



Department of Environment and Local Government
Education and Engagement Branch
P.O. Box 6000, 20 McGloin Street
Fredericton, NB E3B 5H1

July 17, 2015

Re: Public Comment on the EIA Report of the Proposed Sisson Brook Mine, Project #1172

Dear Sir or Madam:

Please find attached (via email) the Conservation Council of New Brunswick's (CCNB) comments on the above EIA Report.

As discussed in Part I of our comments, the proponent should not receive approval to construct and operate the proposed mine. It is our position that the proponent's conduct of the EIA and the poor quality of its EIA report for the project shows that it does not understand or care about the impacts of the mine on the environment and the future economic and social well-being of New Brunswick. Simply put, if the EIA is considered a test of the proponent's future ability and willingness to carry out the project in an environmentally and socially sustainable manner, then it has failed. Given this, CCNB requests that the Minister, under s.16(1) of the *Environmental Impact Assessment Regulation - Clean Environment Act*, recommend to the Lieutenant-Governor in Council that the undertaking (the mine) *not be approved* as proposed at this time. We further request that the Lieutenant-Governor in Council, under s.16(2) of the Regulation, not provide any approval that would allow the mine to proceed in whole or in part as proposed at this time.

If the proponent is given approval to construct and operate the mine, then CCNB believes certain conditions should be attached to this approval. These conditions are discussed in Part II of our comments.

Thank you for giving your time and attention to our comments. If you have questions regarding them, please do not hesitate to contact us.

Regards,

Stephanie Merrill
Director, Freshwater Protection Program
Conservation Council of New Brunswick

**Comments on the Environmental Impact Assessment Report
for the Sisson Project (Tungsten and Molybdenum Mine),
New Brunswick
NB EIA Registration #1172**

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July 17, 2015

PART I – Why Sisson Mines Limited should not be given approval to construct and operate the project

Since the beginning of the federal and provincial environmental impact assessments for this project, the Conservation Council of New Brunswick has not taken a position on the mine. Instead, our and others' efforts were focused on trying to get Northcliff and now Sisson Mines Limited (SML) to prepare an EIA report that is of the highest quality—one that fairly and accurately details the positive and negative impacts of the proposed mine. Unfortunately, the EIA report prepared by Sisson Mines Limited shows it does not understand or appreciate the harm that can be caused by the mine and its wastes. As a result, the Conservation Council of New Brunswick is asking that Sisson Mines Limited not be given approval to construct and operate the proposed Sisson tungsten and molybdenum mine.

When we give private companies such as Sisson Mines Limited the opportunity to exploit and profit from public natural resources, we are placing our trust in them to do so in a way that brings benefits to local communities and our economy and doesn't poison us and the environment. One way resource companies can demonstrate they are worthy of this trust is by conducting thorough environmental impact assessments.

Think of an EIA like being a test for a driver's license. We all know that driving can be dangerous. By passing your driver's test, you have demonstrated you understand the rules of the road, appreciate the risks of bad driving, and have a certain level of skill and competence. Your driver's license is a privilege, not a right, you have to earn it and it can be taken away.

For Sisson Mines Limited to earn the environmental and social license to construct and operate the proposed mine, its EIA needed to show that the company clearly understands the risks of this project and can competently carry out the project. The three examples discussed below will show that Sisson Mines Limited has not done this and as such should not be entrusted with a license to construct and operate this mine.

Example 1 – Not assessing the impacts of a failure of the tailings pond dam

Wanting to know what would happen if the dam for the tailings pond fails is not an unreasonable request. However, throughout the entire EIA, Sisson Mines Limited has refused to address this important issue. In its EIA report submitted to the federal government in 2013, Sisson Mines Limited did not bother to assess what would happen if the tailings pond dam failed because it said that this could not be considered a credible accident.

For the provincial EIA report it was asked to look at this issue again. Sisson Mines Limited's response; a 10-page report with little detail. Clearly this is not sufficient and because Sisson Mines Limited has not provided enough information about this issue, the Department of Environment had to contract another party to review the design of the tailings pond. The Conservation Council is not sure why Sisson Mines Limited continues to deny or hide from this potential catastrophe, but we feel it raises real concerns about the company's willingness and ability to properly care for the TSF in the future.

CCNB has several further comments on this issue.

First, even though the failure of the Mount Polley tailings pond in B.C. occurred in August 2014 and the final version of the EIA report for the province wasn't completed until February 2015, there is no

mention of the Mount Polley catastrophe in Sisson Mines Limited's tailings pond failure report. SML seems determined to ignore the reality of TSF failures.

Second, the independent review of the Mount Polley tailings pond collapse concluded that in B.C. there is a 1 in 600 chance of a tailings dam failure in any year.¹ Sisson Mines Limited's prediction: "the proposed TSF for the Sisson Project would have an annual probability of failure of between 1-in-1 million to 1-in-10 million".² Given the similarity between TSFs used in B.C. and the one proposed by SML for the Sisson Brook mine, SML appears to be significantly underestimating the risk of a TSF failure for its mine.

Finally, CCNB believes an expert with 20 years' experience reviewing proposals for large mining projects hired by the Conservation Council to review parts of the EIA said it best:

"Tailings dam failure is a low probability event, but also an event with high consequences. These consequences have never been ignored in any other EIS/EIA I have reviewed. To in essence assert that 'my engineering' could not possibly fail, in light of existing statistics, **is arrogantly assuming** that it is always the other guy (or gal) that will make a mistake – but not me. This is exactly the attitude that leads to accidents..."³

Example 2 – Failure to properly address wastewater from the mine

This mine will generate wastewater that is toxic. That is a fact of life for hard-rock mines. Knowing this, the question becomes, if this mine is permitted, can SML manage and treat this water? Like the issue of a failure of the tailings pond dam, Sisson Mines Limited does not demonstrate it appreciates the risks of the mine's wastewater and therefore that it should be trusted to operate the mine. Several examples of SML's cavalier attitude towards the wastewater management are discussed below.

To begin, in the main text of the EIA report, the water quality of the effluent flowing from the WWTP and of Sisson Brook is not discussed. It is never made clear why SML hides this information. However, if one searches Appendix C1 of the Predictive Water Quality Report (an Appendix to SML's federal EIA report), one finds that levels of contaminants such as arsenic and fluoride are much higher at the WWTP (Table C1.3) and Sisson Brook (Table C1.7) water quality nodes than at the other water quality nodes, e.g., NAP 5, that are discussed in the main body of the EIA report.

The EIA report does not discuss the impacts to the environment from the mine effluent at these two nodes that does not meet water quality guidelines. It also provides no plans to reduce the toxicity of the effluent from the WWTP, other than rely on the Napadogan and other streams to dilute the effluent to meet guidelines. Given this, one can only conclude that SML believes it is acceptable to release contaminated wastewater into the environment.

In addition, in the main body of the EIA, SML does not provide a design or costs for a WWTP that will release effluent with fluoride concentrations that will meet N.B. guidelines. Based on 2012 details for

¹ Govt. of B.C. 2015. Independent Expert Engineering Investigation and Review Panel Report on Mount Polley Tailings Storage Facility Breach, at p. 118. Available at: <https://www.mountpolleyreviewpanel.ca/sites/default/files/report/ReportonMountPolleyTailingsStorageFacilityBreach.pdf>.

² EIA Report, p. G-4.

³ See comments of Dr. Chambers at p. 84 of CCNB's report to CEA Agency on Sisson Project EIA, October 2013.

the Mount Pleasant mine, SML will be required to have less than 3 mg/L fluoride in the effluent from its WWTP. During operations, with the WWTP as presently proposed by Sisson Mines Limited, the effluent will have an average fluoride concentration of 4.5 mg/L. Therefore, a WWTP that lowers fluoride levels will be needed for the Sisson Brook mine. The capital and annual operating costs for a fluoride removing WWTP are significantly higher than those for the WWTP proposed by SML.⁴

Finally, there is no air of reality to Sisson Mine Limited's plans for how much wastewater needs to be treated. For example:

- Early in the EIA report, it states 6 million m³/year of contaminated water will flow from the TSF to WWTP during operation (EIA report 3-131).
- Appendix H to the EIA report states that after closure, 4.16 million m³/year of contaminated water from the open pit will need to be treated.
- The EIA does not explain where the difference in 2 million m³/year of contaminated water goes after closure? Is it lost to the environment as untreated, contaminated wastewater?
- More importantly, in a response to an information request from the Canadian Environmental Assessment Agency, Sisson Mines Limited reported that post-closure there will actually be 10,799,970 million m³/year of water pumped from the open pit to the WWTP (see Appendix A for details). (August 28, 2014) (p.14-13).

Given all of the above, the question becomes, how much water actually needs to be treated during operations and post-closure? Knowing how much water needs to be treated is important for the environment. Not enough WWTP treatment capacity will result in environmental damage. It is also important economically. Annual operating costs for the WWTP are estimated in Appendix H to the EIA report as \$800,000/4.16 million m³/year= \$0.19/m³. However, if post-closure over 10 million m³/year of wastewater needs to be treated, the annual operating costs more than double to \$1.9 million/year. (CCNB notes that this is an additional \$1.1 million/year underestimation of the wastewater treatment and mine reclamation costs to those discussed in the April 2015 AMEC Foster Wheeler report.)

As SML cannot clearly answer the basic and fundamental question of how much water from the mine needs to be treated, the Province and public of N.B. cannot have confidence in SML to safely operate the proposed mine. In addition, the WWTP is one of the most necessary components of the project needed to protect the environment and public health and yet Sisson Mines Limited downplays its needed functions and costs. This part of the EIA report fails the test and therefore Sisson Mines Limited has not demonstrated it deserves a license for the mine.

Example 3 – Poor archeological research

The original EIA report written by Northcliff (now Sisson Mines Limited) in July 2013 and filed with the Canadian Environmental Assessment Agency confidently stated that it was “highly unlikely” that artifacts would be found on the site of the mine (p.8-625). Obviously, the later discovery of an 8,500 year old arrowhead or knife and 500-plus other artifacts on the mine site shows that Sisson Mines Limited should not have been so bold in its prediction.⁵

⁴ See SRK Consulting. 2013. Scoping Level Water Treatment Cost Estimate for the Sisson Project – DRAFT at section 5.3 for details.

⁵ See <http://www.cbc.ca/news/canada/new-brunswick/rare-artifact-at-sisson-mine-site-dates-back-8-500-years-1.3006681>.

The problem is that the EIA report is filled with these types of assertions about the project—that all its potential impacts are “highly unlikely” or will be carefully managed. What the EIA report consistently fails to do is provide a fair and honest discussion of facts.

Conclusion

To conclude, you ask a new builder to draw up some plans and a budget for a home you want built. The estimate comes back and the price is surprisingly low. You’re happy until you notice the plans, among other things, don’t include the second bathroom you asked for, only the lowest quality materials will be used, like shingles that will have to be replaced in 15 years or less, or that there is no mention of the cost of building and other needed permits. Based on this, would you want this builder to build your dream home? Likely not. Instead you would look for a builder who would take the care to provide an accurate estimate and plans that meet your needs and wants.

That is how the Conservation Council of New Brunswick feels about this proposed mine. The EIA report is the estimate. It shows that Sisson Mines Limited does not want to address legitimate public concerns about the project and downplays or misunderstands the potential environmental harm this mine could cause. Given this, we do not believe Sisson Mines Limited should be entrusted with our resources, and therefore should not receive approval to construct and operate the proposed mine.

PART II – Conditions for Approval to Construct and Operate Sisson Brook Mine

It is the position of CCNB that prior to any proponent receiving approval to construct and operate the Sisson Brook mine, the following 7 conditions must be put in place.

1. A complete and accurate EIA report be resubmitted for public review

In October 2013, CCNB submitted a report to the CEA Agency commenting on the proponent’s EIA report for the federal portion of the EA for the project.⁶ CCNB provided a copy of this report to the N.B. Department of Environment at the same time. CCNB’s 2013 report noted that the EIA report for the federal process was incomplete and missing vital information. We have reviewed the EIA report for the provincial EA process and much of this same information continues to be missing. For example:

- Whether Acid Base Accounting for the project was ever completed is unclear as the provincial EIA report does not provide technical details for this accounting.
- How the effective rates of seepage capture from the TSF set out in Table 7.6.3 were determined.
- Failure to discuss the impacts on the environment by the release of contaminated wastewater from the WWTP and from the poor water quality predicted for the Sisson Brook water quality node.
- A true economic cost-benefit analysis, vs. an integrated economic model, has still not been provided for the project.
- A detailed and accurate assessment of the likelihood and impacts of a failure of the TSF has not been completed.

⁶ CCNB. October 2013. Expert Comments on the Environmental Impact Assessment Report for the Sisson Project (Tungsten and Molybdenum Mine), New Brunswick. CEAR #11-03-63169.

- The closure plan continues to be missing important details such how long mine wastewater will have to be treated and the real costs of closing and rehabilitating the site.

Given the above, it is CCNB's position that any approval to construct and operate the mine be predicated on the prior completion of the EIA report.

2. Require use of Best Available Technology (BAT) to manage tailings

The report of the Mount Polley TSF breach⁷ identified that one of the key causes of the failure of TSFs is the mixing of mine tailings and water. To avoid the consequences of inevitable TSF failures, the report recommends that all future mines in B.C. use the BAT of filtered, or dry stack, tailings.

“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.”⁸

CCNB believes the findings of the Mount Polley review and its recommendations are applicable to New Brunswick and as such, the Sisson Brook mine, should it proceed, be required to employ BAT of filtered tailings as a condition to operate.

3. Use of the open pit to treat wastewater should not be permitted

CCNB is greatly concerned with the proponent's plan to use the open pit as part of its wastewater treatment system for several reasons. First, filling the pit with wastewater presents another source for the contamination of groundwater. As the proponent discusses in its EIA, preventing this requires that water levels in the pit be maintained in perpetuity so that it remains a groundwater sink. It is CCNB's position that this perpetual risk is best managed by not creating it in the first place.

In addition, the proponent wants to use its planned open pit lake as part of its semi-batch wastewater treatment system. As the AMEC-FW report notes,⁹ the proposed semi-batch treatment system is untested and could fail. At present, the proponent has presented no contingency plans to address a pit lake full of contaminated water should its proposed treatment system not work. Again to avoid this risk, the proponent should not be permitted to use the open pit as part of its wastewater treatment system.

Finally, CCNB wishes to point out the inconsistency between the proponent's unwillingness to use BAT filtered tailings technology because it is too expensive and reportedly unproven for a mine like Sisson Brook, but that it is more than happy to use an unproven technology to treat mine wastewater when it lowers costs.

⁷ Govt. of B.C. 2015. Independent Expert Engineering Investigation and Review Panel Report on Mount Polley Tailings Storage Facility Breach. Available at: <https://www.mountpolleyreviewpanel.ca/sites/default/files/report/ReportonMountPolleyTailingsStorageFacilityBreach.pdf>.

⁸ *Ibid.* at p. 125.

⁹ AMEC Foster Wheeler. 2015. Review of Reclamation and Water Treatment Costs Sisson Brook Mine, New Brunswick - Final Report at p. 9. Available at: http://users.xplornet.com/~wuestl/sisson/AMECFW_TE153001_NBDEM_Sisson_Brook_Mine_Closure_FINAL.pdf.

4. Water that does not meet water quality guidelines should not be released from mine site

The EIA report does not provide a true picture of the amounts of contaminants that will be released by the WTP into Sisson Brook. Instead, it describes the water quality at the NAP 5 water quality node (Napadogan Brook), which is below the confluence of Sisson and Napadogan Brooks. As can be seen in the Knight Piésold Predictive Water Quality Modeling Report, during operations and post-closure, the amounts of the ten identified trace elements of concern in the EIA report, plus sulphate, are nearly all higher, often many times, at the Sisson Brook water quality node when compared to the NAP 5 node. The EIA report should have disclosed the water quality at the Sisson Brook node to the public and decision-makers as it is the true picture of the quality of water that will be released by the WTP. (Note that during operations and post-closure, wastewater released by the WTP will make up nearly all the flow of Sisson Brook.) The EIA report is using Napadogan Brook to dilute and mask the Sisson Project's WTP effluent. The implications for the assessment of the environmental effects of the project are discussed further below.

The Predictive Water Quality Study defends its use of the NAP 5 station by stating (at p. 5), "Beginning in Year 8, 6,000,000 m³/yr of excess water from the TSF is pumped to a water treatment plant (WTP) and discharged post-treatment to Napadogan Brook at the confluence with Sisson Brook." (emphasis added) This is the only place in the entire EIA report or supporting documents that effluent from the WTP is described as being discharged to Napadogan Brook. Everywhere else in the report, including in Appendix D of the Predictive Water Quality Study (*Flow Diagram for Contact Water*), Sisson Brook is stated to be the receiving waters for the WTP effluent. As such, the water quality at the Sisson Brook node should have been described in the EIA report.

Essentially, as written the EIA report and Predictive Water Quality Study are treating the approximately 80% of Sisson Brook (3rd order stream) and 42% of its watershed that will remain after the construction of the mine as a sewer. These remaining pieces may become dewatered during construction and operation (although alternative plans might prevent this), but they will not be physically destroyed. In other words, with a return of clean water there is nothing preventing the remaining Sisson Brook from returning to "high quality fish habitat" (EIA report at p. 7-43) during the operation and post-closure of the mine. This remaining portion of Sisson Brook is not part of the TSF and should not be treated as such.

There are three main implications to the EIA report for the Sisson Project as a result of this failure to properly describe or account for the water quality of Sisson Brook during operation and post-closure:

1. The Sisson Project's WTP effluent will have more and greater exceedances of the CEQC and HCDW guidelines for the ten identified contaminants than is predicted by using the NAP 5 water quality node.
2. The significance of the adverse environmental effects of the WTP effluent has been underestimated. For example, the CCME FAL guideline for fluoride is 0.12 mg/L. During operation, the predicted mean level of fluoride at the NAP 5 node is 0.746 mg/L, or 6X the guideline, the adverse effects of which the EIA report describes as being "not significant" (at pp. 8-213 – 8-214). However, the predicted mean level of fluoride at the Sisson Brook node is 2.619 mg/L, or 21X the guideline, the significance of which is not assessed or discussed.
3. The high levels of fluoride (21X the guideline) strongly suggest it needs to be removed from the WTP effluent. However, the WTP as designed will not do this. "In the event that water treatment for sodium or fluoride is required or if effluent metal concentrations must be lower

than those achievable by ferric and lime treatment then the water treatment process proposed here will not be adequate." (from SRK 2013 Metal Leaching and Acid Rock Drainage Potential Characterization Study, Appendix I: Water Treatment Plant Conceptual Design at p. 5.) It is not proper for the proponent to make all its water quality predictions and statements regarding their significance based upon a model(s) that uses an inadequate or wrong WTP design. We believe proper assessment of the project's impacts on water quality requires first a new WTP design and second, new modeling of predicted water quality using this new WTP design.

Is it now accepted that "dilution is not the solution to pollution". Given this, a condition of approval must be that all water released from the mine site, including from the WWTP and at the Sisson Brook water quality node, meet applicable federal and provincial water quality guidelines and limits in place for other mines in the province.

5. Impacts on human health be better assessed

Based on our expert review of the joint federal and provincial Environmental Assessment of Sisson Mine project, it is our opinion that the proponent, Sisson Mines Ltd., has provided an inadequate Human Health Risk Assessment (HHRA) (see Appendix B for a summary of our review). Given the deficiencies in the proponent's work and; given the inherent limitations of HHRA in addressing the broad range of determinants of public health, e.g. socioeconomic, psychosocial and/ or occupational health impacts, and given the sheer scale and length of proposed operation of the Sisson Mine project, we feel strongly that there is a need to develop a comprehensive Health Impact Assessment (HIA) process for this project. This project presents a unique opportunity to develop an HIA process that can be applicable across all present and future industrial projects of this magnitude in New Brunswick.

Dr. Elish Cleary, New Brunswick's Chief Medical Officer of Health, addressed the lack of, and the need for, a Health Impact Assessment framework in her landmark and internationally acclaimed report "Chief Medical Officer of Health's Recommendations Concerning Shale Gas Development in New Brunswick." Office of the Chief Medical Officer of Health (OCMOH) New Brunswick Department of Health September 2012. Recommendation 2.1 of this report states that:

"As part of an improved approach to Department of Health review of all industrial projects, a requirement for conducting a Health Impact Assessment should also be extended to industrial projects in other sectors as well (scope to be defined). Department of Health should design a template for the requirements of these submissions to ensure consistency and comprehensiveness with respect to environmental exposures and the other types of potential health threats identified in Part 2 Section 2b. Furthermore, it may be possible to design such a template in collaboration with other Federal/Provincial/Territorial partners across Canada to ensure a coordinated national approach."

In the EIA process, the Department of Health (DOH) and its representatives are often invited to be members of a project's internal-to-government Technical Review Committee (along with other department representatives) in consultation with the Department of Environment. DOH participates in the review of the proponent's EIA report if they have available staff and time; have knowledge of the project and its public health implications; and feel they can contribute meaningfully. The DOH does not have the ability, authority, resources or regulatory framework to take a leadership role in undertaking a comprehensive review of the project's impacts on or benefits to public health. This limited ability to participate in a process over which they have little control is concerning, given that it is the Department's

mandate to improve, promote, and protect the health of the people of New Brunswick and given that the built environment and industrial projects are directly linked to the health of people in this province. CCNB has done extensive work in this area.¹⁰

While no legal triggers for HIA currently exist in Canadian or New Brunswick regulatory legislation, in 2009 the Senate Subcommittee on Population Health recommended “[t]hat the Government of Canada require HIA to be conducted for any policy, plan or program proposal submitted to cabinet that is likely to have important consequences on health” and “[t]hat the Government of Canada encourage the use of HIAs in all provinces and territories”. Furthermore, in 2004, Health Canada assembled a very comprehensive 4-volume Handbook on Health Impact Assessment in Canada. This handbook would provide a good starting point for developing a framework for New Brunswick.

The major steps in conducting an HIA include:

- Screening (identifying plans, projects or policies for which an HIA would be useful),
- Scoping (identifying which health effects to consider),
- Assessing risks and benefits (identifying which people may be affected and how they may be affected),
- Developing recommendations (suggesting changes to proposals to promote positive health effects or to minimize adverse health effects),
- Reporting (presenting the results to decision-makers), and
- Monitoring and evaluating (determining the effect of the HIA on the decision)

A Health Impact Assessment framework can be applied as a strategic policy direction, or applied on a project by project basis, e.g. the Sisson Mine project. An HIA can be performed independently from an EA or EIA, or can be complementary to the EA / EIA processes already in place. Designing the regulatory framework (i.e. a first and stand-alone process, or a complementary process), with legally binding HIA triggers, should be the mandate of the Office of the Chief Medical Officer of Health.

As part of the current open comment period on the Sisson Mine project, CCNB recommends the Department of Health, specially the office of the Chief Medical Officer of Health be given a more prominent and regulated role in the review of projects that trigger a federal or provincial environmental impact assessment process, including the Sisson Mine project currently under review. Specifically we recommend that the OCMOH be given the responsibility and the resources to develop an HIA framework template, which can be applied to the current review of the Sisson Mine project, and which can subsequently be adapted for use across multiple industrial project reviews in the province.

6. Proper consultations with First Nations

¹⁰ Recent examples of CCNB's work on public health and environmental connections include:

Milewski, I. and Lui, L. 2009. Cancer in New Brunswick Communities: Investigating the new Brunswick connection.

Part 1: Moncton, Saint John and Fredericton. Conservation Council of New Brunswick. 40 pgs.

http://www.conservationcouncil.ca/wp-content/uploads/2013/02/CCNB_Cancer_Report_1_English.pdf

Milewski, I. and Lui, L. 2009. Cancer in New Brunswick Communities: Investigating the new Brunswick connection.

Part 2: Fourteen Urban and Rural Areas. Conservation Council of New Brunswick. 91 pgs

http://www.conservationcouncil.ca/wp-content/uploads/2013/02/Cancer_Report_2_English-2.pdf

Peer reviewed publication of this work: Identifying at-risk communities for action on cancer prevention: a case study in New Brunswick (Canada) communities. *New Solut.* 2012;22(1):79-107.

CCNB is concerned with reports that the Province of New Brunswick has left or delegated its responsibilities for consultation with First Nations about the impacts of the project on Aboriginal and treaty rights to the proponent. As always, it is CCNB's position that projects such as Sisson Brook should not be approved until governments have fulfilled all the duties and responsibilities required of them by s. 35 of the *Constitution Act*.

7. Bonding for the project be significantly increased from what is proposed by the proponent

CCNB has had the pleasure of reviewing the comments of Mr. Larry Wuest submitted to the N.B. Department of Environment regarding the EIA report. We are in agreement with them and in particular his review and comment on the amount of bonding necessary for the project. Further to this, and as discussed in Part I of our comments, based on the water quality guidelines established for the Mount Pleasant mine, the wastewater from the Sisson Brook mine will require, at a minimum, treatment for the removal of fluoride. Setting aside the findings of the April 2015 AMEC Foster Wheeler report, this need to treat fluoride immediately increases the capital costs of the mine's WWTP from \$8 million to \$75 million and its annual operating costs from \$800,000 to \$8 million.

Given this, a condition of approval must be that the amount of the bond(s) for the project need to be significantly increased from the amount proposed by Sisson Mines Limited, e.g., to \$150 million.

Agency IR: The proponent must respond to the follow-up question from MSES.

SISSON MINES RESPONSE

The PMF used in the design was calculated from the 24 hour PMP and snowmelt values using a rainfall-runoff model which was run for longer than 24 hours to ensure complete representation of all runoff. The actual value used in the TSF design is 583 mm. Due to the methodology use to model the snowmelt (variable baseflow), additional melt water contributed to the design PMF after the initial 24 hour period resulting in a higher total equivalent runoff depth. This is conservative from the perspective of the TSF storm storage capacity.

14.2.12 CEA-07-12

Ref. No.: 7.2.34 MSES01-4.2-05 Water Management – Hydraulic Design of TSF; TSF Water Management – Flood Storage Capacity in the TSF

Theme: Dam Design

Summary of Issue/Concern: The additional freeboard height requirement to manage the effects of wind-wave action was not documented.

Agency IR: Provide details or a reference on how the upper limit was determined as well as any information to support the conclusion that this would be sufficient to avoid overtopping from the combined effects of winds and waves

SISSON MINES RESPONSE

The industry-standard methodology that was used to estimate wave run-up and setup is presented in Smith, C. D. (1995), Hydraulic Structures. University of Saskatchewan Printing Service.

14.2.13 CEA-07-13

Ref. No.: 7.2.38 MSES01-4.2-09 Quantitative Analysis - Water Balance Modelling Water Balance Modelling

Theme: EA Methods – Seepage

Summary of Issue/Concern: The post-closure flow schematic provided by Sisson was well done. The summary table of average annual water balance discharge is helpful, but may be incomplete. The total inflows and total outflows in the Post-Closure conditions should be equal given that there will be no net change in TMF Pond water storage from year to year during Post-Closure. Revise the water balance summary table such that the inflows and outflows are equal during the Post-Closure phase. Review the water balance results for the other mine phases and correct them if necessary as well.

Agency IR: Explain why the inflows and total outflows in the Post-Closure conditions are not equal. Revise and re-submit water balance results as appropriate.

SISSON MINES RESPONSE

Table 7.7 in the response to IR MSES-4.2-09 has been supplemented with rows (highlighted below) to include “TSF Spillway to Open Pit” during Closure and Post-Closure. Some values in the table have been revised (shown underlined) to be consistent with the water balance in the predictive water quality model. Any excesses or deficits in the TSF balance are due to change in pond water storage for that year. The excess in the Open Pit Balance in Closure is indicative of the pit filling rate.

Table 7.7 (Revised) Average Modelled Flow Rates for TSF Inflows and Outflows, by Phase

Flow Path	Flow Rate (m ³ /yr)			
	Pre-Mining	Mining Operation (Year 10)	Closure (Year 34)	Post-Closure (Year 50)
Tailings Storage Facility				
Inflows				
Beach Runoff	0	1,565,365	1,988,055	1,988,055
Undisturbed Catchment	5,623,690	768,979	0	0
Precipitation on Pond	0	3,553,483	5,808,610	5,808,610
Water in Tailings Slurry	0	19,500,000	0	0
Water in Clarification Plant Underflow	0	4,301,160	0	0
Mid-Grade Ore Runoff	0	307,283	0	0
Waste Rock Runoff	0	1,035,494	0	0
Water Management Pond Recycle	0	3,872,190	2,762,690	2,762,690
Open Pit Dewatering	0	2,687,940	0	0
Quarry Runoff	0	313,112	803,811	803,811
Seepage Recovery Well Pump-back	0	56,803	28,402	28,402
Outflows				
Clarification Underflow Void Losses	0	1,363,440	0	0
Recycle to Mill	0	19,377,600	0	0
Total Seepage	0	3,313,560	757,380	757,380
Mid-Grade Ore Void Losses ³	0	0	0	0
Waste Rock Void Losses	0	1,541,160	0	0
Tailings Void Losses	0	3,611,160	0	0
Evaporation	0	1,380,488	2,268,964	2,268,964
Pumping to Treatment	0	6,000,000	0	0
TSF Spillway to Open Pit	<u>0</u>	<u>0</u>	<u>8,365,257</u>	<u>8,365,257</u>
Open Pit				
Inflows				
TSF Spillway to Open Pit	<u>0</u>	<u>0</u>	<u>8,365,257</u>	<u>8,365,257</u>
Precipitation on Pit Lake	0	0	1,106,749	1,475,552
Pit Wall Runoff	0	890,967	673,950	342,031
Undisturbed Catchment Runoff	0	1,301,439	736,919	736,919
Groundwater Inflows	0	442,082	361,986	91,173
Waste Rock Runoff	0	0	0	0
Water Management Pond Recycle	222	53,441	142,880	142,880

Table 7.7 (Revised) Average Modelled Flow Rates for TSF Inflows and Outflows, by Phase

Flow Path	Flow Rate (m ³ /yr)			
	Pre-Mining	Mining Operation (Year 10)	Closure (Year 34)	Post-Closure (Year 50)
Outflows				
Pit Dewatering	0	2,687,940	0	0
Pumping to WTP	0	0	0	10,799,970
Lake Evaporation	0	0	435,107	575,163
Waste Rock Void Losses ²	0	0	0	0
Notes:				
1. Flow rates are the annual volume for the year chosen to represent each phase of the Project (in brackets), unless specified otherwise.				
2. Waste rock void losses in the open pit occur only in years 28 through 30.				
3. Low grade ore void losses in the TSF only occur during years 15 through 19.				

14.2.14 CEA-07-14

Ref. No.: 7.2.39 MSES01-4.2-10 Quantitative Analysis - Water Balance Modelling (10); Pit Water Balance Model

Theme: EA Methods

Summary of Issue/Concern: Sisson's response provided some of the requested information. However, it would be helpful if the flow contributions at each modelling point were provided to provide the reviewers with an understanding of average annual discharge contributions from background sources (streamflow from undisturbed areas), and mine contact water (i.e. seepage, treat pit and TMF pond water). This will help the reader understand the relative proportion of flows reporting to each modelling point in the receiving environment. Provide a table of water balance results for each mine phase (Construction, Operations, Closure, Post-Closure).

Agency IR: Provide a table of water balance results for each mine phase (Construction, Operations, Closure, Post-Closure).

SISSON MINES RESPONSE

All of the data requested in the original IR have been provided in the response to it. A table of water balance results for each mine phase (Construction, Operation, Closure, Post-Closure) is shown in the response to CEA-07-13, above.

14.2.15 CEA-07-15

Ref. No.: 3.4 Water Quality (Reviewed by SEA)

Theme: Seepage – Mitigation

APPENDIX B - Summary of CCNB's Review of the HHRA for the Sisson Project

CCNB submitted a comprehensive review of the report on the potential human health impacts from the Sisson Project. The review found serious deficiencies in the methods and data used to estimate the project-related human health impact. Deficiencies identified by CCNB were also identified in Health Canada's review of the project.

- **The open pit mine will increase particulate (fine and coarse dust) pollution that will result in unsafe health levels.**

The HHRA found that dust pollution will exceed provincial air quality guidelines at the project site and will exceed safe health levels. Health Canada requested the project evaluate potential health risks from exposure to coarse particulate matter (PM₁₀) which was not included in the HHRA. Despite the lack of data on PM₁₀ dust levels, the HHRA's response to Health Canada was that "*significant adverse environmental effects from PM₁₀ are unlikely to occur*".

Predictions of dust emissions from at least one open pit mine in Canada were found to be five to 30 times higher (depending on the year) than estimates made by initial depositional modeling for the mine.

- **The open pit mine will increase arsenic and metal pollution that will result in cancer and non-cancer health risks above provincial health guidelines.**

The HHRA found that increased non-cancer health risks will occur as a result of inhaling arsenic-laden dust as well as dust loaded with manganese, cadmium and aluminum. Increased cancer risks will occur as a result of drinking water, ingesting soil (a problem for toddlers) and eating game, fish, and vegetation. The project will also add manganese, thallium, cobalt, chromium, methyl mercury and boron pollution to the area that will also increase non-cancer health risks.

The HHRA downplayed the potential exposure of dust deposited on plants and subsequent human consumption by stating that "*ore dust is not expected to affect soil or terrestrial food concentrations*" and "*it is unlikely road dust from the Project would notably affect the quality of vegetation, including edible berries, along unpaved roads above background conditions*". These statements contradict past and recent studies that found dust on vegetation, at distances as far away as 30 km from the source, are a significant direct pathway for human and wildlife exposure to pollutants. The HHRA stated that there would be no monitoring of drinking water, berries, vegetation or game. According to the HHRA, "*proposed monitoring is complaint-based and focused on ambient particulate matter. If complaints are received, monitoring would be considered*".

- **Health risks for on-site workers at the open pit mine were not evaluated or discussed.**

The HHRA did not provide any explanation for this omission. This information would be useful to New Brunswick's occupational health and safety agency in ensuring that the correct and highest occupational health standards are imposed on the project to protect the health and well-being of workers.

- **Public and occupational health follow-up or monitoring will not be done.**

The Canadian Handbook on Health Impact Assessment, a Report of the Federal/ Provincial/ Territorial Committee on Environmental and Occupational Health published by Health Canada, is explicit regarding the need for follow-up monitoring for development projects such as the Sisson Project. At the very least, public and worker health and selected social/economic indicators such as those identified in the Canadian Handbook on Health Impact Assessment should form the basis of a health monitoring program for the Sisson Project.

Overall, the study's conclusion that human health will not be significantly impacted by the project is not credible and is not supported by the proponent's HHRA.