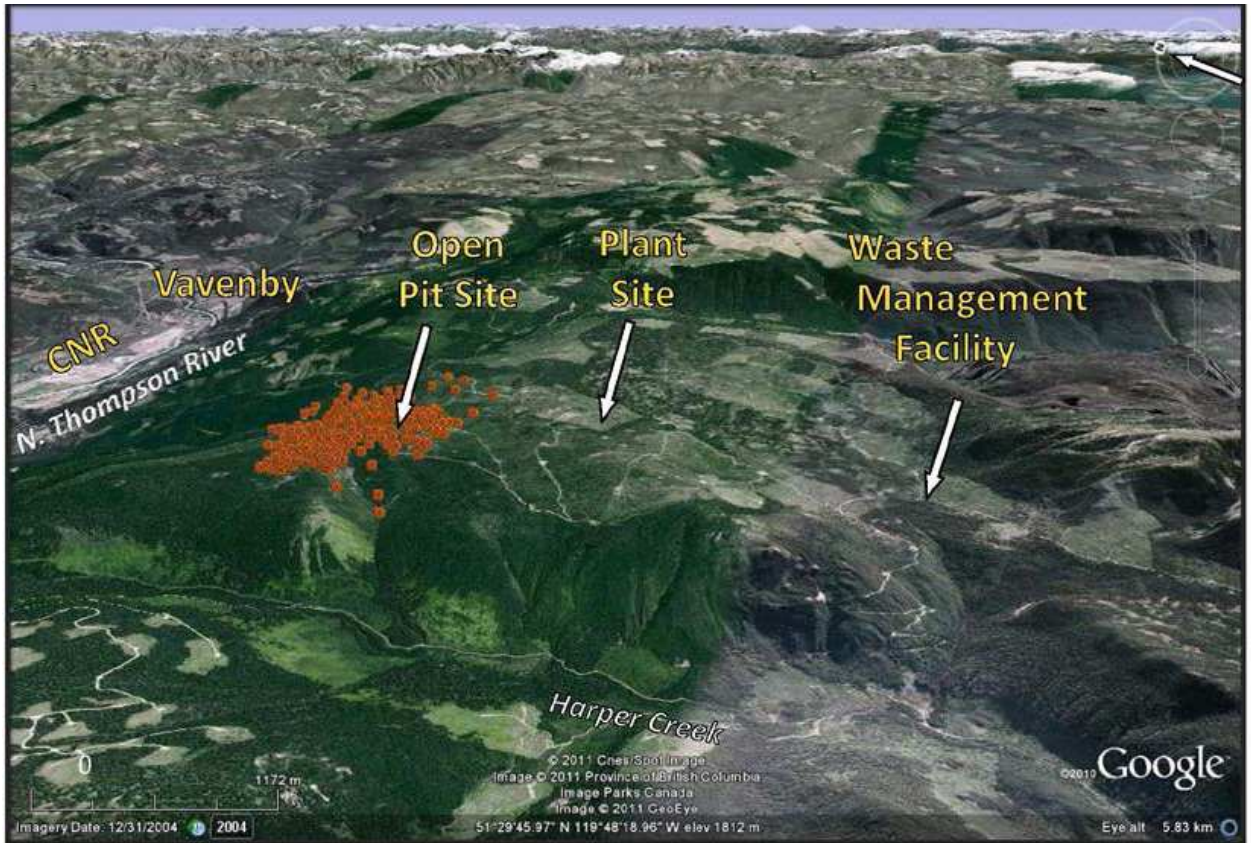
MiningWatch Canada

Submission re: Federal Environmental Assessment, CEAA Project #0230881 - Harper Creek Mine, March 21, 2015



Introduction

Thank you for the opportunity to provide comments on the Yellowhead Mining Corporation (YMI) Environmental Impact Statement (EIS) for the proposed Harper Creek Mine on the traditional, unceded territory of the Sewepemc Nation.

MiningWatch Canada is a pan-Canadian initiative supported by environmental, social justice, Aboriginal and labour organisations from across the country. We were created by our founding members in 1999 to address the need for a co-ordinated public interest response to the threats to public health, water and air quality, fish and wildlife habitat and community interests posed by irresponsible mineral policies and practices in Canada and around the world. Membership in MiningWatch Canada is comprised of not-for-profit organisations working on environmental, social justice, international development and aboriginal issues.

The proposed Harper Creek Copper Mine is a proposed open pit copper mine which plans to process 70,000t/d of ore for a period of 28 years producing a copper concentrate for sale to markets throughout the Pacific Rim countries. Metals to be recovered are copper, gold and silver. The estimated mineral reserve is as follows (based on a 0.14% copper cut-off):

- Proven: 457.2Mt @ 0.27% Cu, 0.030 g/t Au and 1.19 g/t Ag
- Probable: 258.9Mt @ 0.24% Cu, 0.026 g/t Au and 1.16 g/t Ag
- Proven+Probable: 716.2Mt @ 0.26% Cu, 0.029 g/t Au and 1.18 g/t Ag

The initial capital cost is estimated to be C$1billion and a life of mine sustaining capital cost of C$336million.

Our submission comments are organized as follows:

1) The safety of the tailings management plan in light of the Independent Panel Review of the Mount Polley Mine (January 30, 2015) – (Also includes Appendix A references)
2) Short and long term benefits from the mine
3) Conceptual closure plan and perpetual care considerations
4) Acid mine drainage and water contamination concerns (MDAG report in Appendix B)
5) Concerns about Aboriginal consultation for the project

1. Comments on the safety of the mine and tailings management plan

After the catastrophic failure of Imperial Metals' Mount Polley Tailings dam on August 4, 2014, an independent panel of three world renowned engineers was established by the BC government and the affected First Nations to determine the cause of the failure and to make recommendations about the prevention of further such failures. The Panel reported its findings on January 30, 2015[1].

A number of their findings are of particular significance for the Harper Creek Mine.

> *In risk-based dam safety practice for conventional water dams, some particular level of tolerable risk is often specified that, in turn, implies some tolerable failure rate.* ***The Panel does not accept the concept of a tolerable failure rate for tailings dams. To do so, no matter how small, would institutionalize failure.*** *First Nations will not accept this, the public will not permit it, government will not allow it, and the mining industry will not survive it. ... Tailings dams are complex systems that have evolved over the years. They are also unforgiving systems, in terms of the number of things that have to go right. Their reliability is contingent on consistently flawless execution in planning, in subsurface investigation, in analysis and design, in construction quality, in operational diligence, in monitoring, in regulatory actions, and in risk management at every level. All of these activities are subject to human error. (Our emphasis)*

The most detailed information about the handing of Mine Waste and Water Management is to be found in Appendix 5D of the EIS, prepared by Knight Peisold (KP). The Environmental Impact Statement (EIS) summarizes the plan at Section 7.5.3.

> *"The TMF has been designed to provide for secure and permanent storage for 585 million tonnes of tailings and 237 million tonnes of PAG waste rock from the proposed mining operation, and extends over 1, 141.4 ha. The TMF is located in a bowl-shaped basin in the upper reaches of T-Creek, a tributary of Harper Creek. The tributary is classified as non-fish habitat in the vicinity of the TMF and is isolated from migratory fish by a natural fish gradient barrier[2]...the Knight Piesold study adds: "the basin drains toward Harper Creek down a steep unnamed bedrock channel (henceforth referred to as T—creek)."*

It is above the "steep unnamed bedrock channel" that the tailings dam is to be located. The tailings impoundment is expected to handle the water from the site until year 25 of the project, at which time (in perpetuity), it will report to the open pit, before excess water from the pit is piped to the TMF. **The Canadian Dam Association hazard classification for the dam is "Very High".**

[1] Dr. Norbert R. Morgenstern (Chair), CM, AOE, FRSC, FCAE, Ph.D., P.Eng.; Mr. Steven G. Vick, M.Sc., P.E.; and, Dr. DirkVan Zyl, Ph.D., P.E., P.Eng. Report on Mount Polley Tailings Storage Facility Breach, Independent Expert Engineering Investigation and Review Panel, Province of British Columbia, January 30, 2015, p 121-125

[2] Harper Creek Mining Corporation. Environmental Impact Statement (EIS) 7.5.3

1.1. What the Mount Polley Panel said about Best Available Technology for Tailings Impoundments [3]

The Harper Creek Project is one of the first mines to undergo environmental assessment since the findings of the Mount Polley expert panel have been released. It is an opportunity for CEAA and the BC EAO to implement their important recommendations. We quote some of the key recommendations pertinent to Harper Creek below:

> *"The goal of BAT [Best Available Technology} for tailings management is to assure physical stability of the tailings deposit. This is achieved by preventing release of impoundment contents, independent of the integrity of any containment structures. In accomplishing this objective, BAT has three components that derive from first principles of soil mechanics:*
>
> *1. Eliminate surface water from the impoundment.*
>
> *2. Promote unsaturated conditions in the tailings with drainage provisions.*
>
> *3. Achieve dilatant conditions throughout the tailings deposit by compaction.*
>
> *The first of these, eliminating surface water, not only precludes release of water itself, but also eliminates fluvial tailings transport mechanisms, like those illustrated in Appendix C, during the Mount Polley breach. The second, promoting unsaturated conditions by drainage, reduces the possibility for, and the quantity of, high-mobility flowslide release of tailings. And the third, achieving dilatant conditions by compaction, further reduces flowslide potential by improving the properties of the tailings mass. Thus, underpinning these principles are multiple redundancies that provide defence in depth.*
>
> *The Panel recognizes that eliminating water from the tailings deposit will not eliminate the need for storage of mine and processing water elsewhere. But Mount Polley has shown the intrinsic hazards associated with dual-purpose impoundments storing both water and tailings. The Panel considers that security can be more readily assured for conventional water dams that are designed and constructed for their own purpose and that preventing tailings release is the overriding imperative...*
>
> *[...] It can be quickly recognized that water covers run counter to the BAT principles defined in section 9.3.1.But the Mount Polley failure shows why physical stability must remain foremost and cannot be compromised. Although the tailings released at Mount Polley were not highly reactive, it is sobering to contemplate the chemical effects had they been. No method for achieving chemical stability can succeed without first ensuring physical stability: chemical stability requires above all else that the tailings stay in one place [...]*
>
> 9.3.4 BAT RECOMMENDATIONS
>
> *Implementation of BAT is best carried out using a phased approach that applies differently to tailings impoundments in various stages of their life cycle [...]*

[3] Dr. Norbert R. Morgenstern (Chair), CM, AOE, FRSC, FCAE, Ph.D., P.Eng.; Mr. Steven G. Vick, M.Sc., P.E.; and, Dr. DirkVan Zyl, Ph.D., P.E., P.Eng. Report on Mount Polley Tailings Storage Facility Breach, Independent Expert Engineering Investigation and Review Panel, Province of British Columbia, January 30, 2015, p 121-125

• For new tailings facilities. BAT should be actively encouraged for new tailings facilities at existing and proposed mines .Safety attributes should be evaluated separately from economic considerations, and cost should not be the determining factor.

• For closure.BAT principles should be applied to closure of active impoundments so that they are progressively removed from the inventory by attrition. Where applicable, alternatives to water covers should be aggressively pursued.

It is clear that the TMF design for Harper Creek does not meet any of the Panel's BAT recommendations: the tailings will be saturated with water, will depend on a water cover to prevent Acid Mine Drainage, and will have to be maintained in that condition in perpetuity. No filtered or dry tailings analysis has been presented, as the proponent argues that the process would make the mine uneconomic. The EIS dismisses this alternative with one line: "*Dry stack and paste tailings are not technically feasible for the Project,"* [4] without further explanation. The proponent's proposal fails to meet the safety design criteria recommended in the Mount Polley's Expert Panel report.

1.2. The height of the tailings dam is to be determined year by year, with incremental raises determined by production and water levels.

The Mount Polley Independent Panel found:

"A lack of foresight in planning for dam raising (at Mount Polley) contributed to the failure. Successfully executing the raising plan required intimate coordination of impoundment water-level projections, production and transport of mine waste for raising, and seasonal constraints on construction. This made the tailings dam contingent at the same time on the water balance, the Mine plan, and the weather. But instead of projecting these interactions into the future, they were evaluated a year at a time, with dam raising often bordering on ad hoc and only responding to events as they occurred."[5]

Like Mount Polley, Harper Creek is anticipated to have a surplus water volume of up to 180Mm. The EIS plans for directing all this water to the TMF, along with 585 Mt of tailings and 237 Mt of acid-generating waste rock and then discharging excess water downstream when "water quality is suitable for release". The permanent slope of the embankment holding all this back is to be "no steeper than 2H:1V"[6] .

At Mount Polley, although the original plan called for a slope of 2H:1V, the excess water volumes and the lack of materials for dam construction led to a decision to change the slope to 1.3H: 1V which contributed to the failure and might have led to catastrophic failure on its own. Says the Panel:

The design was caught between the rising water and the Mine plan, between the imperative of raising the dam and the scarcity of materials for building it. Something had to give, and the result was oversteepened dam slopes, deferred buttressing, and the seemingly ad hoc nature of dam expansion that so often ended up constructing something different from what had originally been designed.

[3] ERM Rescan/HCMC. Summary of the Application for an Environmental Assessment Certificate / Environmental Impact Statement, December 30, 2015. p. 15
[5] Mount Polley Panel, p.136
[6] Knight-Peisold, HCMC EIS Appendix 5-D. Mine Waste and Water Management Design, Page 30

There were other problems at Mount Polley caused by the inability to deal with a growing water surplus, which in could easily be replicated at Harper Creek. What monitoring, enforcement and guarantees will be in place to ensure that the dam raise plans and slope commitments are met by the proponent?

1.3. Glaciolacustrine layer in the TMF

At Harper Creek, the proposed TMF – and most notably the area where the dam itself is planned - is underlain by a glaciolacustrine unit (GLU)[7] ranging from 1 metre to 12 meters in thickness. The KP report states that site investigation programs included the drilling of a number of geotechnical drillholes and the installation of standpipe peizometers in 31 drillholes. Two attached maps, figure 4.1 and 4.2, indicate a simplified layout of those drillholes and test pits throughout the site. Three reference reports provide factual data about this site investigation. However, the KP report goes on to state that *"Glaciolacustrine material will be removed **if encountered** within the TMF and will require further investigation during detailed design in other areas of the TMF"*[8] *(our emphasis).* This statement contradicts the fact that KP and other reports have already identified an important GLU layer –unless KP refers to yet 'unknown' layers due to a lack of tighter/denser survey drilling in the area.

At Mount Polley , the Panel found that the GLU had not been properly evaluated prior to the construction of the TMF. There were only shallow drillholes in the area of the failed dam segment. There were no drillholes in the area of the dam failure that intersected the Upper GLU or that were lab tested for shear strength. As a result, the Expert Panel found that

> *"The design did not take into account the complexity of the sub-glacial and pre-glacial geological environment associated with the Perimeter Embankment foundation. As a result, foundation investigations and associated site characterization failed to identify a continuous GLU (Glasciolacustrine Unit) layer in the vicinity of the breach and to recognize that it was susceptible to undrained failure when subject to the stresses associated with the embankment"*

There is no indication that "undrained stress testing of the GLU", such as recommended by the Mount Polley Panel has been or will be undertaken for Harper Creek, nor that there have been adequate number or depth of drillings to evaluate the conditions of the GLU layer, or to identify the presence of other potential GLU layers in this complex environment.

Minesite Drainage Assessment Group (MDAG), in Appendix A of this submission, also raises stability concerns for the dams due to subsurface geomorphology and hydrology:

> *"Appendix 11-A adds that the glaciolacustrine deposits near the tailings impoundment are silts and clays. Such deposits are more prone to destabilize after dam construction. Thus, there is reason for concern regarding instability of the Harper Creek tailings dam due to inferred and existing subsurface conditions.*
>
> *Over the 5 km length of the proposed tailings impoundment, most monitor wells were placed near the dam…. many wells showed upward groundwater gradients. Such gradients can lessen the physical stability of unconsolidated deposits.*

[7] EIS Appendix 5-D, p.20 and figure 4.3
[8] EIS Appendix 5-D, p. 25

Therefore, your concerns for dam stability are well founded. The subsurface stratigraphy and groundwater conditions that can destabilize a dam and cause it to fail are present at the proposed location of the Harper Creek tailings dam."[9]

TMF Issues at closure are discussed in Section 4 of this submission.

2. Short and long term benefits from the mine

There is considerable doubt that the mine will ever operate economically, or – indeed – ever open at all. The marginal economics of the mine are likely to result in boom-bust economics and the kind of worker safety and environmental hazards caused by cutting corners.

This section of the submission will address:

- the mineral reserve estimates
- project financing concerns
- the use of the BC input-output model to measure project benefits

2.1. Mineral Reserve Estimates

"The Economic analysis assumes 100% equity and metal prices of US$3.00/lb Cu, US$1,250/oz Au and US$20/oz Ag respectively, which results in a Net Present Value ("NPV") before tax of US$684M, and an after tax NPV of US$355M. The unlevered internal rate of return ("IRR") before tax is 16.8%, and an after tax IRR of 13.4%. Project payback after-tax is 5.4 years [...] The initial capital cost of C$1bn and LOM sustaining capital of C$336M."[10]

The mineral reserve for the deposit was estimated in 2014 using a copper price of US$2.25/lb., a gold price of US$1,250.00/oz. and a silver price of US$20.00/oz.[11] An exchange rate of US$0.90: C$1.00 was assumed. The mineral reserve is reported using a 0.14% copper cut-off grade. Using these figures, the proven and probable mineral reserve at Harper Creek is 716.2Mt with an average grade of 0.26% Cu, 0.029g/t Au and 1.18g/t Ag (Table 1-4).[12]

It should be noted that the YMI Technical Report cautions at 1.7.2.1 - Interpretation of the Mineral Reserve Estimate:

"The mineral reserve estimate was based upon economic parameters, geotechnical design criteria and metallurgical recovery assumptions detailed throughout this FS. ***Changes in these assumptions will impact the in-pit mineral reserve estimate.*** *In general, increases in operating costs, reductions in revenue assumptions or reductions in metallurgical recovery may result in*

[9] MDAG, RE: Harper Creek Project, British Columbia- Observations on the EIS Pertaining to Hydrogeology and Subsurface Stratigraphy in and around the Proposed Tailings Impoundment, for MiningWatch Canada, March 2015.
[10] Yellowhead Mining Corporation (and Merit Consultants). Technical Report & Feasibility Study of the Harper Creek Copper Project near Vavenby, British Columbia. July 31, 2014. 1.7
[11] Ibid. 1.7.2 *mineral reserve estimate*
[12] Ibid. 1.7

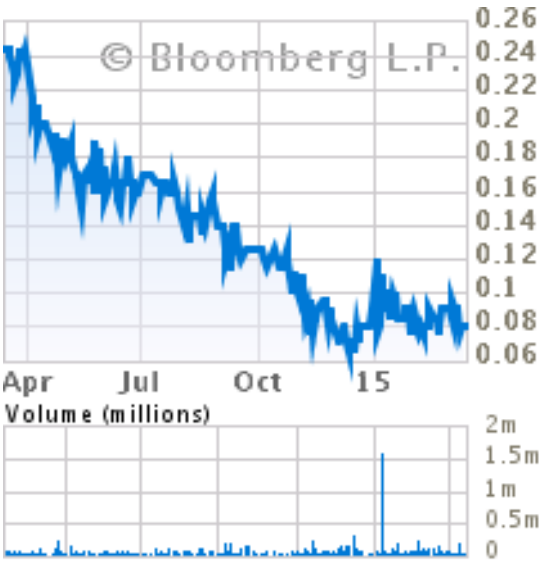
increased cut-off grades, reductions in in-pit mineral reserve and increasing strip ratios. The converse is also true. Reductions in operating costs, increases in revenue assumptions or increases in metallurgical recovery may result in reduced cut-off grades and increases to in-pit mineral resources. The mineral reserve estimate is also dependent upon successful completion of the environmental permitting process and provision of electric power to the mine-site." [13] *(Our emphasis)*

There are already reasons to believe that the reserve estimate for this very low grade mine is overly optimistic. Fluctuations in commodity prices and exchange rates are endemic. At the time of this writing, copper is trading at $2.68/lb, gold at $1,152 and silver at $ 15.28/oz and the exchange rate is $0.78 US/1.00 CDN.

2.2. Financing concerns

In addition, the company assumes 100% equity financing with no financing costs. It is highly unlikely that the company will be able to finance a $1billion mine with equity alone. This is a company with 99 million shares outstanding trading at a very low rate of $0.08 a share, which lost nearly 95% if its value since 2011, for a total current market capital value of less than 8 millions[14] -- which is comparatively very low in the industry and reflects a high financial risk.

YMI share price, March 2015[15] :



The major shareholders are financial investment firm Matco (with 35.91%) and Taseko Mines (with 16.8%)[16]. Last June, just as the Feasibility Study was completed, three key shareholders pulled out: Anthill Resources (which had 11.27%), Callingham Ltd (a UK investment firm 10.24%) and Top-gold AG (a

[13] Ibid. 1.7.2.1
[14] http://web.tmxmoney.com/quote.php?qm_symbol=YMI, consulted on March 21 2015
[15] Bloomberg.com. YMI share price. http://www.bloomberg.com/research/stocks/snapshot/snapshot.asp?ticker=YMI:CN
[16] Yellowhead Mining Corporation, Management Information Circular, May 23, 2014. Page 4

Leichtenstein financial firm – 10.87%)[17]. The current five directors include two from Matco; Yellowhead Chairman Gregory Hawkins is a former president of the BC and Yukon Chamber of Mines, "lead director" R. Stuart "Tookie" Angus is the Chairman of Nevsun Resources, which has only one operating copper mine, in Eritrea.

YMI and its second biggest shareholder Taseko, have been taking a beating from stock pundits in the past six months. Taseko Mines "has underperformed the S&P TSX by 59.62% during the last year."[18] The Globe and Mail writes: "*Taseko Mines Ltd has a net profit margin of -9.28%. Besides being negative, it is also below the industry average and implies that this company is not effective at turning revenues into bottom line profit."*

Lastly, there are no established contracts in place for the metals,[19] yet YMI envisions a very optimistic long term market cost for treatment at smelters and refineries (smelter- $80/dmt and a refining charge of 0.08/lb Cu).[20]

We are very concern about the financial risk of this project: how can one expect this company, which has one asset (the mine itself), to operate the project safely over 28 years – not to mention securing a meaningful financial bond for the perpetual care of the site once the mine closes?

2.3. The use of the BC input-output model to measure project benefits

The proponent used the BC Input-Output model to calculate project benefits in Appendix 1A to the EIS. It is a completely unacceptable paradigm for gauging the economic benefits and costs of an environmentally and culturally impacting project such as a mine.

The BC Input-Output model does not have any debit column. Like calculations of Gross Domestic Product (GDP), it does not take into consideration any of the social, health and environmental costs/losses – either measured in dollars or not -- that are occasioned by a large open pit mine. Also, it does not address the fact that most people working in the construction jobs and other employment at the mine will already have employment. As a result, the net job creation, and net contributions to government revenues will be much less than the gross figures used.

> ***Hydro subsidy to large industry in BC****. The EIS does not provide an estimate of the rate that the company expects to pay for BCHydro over the life of the mine for the 82 MW it expects to use annually. Marvin Shaffer submitted comments during both the Prosperity and the New Prosperity Mine hearings that indicated the rates paid by mining companies in BC were so much lower than the feed-in rates paid to independent power producers, that the subsidy in fact, came to as much as $35million/year. "Based on the cost of electricity at its Gibraltar Mine, TML estimates it would pay $37.4/MWh for this power.[21] The incremental cost of electricity for BC Hydro is, however, much higher. The price it paid for new sources of supply in its 2006 Call for Energy averaged*

[17] Yellowhead Mining Corporation, Management Information circular, May 1, 2013. Page 4.
[18] http://www.theglobeandmail.com/globe-investor/markets/stocks/summary/?q=TKO-T
[19] YMI technical report. 19.2
[20] Ibid, 19.2 Copper Smelter terms
[21] Jones, Scott. Pre-Feasibility Study of the Prosperity Gold-Copper Project, Executive Summary, February 25, 2007, p.144 and 152.

> *$88/MWh.*[22] *...Even at $88/MWh, BC Hydro would lose $50 on each incremental MWh of demand for electricity due to the mine project." Shaffer concludes: "On an annual basis the loss would be $35 million, each year over the life of the mine. That is a significant net cost of this project, a net cost that would be borne by BC Hydro and ultimately all of its customers."* [23]

In addition, the proponent expects BC Hydro to construct a new 138KV 14-km power line connecting the Project Site to the BC Hydro transmission line corridor in Vavenby.

The Input-Output model and Gross Domestic Product (GDP) are the wrong instruments for measuring the economic benefits of large resource extraction projects. GDP 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 then 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 environmental disasters like the BP Oil spill or Mount Polley are shown only as contributing to the GDP – whereas these disasters bear a real cost on people and the environment!

In the GDP, most cultural and caring activities, subsistence fisheries and farming have almost no value; neither do services provided by the environment: freshwater, waste disposal, provision of oxygen, and so on. "Ecosystem services" definitions were formalized in the United Nations 2005 Millennium Ecosystem Assessment[24] , 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).[25] For the purposes of evaluating an environmentally and culturally destructive project like a mine, the GDP (and the BC Input-Output model) is a useless measure.

In the EIS, there is no costing of natural capital and environmental costs (for example, impacts grizzly bear habitat, potential losses to trout in the watershed, long term containment of toxins), no costing of the impacts on human well-being (for example, more income inequality, road accidents, drug use, housing crises) and no costing of the impacts of activities not on the company ledger (for example, huge subsidies for electricity, increased costs for education, health and social services, impacts on the Secwepemc way-of life, lost opportunities to build a sustainable and resilient local economy, increased road construction and maintenance, negative impact on recreational opportunities and the tourist economy).

And then there is the risk of catastrophic tailings dam failure. As the Expert Panel states:

> *"The chief reason for the limited industry adoption of filtered tailings to date is economic. Comparisons of capital and operating costs alone invariably favour conventional methods. But this takes a limited view. Cost estimates for conventional tailings dams do not include the risk costs, either direct or indirect, associated with failure potential. The Mount Polley case*

[22] Marvin Shaffer. Presentation to the Prosperity Review Panel, 2010. *BC Hydro calculated that the average price for firm electricity supply in its F2006 Call contract awards, adjusted for location and other characteristics, was $87.50/MWh. Some of the contracts it entered into were at higher prices. See BC Hydro, Report on the F2006 Call for Tender Process, August 31, 2006.*

[23] Marvin Shaffer. Presentation to the Prosperity Review Panel, 2010.

[24] http://www.unep.org/maweb/en/index.aspx

[25] Costanza, Robert; Ralph d'Arge, Rudolf de Groot, Stephen Farberk, Monica Grasso, Bruce Hannon, Karin Limburg I , Shahid Naeem, Robert V. O'Neill, Jose Paruelo, Robert G. Raskin, Paul Suttonkk & Marjan van den Belt (15). "The value of the world's ecosystem services and natural capital". Nature 387: 253–260.

> *underscores the magnitude of direct costs for cleanup, but indirect losses—notably in market capitalization—can be even larger. Nor do standard costing procedures consider externalities, like added costs that accrue to the industry as a whole, some of them difficult or impossible to quantify. Full consideration of life cycle costs including closure, environmental liabilities, and other externalities will provide a more complete economic picture. While economic factors cannot be neglected, neither can they continue to pre-empt best technology..."*[26]

Jobs and tax Revenue Estimates. Appendix 1A provides estimates of the income, payroll, consumption and property taxes associated with the mine and the employment and business activity generated. Increased social and health costs do not register. Certainly, Vavenby is likely to see very little increase in municipal revenues, as the company will not pay municipal taxes, but there will be increased demands on services such as housing, sewer, water, addictions treatment, road maintenance, health and hospitals, etc. The YMI claims of increased municipal benefits are based on higher property tax revenues from workers' homes.

Appendix 1a says nothing about the ***net*** benefits that these impacts would provide, which depend on what the persons hired would otherwise be doing. Even if the persons hired would have been unemployed, the net benefit would be the difference between his/her mining wage and the minimum wage at which these persons would willingly work.

The percentage of persons who are unemployed in the region is likely to remain the same, unless the mine attracts new settlers with specific mining skill sets. The people who are and would remain unemployed would likely be predominately persons with less than Grade 12 education, with disabilities that make physical work at the mine impossible, or with other limitations to their employability.

3. Conceptual closure plan and reclamation bonding as proposed in the EIS

Closure and Post-closure planning is described in Section 7 of the EIS[27].

> *"Closure of the pit includes backfilling with tailings and water to form a pit lake. Once the pit has reached an elevation between 1,530 and 1,545 m**, excess water will be pumped to the TMF in perpetuity.** The lowest elevation of the pit wall is expected to be an elevation of 1,555 m, which allows for 10 m of freeboard to manage storm inflows. An emergency spillway on the northern edge (lowest point of the pit rim) will be constructed to prepare for potential high precipitation events.*
>
> *At Closure, the pit will be bermed to stop inadvertent access to high walls. Pumping of water from the pit to the TMF will continue in the Post-Closure phase.* [28]

[26] Mount Polley Panel Report p. 123

[27] EIS,section 7

[28] See also EIS 7.5.3.1: *"A spillway will be constructed at the east abutment of the main TMF dam with an invert elevation designed to maintain a minimum watercover over the deposited PAG waste rock and tailings in order to maintain permanent*

In total, approximately 868 ha of the Project Site will be reclaimed to forest, grasses and shrubs, and wetlands, representing about 44% of the land area disturbed for the Project. Of this, the reclaimed waste rock pile will result in approximately 107 ha and the TMF dam and beaches in approximately 452 ha of grass and shrub area. Monitoring and an adaptive management approach will be used to determine the success of habitat reclamation activities and what measures are required to meet the objectives for environmental management of the Project Site."[29] *(Our emphasis)*

There are a number of serious problems with this plan:

1. The plan relies on an acid generating, water saturated tailings impoundment, which will have to be maintained and monitored in perpetuity;
2. There is no mention of a "long-term" or "perpetual care" plan for the site, with the appropriate financial assurance;
3. The information about closure and post-closure costing in the EIS and in the Technical Report prepared in June 2014 contradict each other. The amounts projected vary substantially ($M 16 vs over $M 70), and take different positions on salvage;
4. The ability to undertake "progressive reclamation" is more limited than the proponent acknowledges, and the promises for "adaptive management" remain vague and risky;
5. There is no acknowledgement of the importance of community involvement in developing the closure and long-term care plan including monitoring and emergency response.

3.1 The plan relies on an acid generating, water saturated tailings impoundment, which will have to be maintained and monitored in perpetuity

In effect, the closure plan is to continue to create a pit lake and maintain a saturated tailings impoundment in perpetuity. Given the findings of the Expert Panel on Mount Polley, this is an unacceptable form of closure.

"The Panel recognizes that eliminating water from the tailings deposit will not eliminate the need for storage of mine and processing water elsewhere. But Mount Polley has shown the intrinsic hazards associated with dual-purpose impoundments storing both water and tailings. The Panel considers that security can be more readily assured for conventional water dams that are designed and constructed for their own purpose and that preventing tailings release is the overriding imperative [...]

It can be quickly recognized that water covers run counter to the BAT principles defined in section 9.3.1. But the Mount Polley failure shows why physical stability must remain foremost and cannot be compromised. Although the tailings released at Mount Polley were not highly reactive, it is sobering to contemplate the chemical effects had they been. No method for achieving chemical stability can succeed without first ensuring physical stability: chemical stability requires above all else that the tailings stay in one place [...]

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subaqueousstorage of this material to prevent the onset of acid rock drainage. Lower beach levels nearer to the pond elevation will be inaccessible due to the high water content and fine nature of the material."

[29] EIS page 31

• For new tailings facilities. BAT should be actively encouraged for new tailings facilities at existing and proposed mines .Safety attributes should be evaluated separately from economic considerations, and cost should not be the determining factor.

• For closure. BAT principles should be applied to closure of active impoundments so that they are progressively removed from the inventory by attrition. Where applicable, alternatives to water covers should be aggressively pursued." [30]

3.2 There is no recognition of the need for a "long-term" or "perpetual care" plan for the site

There is no provision for the costs of long term (perpetual) care of the mine site. Since the tailings will be acid-generating and water saturated, they will have to be monitored in perpetuity with an emergency plan and financial bonds in place and ready to be activated. There is not even a mention of this necessity in either the EIS or the Technical Report.

"Long Term Stewardship, the caretaking of hazardous materials, is one of the main unanticipated challenges of high modernity...It arises from the recent realization that the full remediation of contaminated waste sites is beyond scientific knowledge, best technologies or available resources... In all cases, LTS comprises systems and materials that have the potential for catastrophe, for environmental contamination, or for inflicting injury, ill health or death on exposed humans." [31] *-Eugene Rosa*

In a report prepared from the Environmental Assessment of the Giant Mine Reclamation Plan in 2012, Dr. Joan Kuyek undertook a literature review and a number of case studies to look at Best Practices in the long-term care of contaminated sites[32]. A key finding was that almost all attempts to contain contaminants in perpetuity will eventually fail. The question is how and when. Among the findings from that review that are most relevant to this environmental assessment are the following (the names and dates refer to literature cited in the review that support the conclusions):

- *Long term stewardship – centuries and millennia ahead - requires a different kind of planning and should be integrated into clean-up planning from the beginning. (Edelstein 2007, Leschine 2007, Cowan and Robertson 2010, Probst n.d.)*
- *There is a general consensus amongst all writers and case studies that local communities need to be involved in planning for long term care; in particular, the indigenous communities who have strong attachment to the very land upon which the waste repository sits. (Deline First Nation2005, Edelstein 2007, Gerrard 1995, IIIRM 2002, Leschine 2007, Macey 2007, Rekmans 2003, IIED 2002., EPA 2001, Keeling and Sandlos 2005)*
- *The organization that is charged with long term stewardship of the site will determine the introduction, management and control of the technology. It needs to be a High Reliability Organization (HRO) with access to appropriate resources in the event of catastrophic failure. There is an entire literature about HROs,, which describes organizations with an "unwavering*

[30] Mount Polley Panel Report, p 121-125
[31] Eugene A. Rosa, "Long-Term Stewardship and Risk Management: Analytical and Policy Challenges", in Thomas M. Leschine (ed). *Long Term Management of Contaminated Sites*, (Emerald Press. 2008).
[32] Kuyek, Joan. The Theory and Practice of the Perpetual Care of Contaminated Sites, Alternatives North, 2012. Available at: http://www.miningwatch.ca/publications/theory-and-practice-perpetual-care-contaminated-sites

commitment to safety and reliability... other organizational goals, such as efficiency, organizational prestige or profit-making must be continuously subordinated to avoiding serious organizational failures."[33] *(Rosa 2008, Macey 2007, Leschine 2007)*

- *Adaptive Management is designed to "cope with the uncertainty of ecosystems by creating spaces in which reflection and learning can occur and by allowing management systems to take action in light of new information."*[34] *However, problems are often identified at moments of crisis, when there is neither time nor resources to stop and reflect. Being able to recognize warning signs that emerge as part of a slower moving process is also an issue. In addition, 'adaptive management' is often used as a euphemism for stumbling along, and keeping costs to a minimum. (Macey 2007,NRC 2003, Leschine 2007, IIIRM 2004)*
- *Engineered "system components can react in unexpected and unpredictable ways. Two or more small component failures often combine in unimagined ways to produce failures in the entire system – 'system accidents'. This is "not supposed to happen" because technological systems have many built-in safety features: redundancies, back-up systems, control devices, and procedures of vigilance. Yet, small multiple failures can defeat the most elaborate safety systems. Because multiple failures are unexpected, they are not visible to the system designers and are, therefore, outside a conscious purview of design and control."*[35]*(Faro 2010, Rosa 2008, Macey 2007, IIIRM 2004)*
- *How are the physical works maintained? By whom? Who is responsible for translating monitoring results into real action? What is the process for community consultation on engineering matters over the long term? Does the public have resources for technical advice? It is important to ensure the long-term availability of materials, skills and technology to fix unfolding problems. (NRC 2003, Leschine 2007)*

3.3 The information in the EIS and in the Technical Report prepared in June 2014 contradict each other. The amounts projected vary substantially, and take different positions on salvage.

The EIS states very low figures for a site of this magnitude:

> *"Preliminary closure and reclamation costs have been estimated for the Project at $16,377,490 (not including monitoring costs). Approximately $6,213,150 has been estimated to dismantle structures such as the mill, crusher, the water process pond, the conveyors, infrastructure related to the coarse ore stockpile, and various other buildings and structures, with no allowance for salvage value offsetting Closure costs. The reclamation costs for other mine components and other minor costs have been estimated at $10,164,340. This includes costs for site preparation, soil spreading, and re-vegetation for areas such as the coarse ore and PAG LGO stockpile footprints, facility footprints, the TMF dam faces and beaches, as well as the waste rock and overburden stockpiles. More detailed closure and reclamation costing will be developed as required under the Mines Act (1996c) in conjunction with permitting.*

This does not match the information at 21.1.14.3 in the Technical Report. *It states:*

[33] Rosa,op cit. page 242.
[34] Torrell (2000). quoted in Macey, Gregg P. and Jonathan Z. Cannon, *Reclaiming the Land* (Springer 2007), page 10.
[35] Rosa, op.cit. citing Perrow, page 239.

" A maximum of $112.4 M is allocated to reclamation bonding from the project cash flow and is incurred to year 24 of operations to cover possible reclamation commitments in the event of premature mine closure. From year 25 to year 28 approximately c$66.7M will be recaptured as the PAG LG stockpile is processed. Assuming an annualized growth rate of 1.5% after tax for the first five years and 2%thereafter, the total reclamation bond remaining in place upon mine closure is c$89.9 M. This figure plus salvage value associated with equipment is expected to cover the estimated reclamation cost of c$70M." [36]

3.4 The ability to undertake "progressive reclamation" is more limited than the proponent acknowledges

"The Project design allows for substantial concurrent reclamation activities to occur from early in the life of the mine. The Closure activities are split into concurrent reclamation (Years 5 to 28) and final reclamation (Years 29 to 35). The concurrent reclamation work will include activities such as applying soil covers, caps, and/or re-vegetation of Project stockpiles, the TMF and its embankments, and tailings beaches. The final reclamation work will include activities such as decommissioning, removal, or capping various stockpiles, ponds, pumps, roads, and water management ponds.[37]

Although the proponent talks of progressive reclamation in years 5 to 28, in fact most of it cannot be accomplished while the mine is expanding and operating. At the time when the reclamation can take place, there will be very little incentive for the operator to undertake reclamation. Any bonding should therefore, be taken at the beginning of mine operations.

3.5 There is no acknowledgement of the importance of community involvement in developing the closure and long-term care plan.

In regard to monitoring post-closure, the EIS states:

"Monitoring is required under section 10.7.30 of the Code (BC MEMPR2008), as well as the Mines Act (1996c) permit to be issued authorizing the construction, operation, and closure of the Project, and the Environmental Management Act (2003) permit to be issued authorizing the discharge of effluent from the TMF. Monitoring programs will be carried out during the Closure and Post-Closure phases and the results will be included in annual reports on reclamation and environmental monitoring per the Code (BC MEMPR 2008).

The monitoring will be carried out by suitably qualified environmental technicians and will encompass reclamation success, wetland re-establishment, surface water quality, groundwater quantity, geotechnical stability, and the management and stability of water impoundments, with particular attention to the TMF."[38]

[36] YMI Technical report , 21.1.14.3
[37] EIS summary p.20
[38] EIS summary p. 32

This is ignores current knowledge on best practices in the management of long-term care sites. Kuyek's literature review, cited above, found that:

- *There is a general consensus amongst all writers and case studies that local communities need to be involved in planning for long term care; in particular, the indigenous communities who have strong attachment to the very land upon which the waste repository sits. (Deline First Nation2005, Edelstein 2007, Gerrard 1995, IIIRM 2002, Leschine 2007, Macey 2007, Rekmans 2003, IIED 2002., EPA 2001, Keeling and Sandlos 2005)*
- *An endowed independent monitoring agency with responsibility to the affected community appears to be the most effective model. (Affolder 2011)*
- *Generally there is a consensus that the affected community should be formally involved in governance, but be free of financial responsibility. This may create conflict for government agencies and officials who may see community interests as challenging their institutional roles or jeopardizing their work-plans. (NRC2003, Macey 2007, Leschine 2007)*
- *Monitoring of the site must be done extensively and on a regular basis so that even early problems with leakage can be identified. What is sampled? By whom? How often? Five year monitoring by contractors appears to be the norm, but cost-cutting always trumps effectiveness over time. (Affolder 2011, Leschine 2007, Harding 2007, Raffensperger 1999, NRC 2003)*
- *The responsibility to analyze the monitoring data in depth on a regular basis when/if the work is contracted out has to be clearly established and sustainable. How is this to be sustained over centuries? (NRC 2003)*

4. Acid mine drainage and water contamination

See Minesite Drainage Assessment Group (MDAG) detailed report attached in Appendix B, which concludes:

> *"Because of its size, potential environmental impacts, vicinity and cumulative effects to a major river, we expect the Harper Creek EIS to exceed normal environmental work and be very cautious. For the issue of ML-ARD, the Harper Creek EIS fails in this [...]*
>
> *The lack of detail and reliability on the larger metal leaching issue is a major environmental weakness in the Harper Creek EIS. We expect metal leaching (ML) and water contamination will be much worse than predicted in the EIS [...]*
>
> *The EIS fails to provide reliable information that the proposed ARD mitigation will prevent ARD at the proposed site […]*
>
> *In closing, we expect ARD at some point if Harper Creek goes ahead, and serious ML and water contamination can be expected even if ARD is mitigated. This unpredicted and thus unexpected ML-ARD would require treatment of contaminated water, likely for centuries based on similar minesites. In turn, this would likely costs many hundreds of millions of dollars each century. Such large costs should be estimated in advance of mining, and financial security to pay for them*

should be scheduled into the operation. This was not done in the EIS, because ML-ARD has been markedly underestimated, as we showed above." [39]

5. Comments on the adequacy of Aboriginal consultation about the project

The relationships and contact with First Nations upon whose traditional lands the mine is anticipated to be built, is described in the EIS summary at 1.12.2 and in the EIS in chapter 23, in appendices 3-F, 3-G,3-H. The summary states:

"1.12.2 FIRST NATIONS

The Project is located within the asserted traditional territory of the Simpcw First Nation and the Adams Lake Indian Band. Adams Lake is a member of the Lakes Division which includes the Little Shuswap Indian Band and Neskonlith Indian Band. All four of these First Nations are members of the Secwepemc Nation and the Shuswap Nation Tribal Council (SNTC). SNTC is a political organization that works on matters of common concern to all its members, including the development of self-government and the settlement of the aboriginal land title question.

Chu Chua is the main reserve of the Simpcw, meaning "the People of the North Thompson River". It is located on the North Thompson River, 20 minutes from Barriere, BC. The Simpcw have 4 other reserves located near Little Fort, Louis Creek and Dunn Lake. Simpcw has approximately 650 members (2011); 250 live on reserve. The Adams Lake Indian Band has approximately 740 members, half of which live on the seven reserves located near Chase and Shuswap Lake.

YMI has initiated a range of consultation activities with stakeholders since 2006. This includes one-one discussions with local landowners. Consultation with local First Nations has been, and continues to be, an important part of these activities. YMI continues to work closely with First Nations on the development of working agreements. YMI signed a Negotiation Agreement with Simpcw First Nation, and a General Services Agreement with both Simpcw and Adams Lake. Both communities had members involved in the baseline studies and fieldwork, including the archaeological impact assessment, for the Project."

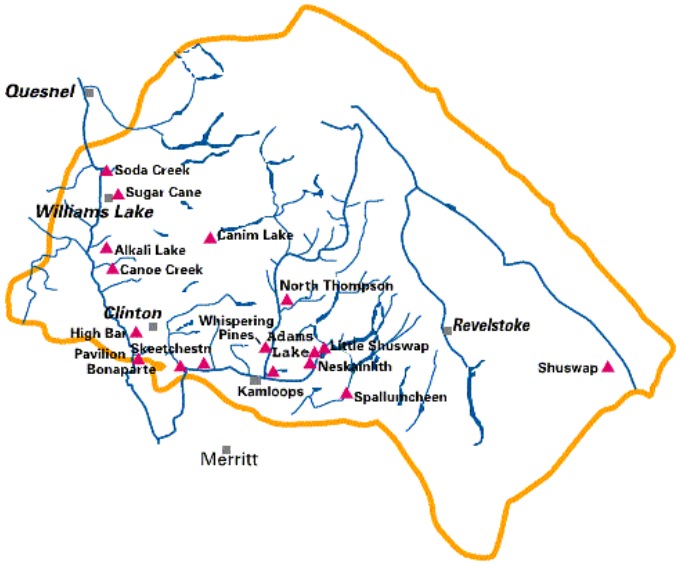
YMI promotes their relationship with the Simpcw First Nation as a positive one[40]. However, the document attached to the EIS as Appendix 23-A - Simpcw First Nation Preliminary Research Report in Regard to Strength of Claim, indicates serious misgivings about the mine plan, real concern about its potential impacts and a willingness to assert title if necessary. The location of two rock cairns in the TMF area has become a focus of contention.

The Effects Assessment on Aboriginal Rights and Related Interests in Section 23 of the EIS relies on a "determination of significance" methodology which does not incorporate traditional indigenous

[39] MDAG, RE: Harper Creek Project, British Columbia- Review and Comment on the EIS Pertaining to Acid Rock Drainage (ARD), Metal Leaching (ML), Water Contamination, and Related Issuesreport to MiningWatch Canada, March 2015.
[40] See http://www.emi-magazine.com/index.php/sections/special-focus/604-yellowhead-mining,

knowledge and marginalizes the holistic understanding of landholders.[41] Table 23-7.1 sets out the Summary of Potential Effects on Aboriginal Groups Rights and Accommodation Measures. The accommodation measures rely almost entirely on a number of "Management Plans" for everything from water to wildlife. Most of the "plans" are put off to the permitting stage, and there is no guarantee that any of them will actually be developed or carried our effectively in the future. Certainly the experience of the Secwepemc in dealing with the proponent at Gibraltar and in regard to the new Prosperity proposal would not encourage trust.

Secwepemc Nation describes its lands on its website as follow:



"The Shuswap or Secwepemc (pronounced suh-Wep-muh) people occupy a vast territory of the interior of British Columbia. The word Shuswap is an English version of Secwepemc. This traditional territory stretches from the Columbia River valley along the Rocky Mountains, west to the Fraser River, and south to the Arrow Lakes. Most Secwepemc people live in the river valleys.

The traditional Secwepemc lived as a self-governing nation grouped into bands. Although the bands were separate and independent, a common language and a similar culture and belief system united them. Before the smallpox epidemic of 1862 there were thirty Secwepemc bands. Today, there are 17 remaining bands that make up the Secwepemc Nation. There are three Secwepemc dialects depending on what part of the Nation you are in.

Traditionally the Secwepemc depended on the natural resources of the land. Each band usually spent the winter in its own village of pithouses. During the rest of the year most Secwepemc

[41] For a good analysis of this form of Determination of Significance Analysis, see Laurence, David. Significance Criteria and Determination in Sustainability-Based Environmental Impact Assessment. 2005. Submitted during the Mackenzie Valley Impact Review Board hearings. Available at https://www.ceaa-acee.gc.ca/155701CE-docs/David_Lawrence-eng.pdf and Gibson, Robert. Specification of sustainability-based environmental assessment decision criteria and implications for determining "significance" in environmental assessment. http://static.twoday.net/NE1BOKU0607/files/Gibson_Sustainability-EA.pdf

people lived a nomadic lifestyle. They moved from place to place, as foods became available in different areas. They developed a unique culture that was totally self sufficient.[42]

The Secwepemc Nation has unsurrendered and unextinguished Title and Rights throughout the Secwepemc traditional territory known as Secwepemculecw."[43] *(Our emphasis)*

In November 2014, a mining policy developed by the Northern Secwepemc te Qelmucw (NStQ) Leadership Council sets out the terms of their relationship with mining companies. It also reflects the position of most other Secwepemc peoples[44]. The mining policy was developed as a result of the operating mines, advanced exploration projects and abandoned mines on their lands. The Mount Polley disaster happened on their traditional territory. The enormous Gibraltar Mine, owned by the second largest YMI investor Taseko, is on the territory they share with the Tsilhqot'in; the New Prosperity project (also a Taseko project) proposed to run power lines over their territory; the Ruddock Creek , Adams Mine and Ajax projects are also on their land. They have every reason to be suspicious about what these mines will bring.

Although the Harper Creek Mine is not within the specific reach of the signatories to the mining policy, it provides an indication of what will be expected by the rest of the Secwepemc Nation and its peoples.

In 2014, the Tsilhqot'in Supreme Court decision found that where First Nations had a strong claim to the land and had not signed an agreement which extinguished this claim, **the Honour of the Crown required their consent before a development could proceed**. The Secwepemc ability to say "no" to this mine is very strong indeed. The Northern Secwepemc Mining Policy sets out the terms on which consent might be based:

From the preamble to the Mining Policy:

The Secwepemc Nation has unsurrendered and unextinguished Title and Rights throughout the Secwepemc traditional territory known as Secwepemculecw (see Appendix "A", Map 1);

The Secwepemc Nation has the inherent jurisdiction to provide stewardship of Secwepemculecw and to ensure its sustainability and viability for future generations;

The United Nations Declaration on the Rights of Indigenous Peoples states:

a. Indigenous peoples have the right to the conservation and protection of the environment and the productive capacity of their lands or territories and resources (Article 29(1)); and

b. Indigenous peoples have the right to determine and develop priorities and strategies for the development or use of their lands or territories and other resources (Article 32(1));

As part of the Secwepemc Nation, NStQ has a responsibility for stewardship and a right to use and benefit from the Resources of the portion of Secwepemculecw known as the NStQ Statement of Intent Area (see Appendix "A", Map 2);

NStQ has Title and Rights throughout the Statement of Intent Area, including the right to conserve and manage the Environment and Resources;

Mining Activities have the potential to harm NStQ Title and Rights, Environment and Resources

[42] http://www.secwepemc.org/adc/table.html

[43] Northern Secwepemc te Qelmucw (NStQ) Leadership Council. Northern Secwepemc te Qelmucw Mining Policy.November 19, 2014. Available at :

[44] Ibid.

Some excerpts from the definitions.

"Alternatives Analysis" means a decision-making process that considers all social, cultural and environmental effects of different means of designing, constructing, operating and closing a Mining Activity, and includes the option not proceeding with the Mining Activity

"Cumulative Impact" means the impact of an activity that may not be significant alone, but may become significant when added to the past, present and anticipated potential impacts of Disturbances at the local, regional or population level.

"Irreparable Harm" means a type of harm that cannot be corrected and which cannot be resolved by monetary compensation, including the destruction of the environment so that ecological functions are lost or indefinitely impaired; the deterioration of Water quality where indefinite treatment is required; and the alteration or destruction of habitat which prevents the return and re-colonization of native species to a functioning self-sustaining ecosystem.

From the body of the policy

6.1.3 NStQ's negotiation of an Agreement with a Proponent does not alleviate the Crown's obligation to seek the consent of NStQ or to consult and accommodate NStQ with respect to a Mining Activity.

6.1.4 NStQ's participation in negotiations with a Proponent or the Crown shall not prejudice NStQ's right to refuse to consent to a proposed Mining Activity if NStQ decides that the Mining Activity would be inconsistent with the Guiding Principles in Part 4 of this Mining Policy.

6.3 Environmental Assessment Agreements

6.3.1 Prior to the Proponent submitting a project description of a Reviewable Activity, NStQ may request a Proponent to enter into a written Environmental Assessment Agreement in accordance with this Policy and upon such request the Proponent shall negotiate and enter into an Environmental Assessment Agreement with NStQ.

6.3.2 Upon the commencement of Environmental Assessment Agreement negotiations, the Proponent shall:

a. provide NStQ with all information listed in Appendix "D";

b. provide NStQ with sufficient funding to meaningfully participate in Environmental Assessment Agreement negotiations and

c. provide NStQ with adequate time to negotiate an Environmental Assessment Agreement before the commencement of the Environmental Assessment.

6.3.3 NStQ's consent to the conduct of an Environmental Assessment shall be evidenced by a signed Environmental Assessment Agreement with the Proponent, and an EA Funding Agreement with the Crown.

6.3.4 An Environmental Assessment Agreement shall contain provisions relating to the topics listed in Appendix "C" and such other provisions as may be agreed to by the Parties.

6.3.5 Despite the signing of an Environmental Assessment Agreement with a Proponent, NStQ retains the right to refuse to support any Mine Development Activity subsequently proposed by the Proponent.

In our opinion, the mine does not have the consent of the Secwepemc or any of its bands to continue, and the "consultation" to date and the conduct of the EA has been improper.

Conclusions

In the course of this review, we heard many concerns about the very short time frame provided to study the EIS from affected First Nations and from our consultants. In some cases, relevant information was password-protected and could not be accessed in the time allowed. This is a serious limitation on a proper review of such a complicated mine proposal.

In our opinion, the Harper Creek Mine should not be allowed to go in to production for the following reasons:

1. YMI has not designed and cannot safely manage its tailings impoundment to the "zero failure" standard recommended by the Mount Polley Expert Panel, and the dam presents a very high risk in case of failure.
2. The economics of the mine and the company are extremely marginal and will result, at the best, in boom and bust operations that are destructive to local economies and a threat to safety and environmental stewardship.
3. The closure and post-closure plans make no provision for comprehensive, long-term, perpetual care of the site, with proper financial bonding; the current financial bonding stated in the EIS contradicts the NI43-101 Technical Report bonding and is severely underestimating the real reclamation costs for a site of this magnitude; perpetual pumping of water from the pit to the TMF and the subsequent perpetual monitoring and treatment of the water is a great concern;
4. The EIS fails to provide reliable information and predictions regarding acid rock drainage and water contamination mitigation measures; MDAG's report attached (Appendix A) expects that "*Metal leaching and water contamination will be much worse than predicted in the EIS*"[45]
5. YMI's consultation with the affected First Nations has been improperly conducted and has not reach any consent.

[45] MDAC, cover letter to MiningWatch Canada. March 2015