Review of the Sisson Mine Comprehensive Study Report

Socio-Economic & Environmental Issues

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For:

Conservation Council of New Brunswick (CCNB)

Canadian Environmental Assessment Agency (CEAA)

May 14, 2016

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1. Introduction

MiningWatch has been engaged by the Conservation Council of New Brunswick to comment on the Comprehensive Study Review (CSR) socio-economic findings for the Sisson Mine Project in New Brunswick. The Comprehensive Study Review is the latest report in the Environmental Assessment of Sisson. The Government of New Brunswick, on December 3, 2015, approved the proponent's Environmental Impact Assessment with forty conditions (mitigation measures). In January 2016, the Summary Report of the New Brunswick Independent Panel publicly released its findings. The Independent Panel Review document summarized and commented on public interventions in the EA process to date.

The MiningWatch Canada Review and Comments are organized as follows:

- Section 3.3 The Purpose and Need for the Project
- Section 10. Benefits to Canadians
- Lack of socioeconomic impact assessment in the CSR
- Enforceability of mitigation and follow-up measures in the CSR
- Need for an independent environmental and socioeconomic oversight body and the ESMS
- Conclusions

2. Purpose and Need for the Project Not Demonstrated, Section 3.3[1]

The CSR states at 3.3:

The former Act requires consideration of the need for and purpose of a project. The proponent stated that the need for the Project is to supply worldwide market demands for tungsten and molybdenum, and help alleviate supply shortages of tungsten caused by export restrictions implemented by China. Supplies from the Project would be available to meet market demands in North America and elsewhere. The purpose of the Project is to mine tungsten- and molybdenum-containing ore from the Sisson deposit, process ore to meet market demand for the mineral products, and create return on investment for the shareholders of Sisson Mines Ltd.[2]

The Sisson Mine would be 5-10 times bigger than most other tungsten mines in the world, but the ore grade (the percentage of tungsten and molybdenum in the ore) is 3-7 times lower. Therefore, this mine would generate more mining waste, be more marginal economically, and greatly increase the overall social, environmental and economic risks for investors, the public, governments, and affected communities.

In fact, Sisson would be one of the largest tungsten open pit mines in the world, with possibly the lowest grade ore, with tungsten (WO^3) grading at 0.067% and molybdenum (Mb) at 0.021%.

Other producers have much higher grades, including Cantung in the Northwest Territories with WO^3 of 0.47% (6 times higher) and Molyhil in Australia (WO^3 0.47% and Mb 0.21%, 6 to 10 times higher). In South Korea, the Sandong Mine has grades of WO^3 0.35% (5 times higher) and Mb 0.04% (2 times higher), and Vietnam's Nui Phao Mine grades 0.21% WO^3 (3 times higher).[3]

For each ton of ore extracted and processed, the Sisson Mine would produce less than 0.09% marketable metal, and over 99.91% waste in the form of mining residues containing many toxic substances. This ratio of waste rock generated increases to over 100% when one considers all of the other material that need to be removed to access the ore (e.g. organic material and millions of tons of overburden and waste rocks). **In other words, the Sisson low ore grades appear to make the Sisson Mine the biggest tungsten waste management project in the world**, with more than 100% of the rock mined turned into water-saturated, face-powder fine, toxic tailings that will have to be managed in perpetuity, along with a pit and quarry that will also need water management forever.

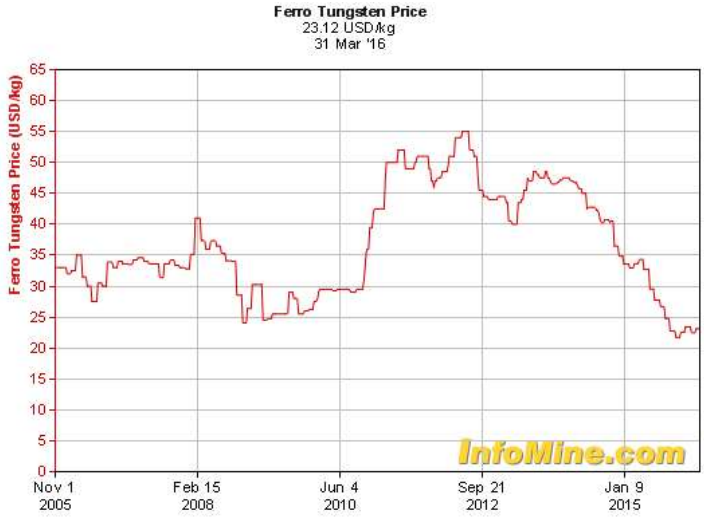
Therefore, the ability of the proponent to remain financially solvent and able to meet its commitments becomes a real concern for protecting the environment, as well as for attaining true sustainable development and intergenerational equity. **We are of the opinion that Sisson Mine does not meet this threshold. Also, the need for this mine's product has not been demonstrated for the foreseeable future for the following reasons:**

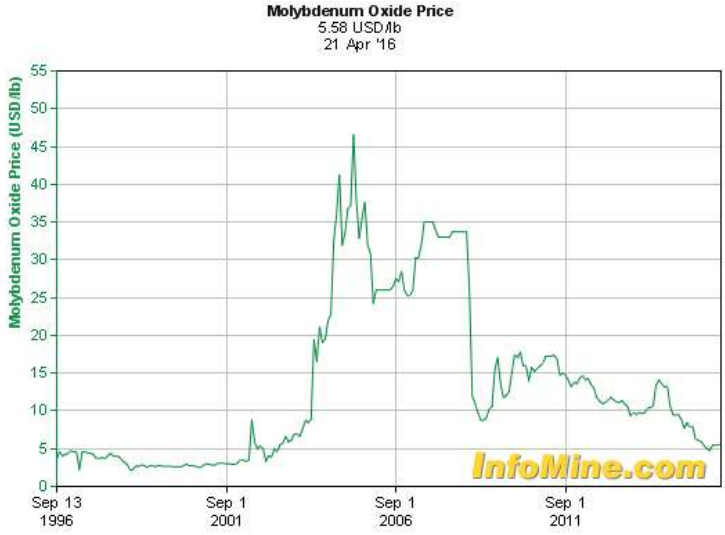
- The proponent's feasibility study argues that China's restrictions on the export of tungsten and molybdenum have created the world wide need for their product. However as of May 20, 2015, after a lengthy trade dispute, China's export restrictions on tungsten and molybdenum were struck down by the World Trade Organization.[4]
- There are also many other sources outside China for tungsten (South Korea, Vietnam, Australia, UK.) which have a lower environmental impact, as the grades are significantly higher in most cases.
- There is little market for tungsten at this time and there are other tungsten mines developing. The USGS writes: *In late 2015 the sole tungsten mine in Canada [Cantung] suspended operations because of low W prices and was placed on care-and–maintenance status. Eight large Chinese tungsten producers plan to reduce output of W concentrates. Bucking this negative trend a new tungsten mine began production in Zimbabwe in 2015; a large new mine in Vietnam has ramped up production for APT and tungsten oxides, the Drakelands tungsten mine in Devon, UK, is scheduled to start full production in August 2016, and new ferrotungsten plants also began production in Russia and the Republic of Korea.*[5]
- **Tungsten tailings and scrap can be re-processed.** It is a very recyclable material, easily extracted from scrap steel and much of world's need for it can be met in this way.[6] A report written for the USGS in 2000 states: "*The importance of scrap as a raw material*

in APT production was indicated by statistics compiled by the International Tungsten Industry Association. In 2001, an estimated 70 percent of the APT produced by companies that contributed data for Europe, Japan, and the United States was derived from scrap. The remaining 30 percent was derived from ore concentrates.[7]

Economic risk analysis of the Sisson Mine Proposal:

- Current prices for APT tungsten and for molybdenum are $160US/Mtu[8] for tungsten (WO^3) and $5.65US/lb for Molybdenum (Mb).[9]
- Prices in the feasibility study from January 2013 are overly optimistic -not realistic- with today's market, and were based on $350US/Mtu for tungsten (two times higher than today's market) and $15US/lb for molybdenum (nearly 3 times higher).[10]
- There is no reason to assume the prices will go up anytime soon. Historic prices for these metals can be seen in the following graphs:





- The company estimates cash costs for this mine currently as $153.3 CAD/Mtu (after deducting a credit for moly byproducts of $107.8Cad/Mtu). In US dollars, this works out to $121US/Mtu with a moly byproduct credit of $85US/Mtu.[11] Since the molybdenum credit is now only worth 1/3 of what it was in 2013, we can conservatively reduce the value of the credit by ½. **Assuming the molybdenum credit is reduced by ½ to $43 US/Mtu, the cash cost from the Sisson Mine is now $164US/Mtu, which exceeds current commodity prices for APT tungsten.**
- Forecasts by the USGS and analysts do not see a rise in tungsten or molybdenum prices in the near future.[12]

The mine will be subject to boom and bust and greatly at risk of premature closures. Bankruptcy is a real possibility.

Security of the investment. The Sisson Mine Project is a limited partnership that has been established for the express purposes of limiting liability for the mine. Its only asset is the mine itself, and the corporate structure will make it impossible for governments to seek restitution if it does not meet its environmental commitments. Given the current and foreseeable markets and the very low ore grades of this mine, experience suggests it is highly unlikely that it will be able to meet these commitments.[13] The company is still seeking investors to make the project a reality.[14] Currently, Northcliff Resources share price is $0.12 CAD; in the past year, it has traded from $.06 to $0.13, but never higher.[15]

The Sisson Project will not be able to guarantee a return to its investors given the metrics given above. In addition, one of the two partners in the mine is in trouble with another tungsten mine. The developing Wolf Minerals' Drakelands Mine, 32.3% owned by Todd Corporation, is said to have one of the Western World's largest reserves of tungsten at 37.5 million tonnes (WO^3 grading at 0.19%), again a very low grade ore body, yet nearly three times as high as Sisson's**.** This project is not doing well either.

"*The firm developing Plymouth's vast open-pit tungsten mine has arranged a £25million safety-blanket finance facility, after doubts were raised about the project's viability. Wolf Minerals Limited shareholders have approved a standby subscription facility with Resource Capital Fund VI LP (RCF VI), a mining-focused private equity firm which normally specialises in buy-outs. The deal, which involves a flexible share offer, comes after Wolf announced a loss after tax of A$24,250,452 in the last six months of 2015, and auditors raised concerns about the future of the Drakelands mine project at Hemerdon.*"[16] It is clear to this author, as it was to other intervenors in the public process,[17] that this mine is not financially feasible currently or in the foreseeable future. It is highly unlikely to meet its commitments to operate for 27 years and close with "no significant environmental effects".

The existing purposes of the mine are no longer relevant: there is no longer any supply shortage of tungsten and molybdenum to fill; there is unlikely to be any substantive returns to investors or governments from the project; and a few hundred jobs could well be created with considerably less risk, less environmental damage and fewer costs elsewhere in New Brunswick. We recommend that the mine not be permitted at this stage, and that another environmental assessment be undertaken using more realistic technical and financial assumptions.

3. Section 10 of the CSR "Benefits to Canadians" Does Not Address the Subject

The text in CSR Section 10 is irrelevant to the section title. It describes the few areas where the proponent claims to have changed the project to reduce its environmental effects. It does not address proponent claims in the EIA regarding taxes, jobs and payments to government, and thus leaves them unassessed. These economic claims appear to be exaggerated. As an example, in "revenues to government" the EIA includes the income taxes paid by workers and contractors. Since employees and contractors are already paying taxes, the amount anticipated from the mine should be net of the amount they already pay.

The other estimates for taxation anticipated from the mine are significantly exaggerated. The mine will not pay taxes until all its exploration and development expenses have been repaid, and unless it makes a profit -which it will not in the current and foreseeable markets. The tax system is briefly described below.

According to Chen and Mintz,[18] the New Brunswick Marginal Effective Total Tax Rate (for all taxes) for mining is 8.6 per cent and with an income tax METR of 4.1 per cent. If the mine does not make a profit, it does not pay tax, either federally or provincially.

- Statutory corporate tax, combined federal and provincial, is 26% of net profit,[19] before deductions.
- The mining tax (resource rent) is 2% of net revenue less transportation and processing costs (tax exempt for the first two years); 2nd tier- 16% of net profits exceeding $100K.

However, the following deductions and tax credits are allowed federally and provincially.[20]

- Exploration and development expenses are fully deductible (and are transferable from one subsidiary to another). In New Brunswick, exploration expenses may be "super-expensed" and reported at 150% of true value.
- Depreciation is allowed at between 5-100% for equipment, activities and other costs.

- A processing allowance (in addition to depreciation allowance) is possible at 8% for milling costs - 15% smelting - 15% refining – for a total up to 65% of profit that is deductible (the APT plant is likely considered to be "refining").
- Financing allowance on carry- forwards of 8% on the undepreciated base.
- All reclamation contributions are tax deductible.
- 15% deduction allowed for research and development expenses.

4. Socio-Economic Impact Assessment Not Carried Out

Although effects on *Labour and Economy* and on *Community Services* were Valued Ecosystem Components (VECs) in the EIA and were part of the New Brunswick Review, they are not VECs for the federal government CSR. The only sections of the report where socioeconomic effects are dealt with are in reference to Aboriginal peoples.

We are not commenting on Aboriginal issues, as the Maliseet and Mi'gmag First Nations are making their own submissions, and we cannot speak for them. However, it is noteworthy that in the EIA, effects on "the traditional land uses of Aboriginal People", which are also socio-economic issues, are treated separately from the economic section, and without reference to monetary gains or losses. "The Agency concludes that the current use of lands and resources for traditional purposes by Maliseet First Nations, in combination with the cumulative environmental effects of other projects and activities, are likely to be significant."[21]

So, there is neither mitigation measures nor follow-up for the overall (or non-Aboriginal local) population proposed in the CSR. The New Brunswick EIA decision accepted the proponent's assessment that there would be little if any effects on labour and economy or on community services, except for some modest, poorly defined, positive ones.[22] Even at closure, despite claims that the mine would greatly enhance the local and provincial economy during operations, there seemed to be little to no consideration in the CSR for the negative socio-economic effect at that stage, and no concrete and overarching mitigation measures.

In all the documents leading up to the CSR: the final EIA, the New Brunswick General Review Statement from the Technical Experts Committee, the NB Independent Panel Summary of comments from the public and First Nations, the NB Conditions of Approval, and the CSR itself, there was no effort to conduct a Socio-Economic Impact Analysis that integrates environmental impacts, social and cultural costs into the assessment of the economic effects of the mine (or its failure). Socio-Economic Impact Assessment (SEIA) is a well-developed field of expertise and

academic study,[23] but has generally been ignored by the consultants who undertook the studies for the Sisson EIA.

Instead the consultants relied on an input-output analysis[24] to study the labour and economic effects of the mine, which looked at GDP, jobs and revenues to governments.

The input–output template is the wrong tool to evaluate an environmentally destructive project such as a mine. The input-output model, like GDP, has no debit column and excludes all those effects which are not calculated in monetary terms. It also deals with gross amounts, not net, so that jobs created and taxes paid neglect the fact that most of the mine workers are already employed and already paying taxes. It ignores social and environmental costs, and - where they can be monetized - they are treated as benefits because they involve expenditures.

5. Enforceability of Mitigation Measures in the CSR

Most of the mitigation measures, although well-intentioned, are unenforceable as they are written; there are no standards, dates for compliance or enforceable bench marks. A considerable number depend on "adaptive management".

> *The Agency's enforcement officers are designated to verify compliance and enforce CEAA 2012 and any conditions in decision statements. Enforcement officers also apply a number of compliance promotion and enforcement activities to foster compliance with CEAA 2012 and avoid adverse environmental effects. These activities include carrying out site inspections and investigations. Enforcement officers apply CEAA 2012 in a manner that is fair, predictable and consistent; and they use the authorities and powers founded in this Act.*[25] (CEAA compliance and enforcement policy)

Sections 89-97 of CEAA provide for enforcement of mitigation and follow-up measures.[26] However, there is no evidence that the enforcement sections have ever been used, let alone on a regular and consistent basis. Although there is a reference to a report about actions taken under these sections, it could not be found. There are to be two employees hired to enforce this entire section of the Act across Canada.

The NB EIA conditions are more specific, but still without standards, and in most cases defer the completion of the mitigation measures to permitting processes in which the public and First Nations are not involved.

Although Condition 29 of the New Brunswick EA decision requires the establishment of a Community Liaison Committee and "consultation" with First Nations and "stakeholders," the

form and process are not set out, and the decision and design still rest with the proponent and the NB DELG ministry. The condition does not mandate public participation in permitting decisions, only some involvement in monitoring.

Any transparency inherent in the EA process is abrogated to the secretive process of permitting. In New Brunswick mine permitting, only the *Clean Air Act*[27] requires notice to the public; consultation beyond that is at the minister's discretion. The *Clean Water Act*[28] does allow that the Minister may require consultation, but does not mandate it. It is likely that even Access to Information requests would not be able to identify what has happened in these processes, because of commercial confidentiality.[29] The same will be true of other provincial Acts referenced in the conditions of Approval, as well as for permits under the federal Fisheries Act, the Explosives Act and other federal Acts.

For example, there is a particular problem for reclamation and closure bonding. The proponent has proposed a three step bonding program.[30] However, the largest bond is put off until mine closure.[31] This is considered to be a very poor practice that is not recommended by either national or international industry associations, and is not used anymore in many other Canadian jurisdictions[32]. For example, the Quebec legislation requires a 100% payment made within the first two years of operation, including 50% when receiving the permit. Without proper financial assurances paid early or in advance, the public/taxpayers and the government will have to foot the clean-up bill if the market crashes or the company is no longer solvent. Also, the amounts of Financial Assurance for mines are confidential information in New Brunswick; this is highly problematic in terms of transparency, public scrutiny, and accountability.

There will be insufficient time and funding to enable adaptive management to identify and respond to warning signs of system failure. The CSR relies on adaptive management to deal with effects on air quality, for seepage interception, for sound problems, water quality management, wildlife management, fish toxicity, ground water drawdown, tailings storage concerns, etc. In most cases, the CEAA agency relies on the adaptive management systems of the Government of New Brunswick. **We have considerable evidence now that adaptive management plans often miss the warning signs of system failure** (for example, the Mount Polley mine waste disaster in 2014,[33] which has led to a mine reclamation review in BC - ongoing), and the ample evidence of fisheries habitat compensation failures.[34]

'Adaptive management' is often used as a euphemism for stumbling along, and keeping costs to a minimum. To be effective, the process needs to be adequately funded and 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."[35] 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.[36]

How will these mitigation measures be enforced? By whom? What if fines would bankrupt the company: will it be considered to be "too big to fail"?[37] What will happen if mitigation measures are found to be inadequate or impossible to implement? What will happen in later years if it is found that the mine should not even have opened, as the problem is irremediable and the consequences are so serious?

6. No Independent Environmental and Socioeconomic Oversight Body

In the CSR, reliance is placed on an Environmental Socioeconomic Management System (ESMS), to be established by the proponent prior to construction, which is supposed to be revised annually.[38] The ESMS is described in condition 29 in the NB EIA conditions. The ESMS will establish a Community Liaison Committee and will involve affected First Nations and "stakeholders" and regulatory authorities. The proponent is to establish it and it will be approved by the NB DELG. It will track "adaptive management" performance against predictions over time. Funding is to be allocated for First Nations to participate in this process; there is no funding for public stakeholders. Monitoring is to include, but not be limited to: aquatic resources, wildlife access to tailings facility, country and traditional foods and socioeconomic benefits and employment for First Nations.

The CSR also relegates closure, post-closure and long term care to the development of a conceptual plan and monitoring program with First Nations and stakeholders which will be approved every two years.

From the point of view of the public stakeholders (we cannot speak for First Nations), this system has a number of flaws:

- There will be no way for affected public stakeholders to compel action on any of the findings;
- The process will be driven by the proponent and regulatory authorities, who will choose committee members, may outnumber First Nations and public stakeholders on the committee, have greater access to technical expertise and will provide the monitoring results according to their terms;
- The proponent will, in most cases, choose which data will be shared with the committee; and

- The process is likely to be very time-consuming and alien for affected public representatives who will have inadequate access to independent technical expertise.[39]

What is required for this mine is an independent environmental and socio-economic oversight body, similar to that established for the Ekati Mine in the Northwest Territories. This monitoring method enabled First Nations to appoint their own representatives to the Monitoring group, which then hired its own consultants as required; it was entirely funded by the mining company, but operated independently.

One of the most thorough studies of independent environmental oversight in recent years is that prepared for the Giant Mine EA in 2011, by Natasha Affolder et al.[40] This document includes a number of case studies and draws conclusions about the effectiveness of different approaches in terms of oversight, independence, and accountability. "*Though oversight does not necessarily effect change, the transparency it promotes is a means of balancing power and ensuring public confidence. If subject to oversight – that is, inspection, evaluation, or investigation – the actions and practices of decision-makers do not go unseen and cannot be made with the same level of impunity. To this end, it has been argued that independent oversight leads to higher standards of performance by regulators and agencies*."[41]

7. Conclusions

The CSR conclusions find that the project will have significant environmental effects on the First Nations, but expects this can be accommodated with alternative blocks of land that belong to the Crown. The Maliseet have now said "no" to the project and news reports indicate they intend to take the matter to the courts.

The finding that there are otherwise "*no significant environmental effects that cannot be mitigated*" is not supported by the following evidence:

- A very environmentally intensive process where less than 0.09% of the ore extracted and processed will be metal and over 99.91% will be waste residue. The waste will contain large quantities of toxic substances that will be stock-piled forever behind man-made dams prone to failure if they are not developed and maintained to the highest standards. Meeting these standards will require millions of dollars more than the proponent has planned for, or access to.
- The creation of an enormous pit lake and quarry lake that will need water treatment in perpetuity and that will never be fish-bearing or safe to use for recreational purposes

(irreversible effects). They will have to be fenced forever and be inaccessible, dangerous and unusable.

- The maintenance of tailings dams (using a mid-stream model) surrounding a water saturated tailings impoundment forever is contrary to best available practices and technologies recommended following the Mount Polley mine disaster in 2014 (BC).
- No effective standards to enforce mitigation measures on which the mine approval is contingent.
- Creation of a boom-bust industry in an area of the province that needs sustainable, long-term stable development. The existing purposes of the mine are no longer relevant or existent, nor demonstrated, with market prices 2 to 3 times lower than they were when the proponent filed its EA application. There is no foreseeable up-take in the market and there is no longer any supply shortage of tungsten and molybdenum to fill. Since the project is uneconomic, or at best very marginal, there will be likely very little, por no return at all to investors or governments from the project. On the flipside, affected communities, the public and governments would be exposed to significant financial and environmental risks & liabilities during and after operation, in perpetuity.

Endnotes

[1] Federal Comprehensive Study Review (CSR) page 8, and section 16(1)e of the former CEAA Act.
[2] CSR 3.3
[3] From company websites.
[4] https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds433_e.htm
[5] http://minerals.usgs.gov/minerals/pubs/commodity/tungsten/mcs-2016-tungs.pdf
[6] http://www.itia.info/tungsten-processing.html
[7] Shedd, Kim B. Flow Studies for Recycling Metal Commodities in the United States: Tungsten Recycling in the United States in 2000. USGS. Open-File Report 2005-1028
http://pubs.usgs.gov/of/2005/1028/2005-1028.pdf, page 5
[8] A metric ton unit (mtu) is 10kg ; A metric ton unit of tungsten trioxide (WO_3) contains 7.93kgs of tungsten; (from http://www.itia.info/tungsten-prices.html)
[9] http://minerals.usgs.gov/minerals/pubs/commodity/tungsten/mcs-2016-tungs.pdf
[10] Northcliffs Feasibility Study, January 2013, pages 23 and 24. Dowloaded from http://sedar.com/DisplayCompanyDocuments.do?lang=EN&issuerNo=00030606
[11] Northcliffs investor presentation December 2015. Slide 13, http://www.northcliffresources.com/i/pdf/Presentation-Dec2015.pdf
[12] http://minerals.usgs.gov/minerals/pubs/commodity/tungsten/mcs-2016-tungs.pdf
[13] Northcliffs Annual Information Return (AIF), January 29, 2016 pages 8-10
[14] Northcliffs Investor presentation, December 2015, slide 6
[15] http://www.bloomberg.com/quote/NCF:CN, as of May 3, 2016.
[16] Tungsten miner Wolf Minerals agrees £25m safety-blanket deal. April 22, 2016. William Telford, http://www.plymouthherald.co.uk/Tungsten-miner-Wolf-Minerals-agrees-25m-safety/story-29157550-detail/story.html#ixzz46lY1vroH
[17] Only in the Independent Panel Summary is there reference by anyone to the ability (or lack thereof) of Sisson Mine Limited's economic ability to meet the commitments it has made to environmental management, to employment, taxation and reclamation and perpetual care
[18] Chen, Duanjie and Jack Mintz. Repairing Canada's tax system to be less distorting and complex. The School of Public Policy. May 2013. http://policyschool.ucalgary.ca/?q=content/repairing-canadas-mining-tax-system-be-less-distorting-and-complex and Mining Effective Tax and Royalty Rate addendum. May 2013. http://www.policyschool.ucalgary.ca/sites/default/files/Mining%20Addendum.pdf
[19] http://www.nrcan.gc.ca/mining-materials/taxation/mining-taxation-regime/8890
[20] Chen and Mintz. page 9
[21] Appendices to the CSR, page 206
[22] EIA, Section 8.10.10.1
[23] The Canadian Handbook on Health Impact Assessment, published by Health Canada Chapter 3: Social Impact Assessment in Environmental Impact Assessment Protocols: A Social Science Perspective. http://www.hc-sc.gc.ca/ewh-semt/pubs/eval/handbook-guide/vol_3/social-sociales-eng.php
[24] EIA Section 8-10, page 8-491
[25] http://www.ceaa-acee.gc.ca/default.asp?lang=En&n=429A25E6-1
[26] http://laws-lois.justice.gc.ca/eng/acts/C-15.21/index.html
[27] Condition 6 of NB conditions of Approval
[28] Conditions 7 and 10 of the NB conditions of Approval
[29] http://www2.gnb.ca/content/gnb/en/services/services_renderer.200949.html.html
[30] EIA Appendix H- reclamation and bonding
[31] EIA Appendix H, page 138, summary of bonding requirements
[32] Cowan. W.R, W.O. Mackasey and John Robertson. The Policy Framework In Canada For Mine Closure And Management Of Long-Term Liabilities: A Guidance Document. NAOMI. 2011. http://www.abandoned-mines.org/wp/wp-content/uploads/2015/06/PolicyFrameworkMinClosure2010.pdf. Pages 14-16
[33] Dr. Norbert R. Morgenstern (Chair), CM, AOE, FRSC, FCAE, Ph.D., P.Eng.; Mr. Steven G. Vick, M.Sc., P.E.; and, Dr. Dirk Van 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
[34] A 2005 study of failures in enforcement of Fisheries Act provisions can be found at MiningWatch, Protecting Fish Protecting Mines http://miningwatch.ca/sites/default/files/Protecting_Fish_0.pdf. This study includes references to an important and detailed report from the Dept. of Fisheries and Oceans about compensation measures for loss of fish habitat.
[35] Torrell (2000). quoted in Macey, Gregg P. and Jonathan Z. Cannon, *Reclaiming the Land* (Springer 2007), page 10.
[36] Excellent resources on this issue can be found in: International Institute for Indigenous Resource Management. Taking Control: Opportunities for and Impediments to the Use of Socio-Cultural Controls for Long-Term Stewardship of U.S. Department of Energy Legacy Waste Sites. November 22-23, 2004. Final Report: Summary of Roundtable Findings and

Recommendations; in Burger, Joanna. *Incorporating ecology and ecological risk into long-term stewardship on contaminated sites*. Remediation Journal, Volume 13, Issue 1, pages 107-119 Winter 2002. http://onlinelibrary.wiley.com/doi/10.1002/rem.10058/abstract. And in GAO, 2005. Hardrock mining: BLM Needs to Better Manage Financial Assurances to Guarantee Coverage of Reclamation Costs. Report to the Ranking Minority Member. GAO-05-377, June 2005. www.gao.gov/cgi-bin/getrpt?GAO-05-377

[37] http://www.thestar.com/news/canada/2013/05/25/snclavalin_looking_to_clean_up_its_reputation.html

[38] Appendices to Comprehensive Study Review, page 212.

[39] Ibid, page 213.

[40] Affolder, Natasha, Katy Allen and Sascha Paruk. Independent Environmental Oversight: A Report for the Giant Mine Remediation Environmental Assessment. February 2011. http://www.reviewboard.ca/upload/project_document/EA0809001_Independent_Environmental_Oversight_Report_1328898833.PDF

[41] http://www.reviewboard.ca/upload/project_document/EA0809-001_Independent_Environmental_Oversight_Report_1328898833.PDF, page 10.