in most cases, but usually involves long-term maintenance of a water-retaining dam. There is sometimes cost associated with reclaiming the shoreline and to ensure the lake is productive (When lakes are used)[2]. Often the lake must be capped with water pumped from a local river or natural lake. Costs of this method are often in the order of $3 to $5 /$m^2$." Thus the cost to remediate the wet tailings after the mine has closed could cost as much as $25[3] per ton plus $5 per metre for the pond area.

Site remediation can cost as much as $410,000 per hectare[17]. In this case a lesser value is taken on the basis of climate and the ore composition. It may be that the Ajax site could be remedied for about one-quarter that amount, although if the more noxious pollutants such as arsenic, cadmium and other deadly chemicals are strongly present, a higher value could apply. It is projected that not all of the Ajax site with 2,400 hectares will be contaminated. There can be anywhere from 500 to 2000 hectares that will be affected by contaminants that will need neutralization and remediation to bring the soil back to growth conditions. The area containing the tailings pile (or proposed 600 hectare tailings pond), waste rock and operations will be 1500 hectares which will likely be contaminated. The contaminants will fill the air over the region and seep along the Peterson Creek and aquifer drainage system to the Thompson River.

The tailings will be the most adulterated with sulphides and heavy metal contaminants that will be discharged into the environment through air pollution (dry) and/or ground water pollution. The estimates for dealing with tailings material which has the consistency of talcum powder are varied. Most authorities agree that tailings piles (dry stacking) regardless of technology will remain an eternal source for contamination. However, there are methods for dealing with the problem and taken from B. C. Mining Council estimates it runs about $9.80 per ton[18] of tailings. Here the assumption is that there will be a cost somewhere between $1 and $25 per ton for wicking or nearly $10 per ton for remediation.

However to be conservative the estimate used will be half the latter amount. Ajax promises to produce over 500 million tons of tailings. This is in addition to the 1.148 billion tons of rock excavated from the pit. There will be contamination from this source, but it is not included in the estimates at this time. The following is calculated as the requirement to return the site to as close a neutral environment as possible.

[2] When a lake is used as a tailings pond.

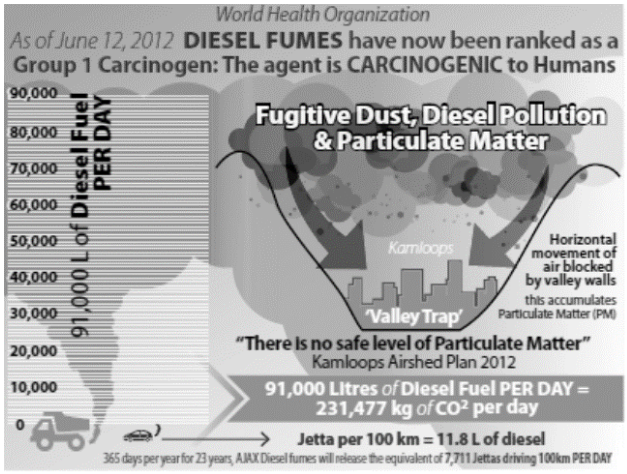
[3] In this case one cubic metre is considered equal to a ton of material.

Site Clean-up

Site remediation of 1500 hectares	**-**	**$ 150,000,000**
Tailings Treatment of 500 million tonnes	**-**	**$ 2,500,000,000**
Total		**$ 2,650,000,000**

3.0 Economic Impact on Health and Welfare

There is not a mining operation anywhere in the world that does not create some pollution with an effect on the health and welfare of employees and people in the vicinity. It is the primary reason that mining activities are located as far from urban areas as possible. Highland Valley Copper, for example is located 17 kilometres from Logan Lake where most of the workers live. In fact there are at least twenty new applications for new copper and gold mines in British Columbia averaging over ninety kilometres from any large or small populated area. Only Ajax sits proximate to a large population centre; the city of Kamloops with the promise of expelling thousands of tons of noxious material into the city's breathing environment. What makes the Ajax operation so critical is that Kamloops is located in a valley that is subject to inversions that trap air pollutants in the city.



Six common pollutants are normally found, in varying concentrations in the region. In each case the amounts will be increased due to mining activities.

- Ozone - created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight. Heavy use of huge diesel powered trucks will increase this in the region
- Particulate Matter – from fine, dry-stack tailings piles**, road dust, mining blast of 45,000 tons of explosive annually, about 130 tons daily
- Carbon Monoxide – motor vehicle emission
- Nitrogen Oxides – motor vehicle emission
- Sulfur Dioxide – dust from tailings** and waste rock piles
- Lead, mercury,chromium6, arsenic, cobalt, manganese, etc – dust from tailings and waste rock

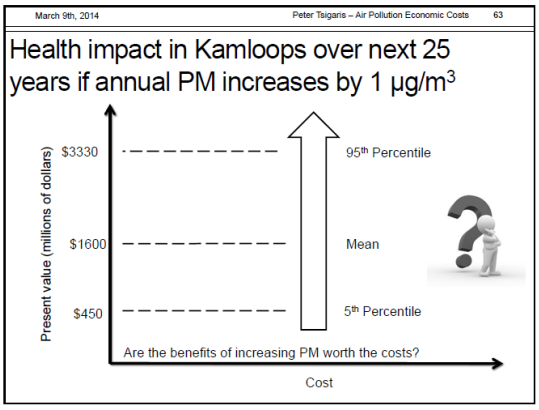
** From contamination of site and dry stacks if used.

The flow of these pollutants into the atmosphere, carried by prevailing winds over the City of Kamloops will promote serious health problems. There are five key issues and sources for health cost increases that will impact on the community;

a) Increased mortality,
b) Emergency room visitations from distress including heart attacks,
c) Doctor visitation, school absences, lost work days,
d) Respiratory issues, increased asthma, medications,
e) Lung function problems,

The danger to health takes place as the levels of these pollutants, particulate matter in particular are increased[19]. Of more concern is the size of the particulate matter. One of the more important studies was made in Sweden[20] which finds that, "Over one hundred epidemiological studies world-wide have demonstrated exposure to ambient PM in urban concentrations to be associated with considerable adverse health effects (WHO, 2006). These include increase in respiratory symptoms, worsening of asthma, chronic obstructive pulmonary disease (COPD), airway infections including pneumonias as well as worsening of cardiovascular diseases like heart attacks and stroke [1]. Additionally, exposure to ambient air pollution has been associated with substantial increases in death from respiratory and cardiovascular causes, which have not been restricted to elderly age groups but may also be observed in children. An increase in infant mortality with particulate matter (PM) air pollution has been demonstrated from several continents [2, 3]."

Figure 1 Medical Cost



The study goes on to confirm that the smaller the particulate size the more dangerous to human health. In the case of the Ajax mine, it is evident that the size and increase of particulate from the associated noxious material will go beyond the current levels of particulate by at least one microgram per cubic metre. That being so the probable cost increase will be as follows:

Mean valuation costs due to health affliction $1, 600,000,000

Note: It is likely particulate values will be much more than the mean value shown on Figure 1. Also the effects will be felt long after the mine has closed.

4.0 Economic Costs to the Environment

The environment in the proposed Ajax boundary is a pristine grassland with light forest growth and a number of recreational lakes with drainage by Peterson Creek that flows into the Thompson River. The lakes are well known for fishing and outdoor activities and the landscape is dotted with cattle and wildlife. That will all change due to the likely tainting effects from the mine that will include:

1. Contamination of the Atmosphere over the city and region
2. Pollution of water table
3. Removal of Jacko, Inks, Jaks and Wallen Lakes as recreational lakes due to probable contamination. Elimination of Goose Lake.
4. Contamination of Peterson Creek
5. Removal of 8,000 hectares of grass lands from agriculture
6. Dust across the city of Kamloops
7. Potential loss or degradation of fish stocks along the Thompson River and Adams River systems.

The mine will realize all these which would also load the creek's drainage system with toxins and dissolved impurities. The flow into the Thompson River system from the creek and natural ground water drainage will carry with it sufficient pollutants as to seriously affect or kill much of the Thomson River marine life. It is estimated the Ajax mine will require 3.08 billion gallons of water annually to feed the operation. That is a block of water one mile square and 17 feet deep each year.

Much of it will return to the Thompson carrying with it the toxins from the tailings and mine site. An example of the contaminating effect is the "Galactic Resources Summitville heap-leach gold mine in Colorado, the leach pad was leaking only six days after the first cyanide hit the heap. From there the problems multiplied and by June 1990 cyanide had killed the Alamosa River for 17 miles downstream of the mine. U.S. taxpayers have been saddled with the $110 million clean-up of the mine site, abandoned in 1992 by its Canadian owners[21]".

But there is another more comparable reference: "The Tsolum River on Vancouver Island used to run clean and clear from its source near Mount Washington to the Courtenay estuary. For thousands of years, the river provided rich runs of coho, pink, chum and cutthroat salmon, as well as steelhead trout that weighed up to 23 pounds. In 1964, the Mt Washington Copper Mining Company moved into the upper Tsolum watershed and killed the river. It was a small mine, high up in the mountain, disturbing an area of only 13 hectares. But it left behind a toxic legacy that has spread far beyond the mine's perimeter[22]. With its demise came the loss of the Tsolum river fishery of pinks, coho, chum and steelhead, which had generated as much as $2 million per year for the community."

How does one account for all the losses that will occur to the landscape and environment? There will be fishery losses along the Thompson River system. It will affect the salmon run and the fish population. In turn there will be a consequential impact along the food chain including salmon spawning feed and other fauna. Then there is the potential effect on First Nations people who rely on fishing for food. What are the costs from lost cattle and agricultural products? Placing an economic value on these is difficult. Some part of it may occur in losses in Tourism. However, accepting the foregoing observation for the Tsolum as a major loss of $2 million annually for at least three years after the mine closes as applying to Kamloops and region indicates:

A loss of at least **$46,000,000**

5.0 Tourism & Recreation Losses

Since the environment has a significant effect on tourism, including visitation to the region and to see wildlife generally, the mine will have a serious effect on this economic unit as well. Visitors to Kamloops come from Europe, Asia, Oceana (South Pacific), and the rest of North America. In the past few years there has been an increasing number of travelers from China and South America. These tourists seek the clean vista of the Canadian natural environment. However, a survey by the Kamloops Voters Society indicates that a majority of respondents, (over 71 percent) expect the mine will have a negative impact on tourism[23]; the attraction to the country will be greatly diminished from the dust and pollution of a mining operation in the city.

In 2011, the B. C. tourism industry generated $13.4 billion in revenue, a slight increase of 1.4% from 2010 and a 39% increase over 2001[24]. There were six million visitors to the province for an average expenditure of $2,250 per visitor and it is estimated Kamloops received about 70 – 80,000 visitors.[25] The data suggests the city has a $180 million market and the effects from the mine will cut the rate by at least 5 – 10%, given a dust laden environment with restricted fishing. That being so this would account for a loss of about $10 million annually or:

Loss from decline in Tourism **$200,000,000**

6.0 Urban Losses

There will be an impact on assets and other factors within the city and region. 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. In other jurisdictions where mining operations moved in the resulting losses were much higher. The average house value in Kamloops[26] 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. (See Appendix B, Comments on Real Estate Values)

Surveyed citizens also expressed their judgment that the city Tournament sector would be negatively affected as would the attraction of Thompson Rivers University as an educational destination. Thompson Rivers University attracts students from all over the world as well as from the region and country. The estimated contribution to the economy from the 9,600 FTE students, of whom over 2,000 are international students, is an estimated[27] $344 million each year. However, a mining town is not usually looked on as an attractive place to attend a university or college. It is suggested there would be at least a five percent decline as a desirable place to attend university or $ 17.2 annually and $342 million over the life of the mine.

Finally, Kamloops prides itself as the Tournament Capital of Canada. Each year over 180 events take place in the city, drawing young athletes from across the region and continent. The Kamloops Tournament Capital Center drew $3 million in revenue for 2013. Further, there is an estimated $11.7 million annually[28] that comes into the city directly from the Tournament events. When combined with the estimated draw on tourism data for the 20 to 40,000 people from outside the city who attend and support the event there is an estimated $68 million in Tournament revenue into the city. It is not likely there will be much willingness to expose young lungs to the anticipated air pollution and there could very well be a decline if not a demise of tournament activities. As an estimate, assuming the effect is not as dramatic as might be suggested, there is a likelihood of a 10 percent decrease or $136 million over 20 years.

Of course the valuation does not take into account the potential legal liability for encouraging young people to compete in the area with a bad air quality rating. Kamloops does,

on a number of occasions each year, fall below WHO standards for air quality. This condition will likely be very much increased with the Ajax operation as will the potential liability.

Urban Losses	
Losses in Real Estate Value	**$ 155,000,000**
Loss in student revenue	**342,000,000**
Loss in Tournaments	**$ 136,000,000**
Total	**$ 633,000,000**

7.0 Governmental Costs

There are a number of ongoing costs to the public that are associated with a mining operation in addition to the site remediation that must be considered. These are the social and infrastructure costs to support education, health services, roads, governmental services and so on that are normally covered from taxation revenue. The cost of government and all that it provides is added up and becomes the budget for each of the city, region, province and country.

There are three areas that will manifest costs to the public from the mining operation;

(a) Increased costs from usage of roads and other public services, (b) subsidization of the mining operation through power costs and (c) the mining company's fair share of social and infrastructure costs that support the mine and it's personnel.

The Lac Le Jeune road and the Coquihalla will be impacted by additional heavy trucking on these roads. There will be some 100 truckloads daily on these highways, (one heavy truck every fifteen minutes), that will need to assume some responsibility for increased wear and tear on the pavements. The present maintenance costs[29] for this system are taken at $27 million annually. Further, road improvements will likely be needed and some portion of this costing must be to the account of the mining operation.

An additional cost will occur from the flow of dust from the waste rock piles and the mining operation onto the roads. Accordingly, the estimate of a $210 million* payout for provincial mining tax, which translates into $9.1 million per year, will likely just cover the effect of increased trucking. Thus it is a cost to the account of the mine.

There is an imputed agreement between B. C. Hydro and the mine as to the cost of electricity. In its feasibility study Ajax will consume 472 gigawatt-hours of power to fuel the grinding operation. This does not include any other electrical requirements there may be. It is expected that B. C. Hydro will need to build a new hydro station, currently planned as The Site C Clean Energy Project on the Peace River in northeast B.C. It will generate 1,100 megawatts (MW) of

capacity, and produce about 5,100 gigawatt hours (GWh) of electricity each year. It is expected the marginal cost of Site C power will be at least 12.5 cents kW/H. However, the bulk rate for industrial power currently runs about 5 cents. Thus Ajax will be subsidized to the tune of about 7.5 cents kW/H (or $75,000 per GW) assuming Site C construction and operations do not experience any major cost over runs. At 472 GW of power, the total annual subsidy to Ajax will be $35.4 million, or $708 million over the lifetime of the mine.

The contribution of $110 million over 20 years to the municipalities comes to about $4.2 million a year. This will make a small provision to TNRD and Kamloops infrastructure costs but there is some question if it will cover all of the real costs. The flow of dust into the city will have a cumulative effect on roads, buildings and public systems such as water taken from the Thompson River that will require additional services. Therefore, rather than a contribution this amount is looked on as a recovered cost.

Finally it is further noted that governments often grant new businesses special deals and considerations. The report does not include any cost back to taxpayers that might come from such an arrangement.

Accordingly the total cost to government and the people of B.C. and Kamloops is:

Provincial road costs* –	**$ 210,000,000**
Subsidization cost –	**$ 708,000,000**
Local municipal costs* -	**$ 110,000,000**
Total	**$ 1,018,000,000**

*Mining and municipal taxes

8.0 Corporate Governance – KGHM

In a presentation[30] April 13th it was pointed out there is a difference between the science of discussing the potential effect of the mine on the community and what will transpire when it goes into operation. When a mine goes into operation it will usually do what is necessary to maximize output even at the expense of environmental and other directives.

The history of mining corporate default is legend in Canada. In fact the legal system has readily set the standard that allows companies the right to walk away from their responsibilities[31]. A recent Supreme Court ruling[32] encourages corporations to ignore their responsibilities. “The Supreme Court decided that remediation orders, which required Abitibi-Bowater (now Resolute Forest Products) to clean up after years of pollution, are equivalent to private financial claims under insolvency law. The end result is that taxpayers will bear much of the financial and environmental costs associated with cleaning up Abitibi’s industrial sites.”

The over-riding concern is the reputation of companies such as KGHM and how they will perform in meeting their obligations. Mining operations in Canada have a dismal history in regard to social responsibility. There are a wide variety of environmental, social, and economic problems posed by orphaned and abandoned mines which highlights the inadequacy of Canadian law on the issue. This is emphasized by the 10,000 or so mines in Canada with cleanup costs expected to be in the billions, paid for predominantly by taxpayers[33].

Current laws operate on the assumption that a responsible person is available, upon whom regulators may impose obligations. But the laws have no effect on orphaned or abandoned mines. Nor have authorities developed mechanisms for addressing the situation, other than emergency response by governments using public monies to remedy the problem. Consequently it seemingly has been the disposition of mining executives to simply walk away and abandon a depleted mine.

What then is the likelihood that after 20 years when the Ajax operation has run its course the principles will simply walk away? One cannot foresee the future and there is the further inquiry whether governments will redress the legalities that permit these events to occur. In its own country KGHM is not evidently able to address problems associated with pollution from its operations. The European Environment Agency records that pollution cast off by KGHM operations in Poland costs the country $360 million annually[34]. Further to this issue, the Environmental Investment Organization[35] rates KMGH as the "absolute worst" polluter in Europe out of 300 companies cited in the report. Given a company can do that in its own territory and is noted as having a poor environmental record, what can be said for its behaviour in another country or in British Columbia?

9.0 Conclusion

The report has reviewed the costs that would likely occur if a solid effort were made to return the Ajax Mine to a more benign condition; the objective being to leave behind a humanly and environmentally acceptable landscape rather than moonscape. Further, the cost determinations were laid out using qualified references and posing conservative assumptions. It should also be noted that there will be additional ongoing costs. "Although there are a number of ways to reduce the development of acid mine drainage and treating mine effluents, there are no technologies that allow a company to close a mine and walk away from it. In most cases, any mine that exposes metal sulphide-bearing rocks will need to be monitored and potentially treated for hundreds of generations after the last miner has worked there. It could take hundreds to thousands of years for some sites to become "acid neutral" and stop leaching into the environment[36]." It is this leaching that killed the fish life in the Tsolum River. It is this leaching process that threatens the feedstock for salmon in the Thompson River system.

The total costs from the operation of the Ajax mine in the close proximity of the city is $6.147 billion. It is almost equal to the expected gross profit the mine will produce. On the

other hand there is the potential for $2.195 billion in economic gain, although there is some question about the real effect of that. Then again, from an economics perspective it is likely that any benefits from declared wage and salary amounts are somewhat overstated.

But a major issue, given the historical track record of government and mining companies, is that the costs for remediation will not likely be assigned to the operation but rather will be laid onto the Canadian taxpayer, the people of Kamloops and the region. It is hoped that governments will concern themselves with the long term; the fact that people will die, children will suffer and the region will be debilitated.

The report does not make the attempt to assign a cost value to the limitation the mine imposes on city growth. The Kamloops Planning Department has spent much time, money and resources laying out the plan for expansion of the city to the south, toward the Ajax Mine site area. Should the mine become operational that is no longer an option and more money will need be allocated to seek out a new development. The loss that will occur by not being able to expand the growth of the city into the four Special Development Areas (SDA) designated in the city Plan to accommodate 10,000 people and 4,000 dwellings, (AppendixF). This area was chosen because of the relatively easy access and lower cost to accommodate development. With an ongoing mining operation the potential loss of taxation from a potential development worth an estimated at $1,680,000,000. This would represent annual tax revenues to the city of about $134 million annually. However there is also the claim that the development would be located elsewhere although at a higher cost and taxation would not change that much.

Those who claim the short term benefits of jobs for the city should realize that they are imposing a future tax on their children and themselves, perhaps at a time when they are considering retirement and are looking forward to enjoying the region. One can argue the cost estimates are high and not realistic. But it can also be argued that lower costs have been assumed in the calculations and that if one were to apply the higher costs, which could very well take place in the future, the expense would be even more. The Ajax mine will, in effect, impose an estimated net cost of $ 3.952 billion on the people of the area that would represent a tax of about $40,000 on every man, woman and child in the Kamloops CA

Ajax will be an open pit mining operation almost in the city limits. The 20 or so open pit mining proposals currently seeking approval from the BC Environmental Assessment Board are located about 90 km distance on average from any hamlet or town and certainly none are as large as Kamloops. So here is the question; given the options why is there a need for a copper – gold mine almost in a city?

On an economic basis and with regard to the well-being of all people in the region, the mine comes at a price too high. It is not economically viable for the region, environmentally worthwhile nor justifiable from a health and welfare perspective. The potential morbidity and debilitation of the personal health of thousands of people in the region by itself should rule out any attempt to proceed.

APPENDIX A - ISSUES OF CONCERN AT THE HEALTH & WELFARE LEVEL

1. **Worsening of symptoms of lung disease [COPD] with increasing disability, absenteeism, diminished quality of life, chronic hospitals premature death. Most will move.**
2. **Initiate new onset asthma in all ages-mainly children.**
3. **Mine dust will contain particle size <2.5 absorbed through the lung alveoli and circulated through the body with heavy metals attached to result in increased occurrence of all type cancers, increased early dementia, increased illness and death from heart and stroke events**
4. **Lead pollution causes frontal lobe disease leading to spikes in juvenile violent behaviour.**
5. **Increase incidence birth defect through in utero exposure to heavy metals and toxic fumes.**
6. **Impaired in utero brain development.**
7. **Diminished IQ by 5 points in children.**
8. **Increase in severe prolonged depression [Am. Psychological Association]**
9. **Decline in cognition[thinking skills]**
10. **Increase in suicide American Journal Psychiatry.**
11. **Decline in quality of life and happiness living in an open pit mine city.**
12. **Chromosomal abnormalities acquired in utero passed on to subsequent generations.**
13. **Doctors already in short supply will leave for greener pastures safer, more pleasant, attractive communities.**
14. **Recruitment of Doctors and paramedical personnel will fail to meet needs.**
15. **TRU will see declining enrolment from domestic and international sources.**
16. **Recruitment and retention of professionals as a whole becomes a struggle with high turnovers.**
17. **Rejection of Kamloops as a site for large and small business expansion.**
18. **Collapse of Health Services due to increased incidence of disease/disability and declining complement of Health Care Workers.**
19. **Conventions meetings continuing education conferences seminars will divert to more appealing locales.**
20. **Diesel fumes from burning 91,000 l/day drifting over the city will exert their #1 cancer causing effect.**

APPENDIX B - SUMMARY OF CONCERNS REGARDING EFFECTS OF MINING

21. **Accelerated real estate home listings mainly SW sector and no buyers.**
22. **Loss of residential home municipal tax base.**
23. **Taxpayers bear the burden of cost of massive reclamation if in fact it even occurs**
24. **Unsustainable extraction of water from the Thompson River System.**
25. **Potential loss or degradation of Adam's River Sockeye run.**
26. **Threat posed to two major aquifers under the proposed operations.**

27. **Loss of BC Lions practice activity.**
28. **With "foot in the door" mine will expand from West of the Coquihalla to East of the Merritt Hwy and shores of Kamloops lake to Lac le Jeune. In the industry it's called an expanding footprint.**
29. **Among the recently purchased land and mineral claim parcels is one from NuGold for future development which is 400 meters from the Merritt Hwy ideally situated for a smelter.**
30. **The existence of Knutsford is threatened by purchase of land and mineral claims within the area.**
31. **Vacationers will re-route through the Okanagan and the connector to avoid Kamloops transit and overnights.**
32. **Collapse of the Hospitality Industry.**
33. **No further Communities in Bloom awards.**
34. **Threatened Riverside Park activities due to heat and inversion layer creating Air Quality Health hazard as defined by World Health Organization.**
35. **There will exist a moral if not also legal responsibility for the City of Kamloops to cancel scheduled outdoor tournament activities for those days when the Air Quality Health Index would prohibit strenuous exercise according to World Health guidelines.**
36. **Kamloops air quality has already frequently exceeded levels of particulate matter [PM 2.5] as recommended by BC Air Care Objective.**
37. **Air traffic will be further compromised by worsening smog [water vapour+dust=smog].**
38. **Total curtailment of growth of Kamloops into the SW sector with few options.**
39. **Disruption of KAMPLAN.**
40. **Kamloops is turned into an ugly pollution infested city with a deepening and widening open pit, constant dust, multi-story mountains of rock and debris and never ending heavy laden truck traffic and the prospect of city roads and highways traversing through open pit operation territory as occurs at other World sites.**
41. **Will you readily acknowledge residency in an open pit town as dissimilar from a Community in Bloom?**
42. **Startup jobs are not reserved for Kamloops people. Miners may come from foreign lands as is occuring at other mine sites.**
43. **Blasting damage daily.**
44. **Mine operations are too close to established schools and neighbourhoods.**
45. **A pittance of tax dollars for the municipality [14%] the balance to Federal and Provincial coffers as general revenue.**
46. **Processing of ore will create offshore and not local jobs.**
47. **Heavily laden mine trucks daily destroying our roads.**
48. **Constant Air Quality Alerts as on Jan 25/14.**

for the municipality[14%] the balance to Federal and Provincial coffers as general revenue.

APPENDIX C. CONCERNS AT ENVIRONMENTAL LEVEL

49. Contamination of the Atmosphere over the city and region

50. Pollution of water table

51. Destruction of Jocko, Inks, Jaks and Wallen Lakes

52. Destruction of Peterson Creek

53. Destruction of 8,000 hectares of grass lands

54. Production of 300' high rock waste mountain

55. Production of 500' high rock waste mountain

56. Dust across the city of Kamloops

57. Decimation of fish stocks along the Thompson River

Smithsonian Article Gold Mining

The Environmental Disaster That is the Gold Industry

The mining industry has had a devastating impact on ecosystems worldwide. Is there any hope in sight?

By Alastair Bland smithsonian.com
February 14, 2014

A global campaign to boycott what activists are calling "dirty gold" gained its 100th official follower three days before Valentine's Day.

The pledge was launched in 2004 by the environmental group Earthworks, which has asked retail companies not to carry gold that was produced through environmentally and socially destructive mining practices. Eight of the ten largest jewelry retailers in the United States have now made the pledge, including Tiffany & Co., Target and Helzberg Diamonds. The No Dirty Gold campaign is anchored in its "golden rules," a set of criteria encouraging the metal mining industry to respect human rights and the natural environment.

While the list of retailers aligned in their opposition to dirty gold continues to grow longer, most gold remains quite filthy. The majority of the world's gold is extracted from open pit mines, where huge volumes of earth are scoured away and processed for trace elements. Earthworks estimates that, to produce enough raw gold to make a single ring, 20 tons of rock and soil are dislodged and discarded. Much of this waste carries with it mercury and cyanide, which are used to extract the gold from the rock. The resulting erosion clogs streams and rivers and can eventually taint marine ecosystems far downstream of the mine site. Exposing the deep earth to

air and water also causes chemical reactions that produce sulfuric acid, which can leak into drainage systems. Air quality is also compromised by gold mining, which releases hundreds of tons of airborne elemental mercury every year.

Gold has traditionally been a gift of love, and, not surprisingly, jewelry sales spike around Valentine's Day. According to a recent survey released by National Jeweler, about 20 percent of Americans who planned to give a Valentine's Day gift this year said they would be buying jewelry—sales estimated to total about $4 billion. Thus, activists see Valentine's Day as a prime opportunity to educate consumers and stifle the trade of dirty gold. Payal Sampat, Earthworks' director of the No Dirty Gold campaign, wants consumers to understand the back story of the gold industry. This, she believes, would spur an improvement in mining practices.

"We believe gold and metal mining can be done much more responsibly," Sampat says. "It's feasible, but consumers need to think about the impacts they have when they buy jewelry."

But the demand for gold is tremendous now. Several months ago, gold's value hit $1,800 an ounce. It has since dropped to roughly $1,300—though that's still five times its price in the late 1990s. The money to be made at all levels of the industry, from laborers knee-deep in mud to executive officers reaping thousands of dollars a day, creates powerful incentive to find gold—even though doing so may now be harder than ever. Alan Septoff, communications manager for the No Dirty Gold campaign, says that easily accessible gold has become scarcer and scarcer through time. "What we have left in most mines is very low-quality ore, with a greater ratio of rock to gold," Septoff said.

This, he explains, makes the energy required to mine that gold—and the waste and pollution produced in the process—proportionally greater and greater. In other words, dirty gold is only getting dirtier. What's more, gold that cannot be traced back to some level of deforestation, air and watershed pollution, and human injury and death is virtually nonexistent, according to Septoff.

"There is no such thing as clean gold, unless it's recycled or vintage," he says.

But James Webster, the curator of mineral deposits at the American Museum of Natural History, says the story is not as dark and one-sided as some may spin it. A clean gold mining industry is indeed possible, he says. Moreover, the industry is not as destructive at it may seem. Some states have strict—and effective—regulations on the handling of mine waste and runoff, Webster says.

"Cyanide is not as nasty/scary as it may sound," he wrote in an email. "Its half-life is brief in the presence of sunlight."

Yet the Environmental Protection Agency has reported that 40 percent of watershed headwaters in the western United States have been contaminated by mining operations. Many of these are tiny sites, and there are, overall, roughly 500,000 defunct metal mines in 32 western states that the EPA has plans to clean up. Remediation of these sites may cost more than $35 billion.

One of the largest open pit mines is located near Salt Lake City—the Bingham Canyon Mine. The deepest mine in the world, it is about 4,000 vertical feet from its rim to the bottom. Bingham Canyon is known as a copper mine, but the site yields gold, too. More than 600 tons of gold have come out of the mine since its opening in 1906, and every year, $1.8 billion worth of metals are produced here.

Another infamous American mine is the Berkeley Pit, in Montana. This mine made the nearby town of Butte rich and prosperous for a time, but the site was eventually exhausted of riches—including copper and gold—and retired. In the decades since, water has seeped into the Berkeley Pit and filled the mine, and today it contains one of the most lethally polluted lakes in the world. The toxic, acidic water killed 342 snow geese that landed here in 1995. The water, many people fear, will eventually taint the region's groundwater supply.

The Grasberg Mine, in Indonesia, is one of the largest gold mines in the world and is owned by American company Freeport McMoRan. The Grasberg Mine is also located smack in the middle of Lorentz National Park, creating such a huge scar on the Earth that can be seen from space. The mine dumps about 80 million tons of waste debris into the Ajkwa river system every year, according to Sampat at Earthworks. Another American company, Newmont, owns the Batu Hijau mine, also in Indonesia. This operation dumps its waste into the ocean near the island of Sumbawa.

While the EPA struggles to remediate and restore almost countless mine sites in the United States, and while activists work to stem the tide of demand on the gold industry, efforts are underway to develop more open pit mines. Among the most controversial is the Pebble Mine, proposed for Alaska's Bristol Bay region. The project, critics say, could destroy or seriously damage unspoiled wilderness, wildlife habitat, indigenous cultures and the region's sockeye salmon fishery. Of the Pebble Mine, Septoff at Earthworks said, "There could not be a clearer example of a short-term profit gained at a long-term loss."

The road ahead for the Pebble Mine's proponents will not likely be a smooth one. A major investor in the project backed out late last year, and the jewelry industry—which uses about half of all gold mined each year —has expressed opposition to the project. Several days ago, Tiffany & Co.'s chairman and CEO Michael Kowalski told JCK Magazine that developing the Pebble Mine site will almost certainly do more damage than it's worth to the environment, the region's salmon-based economy and the face of the gold industry itself.

"The possibility of this ending in disaster is so high, it's hard to see how any mining company could go forward," Kowalski told JCK.

The EPA released a report in January in which the agency said development of the mine would carry many risks of damage to the ecology and culture of the region.

Read more: http://www.smithsonianmag.com/science-nature/environmental-disaster-gold-industry-180949762/#tq1WFBjzpiDxMxWh.99

Appendix D Faro Mine Site

Faro Mine an 'Expensive Lesson' for Government and Business

Yukon News Thursday July 31, 2008
Jeremy Warren/Yukon News
http://www.yukon-news.com/letters-opinions/faro-mine-an-expensive-lesson-for-government-and-business



The main tailings pit at the Faro minesite on Tuesday. 55-million tons of contaminated silt and sand fill the pit, with Rose Creek diverted around it.

FARO

Faro is branded as Yukon's Best Kept Secret, but it's the territory's dirty little secret that keeps the skeletal town under scrutiny.

Ten years after the Faro lead-zinc mine permanently closed, the site is poised for a cleanup that could cost billions of dollars over five centuries.

Time is running out, too.

During the mine's operation, lead dust was scattered well beyond its boundaries.

Concerns about severe contamination of aquatic and wildlife ecosystems have made the Faro reclamation an urgent project.

More than 70 million tonnes of ore tailings, a fine, sand-like material, remain in an ecologically sensitive area.

The tailings — piled an average of 14 metres deep, 40 metres in some spots — are held in a massive reservoir, an open sore that oozes orange and pink water into the once-pristine valley.

A group of Faro students who recently toured the site calculated the pit of contaminated material could hold 30 million bison.

A tour bus passes the site, which resembles a sickly grey, frozen lake. It always gives Faro Mayor Michelle Vainio a chill.

“The first time I saw the pit I got a haunting feeling — this is what we’ve done to the environment?” she says.
“It’s a moonscape.”
A tour organized by the parties running the Faro mine complex reclamation took media and government representatives around the mine site Tuesday.
Technical adviser Bill Slater served as tour guide, taking guests to 300-metre-deep mining pits, old mills and piles of waste-rock that blocked out the sun as the school bus drove by.
The reclamation is aimed at easing fears of environmental contamination. It could help restore the formerly lush Rose Creek Valley to something resembling its natural state.
“The tailings, they have to stay here basically forever,” says Slater during a tour stop along the tailings area.
On one side of the road rocks, discoloured bright orange and yellow by the tailings line the outer rim of the pit.
On the other side Rose Creek flows below trees, safe, for now, from contamination.
The committee responsible for the reclamation project is confident its extensive planning process will leave the valley free of the possibility of contamination.
“Whatever we do is to keep water quality from contaminating the downstream aquatic ecosystem,” says Slater.
Rose Creek meets the Pelly River 25 kilometres from the Faro mine.
Distilled from dozens of options, there are essentially five cleanup plans under consideration.
Tailings could be moved, or used to cover waste rock.
Another option is to cover the tailings with soil and divert Faro Creek over top, or cover some tailings with soil while moving the rest.
At the Vangorda-Grum area, located about 14 kilometres down a makeshift road from the Faro mine site, the waste rock could be moved into the Vangorda pit or it could be covered where it sits.
The huge project would require massive amounts of pumping, hauling and shifting.
That will bring jobs to the former mining town, which was built for 2,500 people and is currently home to just under 400.
Some Faro residents feel the mining companies abandoned the town. At its lowest ebb, the town had just 87 residents.
“Everybody went bankrupt and how these companies can do the same is incomprehensible,” says Vainio.The problem, she says, is that the mining companies that filed for bankruptcy would leave without paying debts and emerge as another company soon after.
The boom-bust economic cycle of mining should serve as a lesson for the reclamation process.
The goal is now to ensure long-term jobs to keep people around Faro for a while, says Vainio.
“They could speed up (the reclamation), but it could also be done slowly in a safe manner,” she adds.
For every tonne of ore mined, the mine removed four tonnes of waste rock.
The mine processed between 5,000 and 9,300 tonnes of ore per day for 29 years at the Faro site.

More than 320 million tonnes of waste rock are piled around the mine.
Of the 70 million tonnes of tailings at the mine, 55 million remain in the Rose Creek Valley.
The problem with tailings is acid-rock drainage, a set of chemical reactions that create acid when sulphur-containing rock contacts water and oxygen.
The acid dissolves metal in surrounding rocks and leaches into the ground and surface waters, harming fish and wildlife.
In a valley where sheep, moose and salmon can be found, contamination could harm the region's entire food chain.
A 2007 study determined lead from the mine could be found up and down the food chain, from caribou to lichen, in a zone running northwest along the Tintina Trench to Pelly Crossing.
Citizens of Ross River Dena Council raised concerns about the risk of eating contaminated plants and animals, however, the study emphasized hunters aren't at risk.
But the fact a study was necessary is dismal, says the council.
"At one time, prior to the mine, families would go down by raft and camp along the shore and came up the mountains to harvest moose," says Kathleen Suza, project co-ordinator for Ross River Dena Council.
"There was an abundance of moose and caribou and sheep."
The council, representing the Kaska Nation, is closely monitoring work on its traditional territory, and has secured a spot as a major partner in the closure project.
It could lead to guaranteed jobs or training opportunities for Ross River citizens, says Suza.
"Once planning has been implemented, that will happen," she says.
Mining stopped in 1998 when Anvil Range Mining Corporation filed for bankruptcy.
The court-appointed receiver took over operations for care and maintenance of the site.
Ottawa will spend upwards of $900 million over several decades to clean up the Faro mine.
After that, it's estimated up to $3 million will be spent annually for an estimated 500 years to ensure the damage is contained.
This week, Ottawa announced care and maintenance duties for the mine site would be handled by Denison Environmental Services, of Elliot Lake, Ontario.
The contract will be managed by the Yukon government and paid for by Ottawa. Denison takes over in 2009.
"It's a very expensive lesson," said Marg Crombie, director of assessment and abandoned mines for the territorial government, who is also on the tour.
A devolution agreement has shifted mining responsibilities from Ottawa to the Yukon, which means if a Faro happened today the territory would pay the reclamation bill.
But that high-priced education Crombie mentions prompted the territory to develop a policy that requires mining companies to set aside security in the event of closure.
The security could be money in the bank — an upfront payment calculated from initial closure estimates — or some money and then a sliding scale of payment based on benchmarks of development.

This should guarantee the territory will not be on the hook for clean-up costs when a mine closes or goes bankrupt, says Crombie.
“As you’re developing a mine, now you’re doing it with closure in mind,” she says, as the bus passes through the mill yard, rusted scrap metal piled high.
“If you’re not worried about closing, you might take the cheap and quick routes up front. (Mining companies) will want to rethink that.”
A Yukon Environmental and Socio-economic Assessment Board review of the proposed Western Copper mine near Carmacks found the company offered insufficient security and recommended an increase.
Four governments comprise the oversight committee that directs the reclamation project: Ottawa, the Yukon, Selkirk First Nation and the Ross River Dena Council, representing the Kaska Nation.
The committee was to have finalized the reclamation plan this past spring, but delays have pushed the decision deadline to this fall or spring 2009.
“This is a new process with four governments and sometimes things take longer than expected,” says Deborah Pitt, acting senior project manager.
“We went from hundreds of options, to 12 to five combinations of options.”
The committee has been requesting technical information that takes time to obtain, and all this work should create a comprehensive environmental and socio-economic study, adds Pitt.
The final plan will then be submitted to the Yukon Environmental and Socio-economic Assessment Board for review.
“This will be one of the largest projects to go through the assessment process,” says Pitt.

APPENDIX E – ANALYSIS OF ELECTRICITY REQUIREMENT AJAX MINE, 2013

The Ajax Feasibility Study states it will be using Isa Mill grinders and will require a considerable amount of electrical power to run the operation. This will include energy in the blasting, mining, milling as well as the energy content of grinding the ore with steel balls and flotation reagents.

Now a power subsidy is critical to the benefit/cost discussion for Ajax. According to page 21-12 of the feasibility study, total annual power consumption for Ajax will be 471,946,457 kW hours. This is 472 gigawatt hours. As the following excerpt from a BC Hydro fact sheet on Site C states, this is 9.25% of the total power that Site C is expected to produce annually.

> "The Site C Clean Energy Project (Site C) is a proposed third dam and hydroelectric generating station on the Peace River in northeast B.C. Site C

would provide 1,100 megawatts (MW) of capacity, and produce about 5,100 gigawatt hours (GWh) of electricity each year — enough energy to power the equivalent of about 450,000 homes per year in B.C."

BC Hydro likes to say 450,000 homes will use Site C power, instead of saying 10 new mines. Comparatively speaking, Ajax will use the equivalent power for 41,625 homes, which is more than all the homes in Kamloops.

BC Hydro states the cost of generation for Site C will be 9.5 cents kW/H. This does not include transmission and distribution costs. Also, BC Hydro's track record is such that their final dam costs have always been much higher than their forecast costs. It is conservative to conclude that the marginal cost of Site C power will be at least 12.5 cents kW/H. The bulk rate for industrial power was 4.6 cents kW/H (probably a little higher now...let's assume 5 cents.

Because BC Hydro uses "postage stamp" pricing, new power users like Ajax that will require BC Hydro to build new generation facilities (because Hydro has little base power left to spare), will be subsidized to the tune of about 7.5 cents kW/H (or $75,000 per GW) and much higher if Site C experiences major cost over runs. If Ajax uses 472 GW of power, the total annual subsidy to Ajax will be $35.4 million, or $814.2 million over the lifetime of the mine.

Someone has to make up the difference in marginal power costs, and it will be existing Hydro users including the people in the Kamloops region. This means $814.2 million will need to come from the public and to the account of the Ajax mine and KMGH principles.

Further Comment on Electric Subsidization

The following is an article that was posted in the Tyee August 26th, 2014. It adds weight to the power subsidy to the BC mining industry.

VIEW: Your bi-monthly donation to Imperial Metals

By **JIM QUAIL**

Published August 26, 2014 12:10 pm | 13 Comments

The BC Hydro Northwest Transmission line is now powered up and operating, delivering under-priced bulk electricity to mining companies and under-priced delivery services for private power generators.

Not only did they overrun the capital cost of building the line, but BC Hydro goofed in its design of the rate structure to recoup construction cost from the users and left out about $100 million.

The electricity they deliver to the mines will be priced far below its cost. The electricity they deliver from the power producers will be priced far above its value. Hydro customers will pay directly for every deficiency in this set-up.

We tried to warn Hydro and the Utilities Commission about the $100-million error but the government, Hydro and the Commission all took the position that the BCUC had no choice but to approve whatever Hydro came up with, even if it was contrary to law.

Next time you pay your BC Hydro bill, you might want to think about the involuntary donation you are making **to Imperial Metals (who brought us the Mount Polley tailings disaster). Part of your payment to BC Hydro will help subsidize their profits for the new Red Chris mine they are building along the new transmission line.**

You might also wish to contemplate that Imperial, in turn, makes hefty donations to the governing BC Liberal party who oversee their environmental standards and forced Hydro to build the white-elephant transmission line.

I am quoted briefly in this article from the Vancouver Sun about the line, with a rather pathetic effort by the minister to respond.

Jim Quail is an energy lawyer based in Vancouver. This post first appeared on his blog.

APPENDIX F Comments on Real Estate Values

Here are some numbers to start working with for an understanding of the potential impacts of Ajax and related mining developments (e.g. Galaxy deposit) on real estate, development, and the Kamloops Official Community Plan.

From the Aberdeen Area Plan, the following information was obtained.

There are 4 Special Development Areas (SDA) designated in the Plan to accommodate 10,000 people and 4,000 dwellings.

SDA 1 is Aberdeen Estates consisting of 500 units. This area is located above the Costco area and would be accessed by the Howe Road extension. The plan envisions predominantly multi-family (condos apartments) units in this area. It could be negatively affected by the development of the Galaxy deposit which is located about 2.3 km to the west.

SDA 2 is the Kerr property. This is the smallest of the SDAs at only 200 units. The plan envisions a mix of multi-family and single family dwellings. It would be accessed from the end of Copperhead Drive and is located about 2.1 km from the Galaxy deposit.

SDA 3 is Aberdeen Highlands, and is the largest at 1700 units. This area basically wraps itself around Coal Hill. Eye-balling the area, it looks like about 50% of the area is north and 50% south of Coal Hill. All the area south of Coal Hill is envisioned to be single family, while the north side has a mix. The north side would be less affected by Ajax. The south side would be in direct line to the open pit, with the southern limit of this area being only about 1.7 km from the edge of the pit.

SDA 4 is Edinburgh Heights, and is almost as large as Aberdeen Highlands at 1600 units. This area, which lies immediately to the south of Aberdeen, is the closest to the pit and the East Waste Rock Facility, with the closest distance being about 1.3 km from the pit and about 800 metres from the waste rock area. The plan envisions almost all this area to be single family, except for a higher density area immediately adjacent to the existing Aberdeen residential area.

In my view, I expect that half of SDA 3 and all of SDA 4 to be lost to residential development during the life-span of the mine because I can't imagine any sane person wanting to re-locate to within 2-3 km downwind and within visual range of a huge open pit mine. This is approximately 2400 dwelling units, mostly single family, which Is expected to house about 6,000 people.

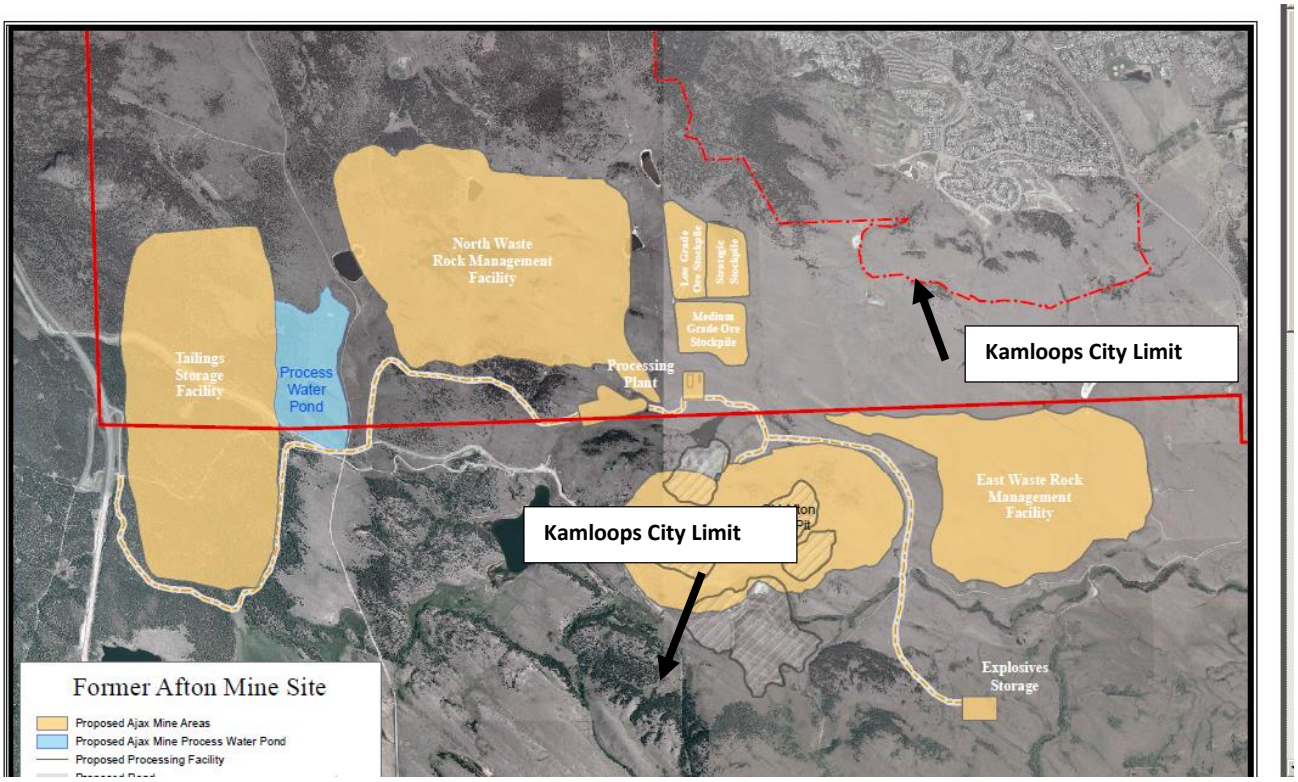
New homes being built in Juniper and Aberdeen typically cost around $700,000. Without the mine, I would expect that the SDAs would see mostly high-end home construction, and therefore the expected real estate value in the directly impacted area, once fully developed, would be about $1.68 billion ($700,000 X 2400) if there is a similar per home value.

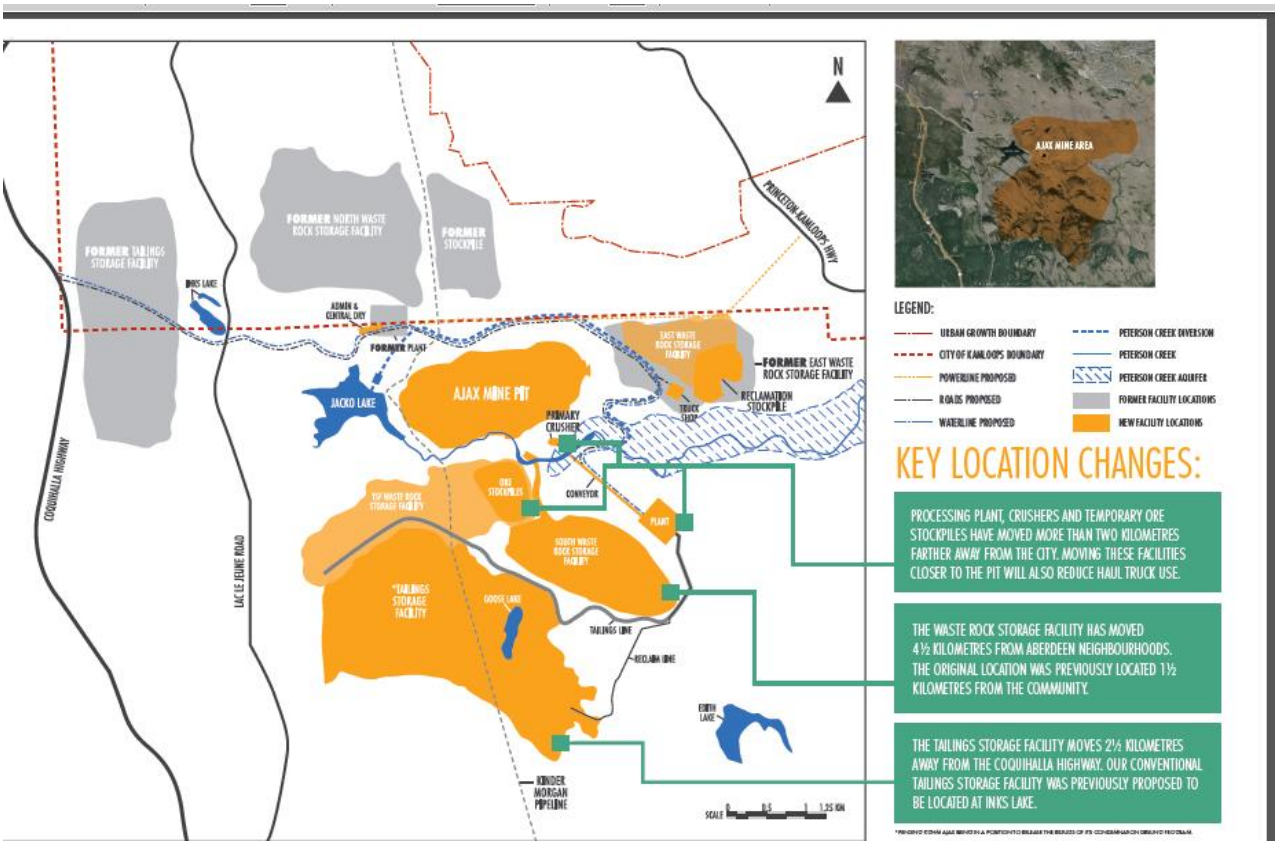
If the mine results in a stagnant or a declining population in Kamloops, which I believe it could, this real estate development value will shift to other cities. Even if Kamloops grows, within Kamloops, other areas would be developed first. This may represent a net cost to the city if other

areas have higher service costs. For the land owners of these SDAs, major property value losses may be incurred.

To avoid possible lawsuits from the SDA owners, the City would likely continue to maintain the Special Development Area status, despite the obvious conflicts with the mine. However, the City might have a legal out if it does reduce SDAs near the mine on the basis of technical grounds. These landowners would be then faced with seeking redress from the mine owners for loss of property values.

APPENDIX G AJAX MINE SITE AND CITY OF KAMLOOPS





Endnotes

[1]The Giant Mine Remediation Project, https://www.aadnc-aandc.gc.ca/eng/1100100027395/1100100027396

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85 Umeå, Sweden, 2 Department of Public Health and Clinical Medicine, Occupational and Environmental Medicine, Umeå University, SE-901 85 Umeå, Sweden, 3 Department of Analytical Chemistry, Arrhenius Laboratory, Stockholm University, SE-106 91 Stockholm, Sweden
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[29] B. C. Ministry of Transportation and Infrastructure, http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/hwy_maintenance_contracts.htm

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[31] Mining companies love Canada. It is not only the advantage of being able to ignore the clean-up aspect but it is also the enormous protection and tax advantage that Canada provides to mining companies that encourages their operations here. It is not by chance that 75 percent of the world's mining companies are situated in Canada, even though many do not have active mining operations in the country. Further, these companies pay almost no taxes. Canada is a major tax haven for mining corporations in the world regardless of where they carry out their operations. (Alain Denault and William Sacher, Imperial Canada Inc. Legal Haven of Choicer for the World's Mining Companies, Talonbooks, Vancouver, 2012)

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[34] European Environment Agency, Revealing the Costs of Air Pollution from Industrial Facilities in Europe, EEA Technical Report, No152011

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