Ian Peace
Salt Spring Island, BC
Email: <email address removed>

May 7, 2021

Impact Assessment Agency of Canada
160 Elgin Street
Ottawa, ON

Re: Suncor Base Mine Extension Project – Public Comment on the Draft Tailored Impact Statement Guidelines

To Whom It May Concern:

Please accept the following comments on the draft Tailored Impact Statement Guidelines (draft Guidelines) for Suncor's Base Mine Extension Project (BMX). General and detailed comments follow a brief description of my knowledge of the topic.

Field experience with Oil and gas exploration informed my First Nations Consultation work in the oil sands region. Consultation work provided opportunities to live in Fort McMurray and Fort Chipewyan for which, I remain grateful. These activities sparked my interest in oil sand developments, which triggered research. In 2006, I earned a BA in Anthropology at University of Calgary. In 2019, I wrote a thesis, "Oil Sand Tailings Water in the Athabasca River," which completed my MSc Environment and Management at Royal Roads University.

General Comments: a background for detailed comments

My comments follow from the tension between Suncor's unspecified claims to recycle almost all the water diverted from the Athabasca River (AR) and specific information that contradicts these claims. A large measure of Suncor's stewardship in the mineable oils sands region depends on their claim to recycle Oil Sands Process-Affected Water (OSPW). Over the past two decades, Suncor's Sustainability Reports claim that 75 – 88% of the water required to drive the Clark Hot Water Process (CHWP) "is recycled tailings water" (Suncor Energy Inc., 2012, p. 13; Suncor Energy Inc., 2019, p. 86). In contrast, a rich literature reveals specific information about economic barriers that prevent the reuse of all but a small amount of Oil Sands Process-Affected Water (OSPW).

In fact, unspecified, claims to 'recycle' Oil Sands Process Affected Water (OSPW) appear early in the history of mineable oil sands development and continue to the present (Clark, Pasternack, Hodgson, & Wardle, 1951, p. 200-201; Baddaloo, 1985, p. 72; Steepbank Mine Project Application, 1996, p. 359; Suncor Energy Inc., 2019, p. 86) ("Suncor Base Mine Extension Detailed Project Description," 2020, p. 20). However, no information available to the public explains details like, what is recycled or, how and where recycling works. More specifically, the absence of a definition for 'recycled' and lack of parameter detail for the numerator and denominator of percentage fractions restrict the quality of this information to a series of unspecified claims.

An unspecified "Zero Discharge Policy" appears at about the same frequency as recycling claims (Baddaloo, 1985, p. 1; Energy Resources Conservation Board, 2012, p. 13). Determining the fate of OSPW influences our ability to understand the potential for adverse environmental impacts. Environmental managers require accurate information about the dose of contaminants released from a development. If the CHWP does not reuse highly toxic OSPW then naturally, questions arise about the fate of OSPW. The credibility of a zero discharge policy and recycling link intrinsically.

Naphthenic Acids (NAs) remain the primary contaminant of concern. The CHWP separates bitumen from the Oil Sand Ore (OSO). NAs that occur naturally in the ore act as surfactants or, detergents that play a critical role washing sand, fine mineral particles and clay out of bitumen. NAs dissolve readily into the warm, caustic process water. The mass of NAs Suncor discharges from the CHWP daily illustrates the concern. In 2012, Suncor's Base Plant Processing facility, which excavated about 414,000 tonnes of OSO per day, also discharged approximately 83 tonnes per day of naphthenic acids to tailings (Clemente & Fedorak, 2005, p. 587).

Information that contradicts Suncor's claim to recycle significant quantities of OSPW in the CHWP demonstrates the depth of contrasting information. For example, Karl Clark, the Alberta Government Research Engineer credited with inventing the CHWP advised against reuse of process water,

> "I feel that water going into the pulp should be fresh water. There are two advantages. The main one is that it will not introduce clay where clay does harm. The other is that it will *slow down* the accumulation of clay in plant water. If it is simple to put some connections so that plant water need not be used in the pulp, I think it should be done. I feel pretty sure that it will be done sooner or later of necessity" (Sheppard, 1989, p. 430) *emphasis added*.

Numerous sources present specific information in support Clark's conclusion that the clay content of OSPW renders reuse economically, impractical. More recently, a regulator concluded "Despite some recycling, almost all of the water withdrawn for oil sands operations ends up in tailings ponds" (Canada National Energy Board, 2006, p. 38).

In addition to the accumulation of clay, a number of barriers to significant OSPW reuse remain unexplained.

> "There are also limits to improving water use efficiency by recycling process-affected water. Repeated extraction cycles are found to contribute to a decline in water quality, which disrupt the extraction process by way of scaling, fouling, increased corrosivity and interference with extraction chemistry" (Council of Canadian Academies, 2015, p. 60).

Elsewhere, oblique description can masquerade as explanation. “The water used in extraction of bitumen from mined oil sands can be recycled for reuse without water treatment, as long as the content of fine solids is low and it has acceptable levels of dissolved salts” (Council of Canadian Academies, 2015, p. 63).

Furthermore, Suncor published water use information that contradicts recycling claims. For example, in the Millennium Mine Application Suncor allayed concern about AR withdrawal during low-flow conditions by writing “80% of water diverted from the Athabasca River is returned to the river”(Suncor, 1998, B2.4.2). This aligns with Suncor’s License to divert water from the Athabasca River for industrial purposes. The Water License allows the company to “return flow” 79% of OSPW back to the environment. In 1998, Return Flow amounted to about 34,000,000 cubic metres of OSPW (Alberta Environment Licence to Divert and use Water, 1994, p. 2; Bullis, 2013). The 1998 return flows happened shortly after industry and government agreed that there are no pollution control technologies installed for OSPW (*Approaches to Oil Sands Water Release*, 1996, p. 12).

Finally, in successive Summary Reports on Sustainability, Suncor classifies the fate of water withdrawn from the AR in two ways. Either, “consumed” or “returned to its proximate source,” Consumed water is the volume bound up in sludge or, Mature Fine Tailings (MFT) (Suncor Energy Inc., 2012, p. 13; Suncor Energy Inc., 2019, p. 156). The above suggests Suncor routinely wastes significant quantities of toxic OSPW to the environment.

After comparing what the literature says to unspecified claims about recycling OSPW, it appears Suncor minimizes their environmental impact. My research suggests Suncor’s efforts to minimize the adverse effects of their oils sands development extends to other phases of the scheme and manifests as a pattern. Of particular concern is the quantity of OSPW that drains (releases) from Tailings Impoundment Areas. In order to understand the quantity of fresh, AR water required it is useful to align with what the literature says.

The clay content of OSO determines the quantity of AR water required to separate the bitumen. Briefly, the basic water plus ore formula or recipe for average quality OSO is about 2:1 parts water to ore. It takes almost one cubic metre of average quality OSO to yield 1 barrel of bitumen. That works out to about 12 units of water to separate 1 barrel of bitumen. Generally, lower quality OSO requires more water. For high clay content OSO the ratio increases to about 3 parts water to 1 part OSO (Mikula, Kasperski, Burns, & MacKinnon, 1996, Fig. 3; Camp & Chester, 1970, p. 2-3). The point is that Suncor discharges about one million cubic metres of toxic, OSPW to tailings every day (Suncor Energy Inc., 2013, p. 10).

Comments about potential plans to discharge mining sludge

Language in the draft Guidelines and newspaper articles suggest Suncor is pursuing and anticipating a permit to release OSPW into the Athabasca River. Below, based on the unspecified definition of OSPW, are concerns about that the OSPW referred to is actually mining sludge or MFT.

Shortly after discharge to a TIA, OSPW is about 90% liquid. Fine silts and clay make up the 10% mineral fraction. One consequence of caustic inputs and extensive mixing in the bitumen separation process is that the clay particles remain in suspension for years. This extended settling period results in proliferation of sludge. In about 1991, the industry renamed sludge Mature Fine Tailings (MFT) (Mikula, Kasperski, Burns, & MacKinnon, 1996). After about a 2 - 5 year settling period, sludge consolidates to approximately 30% solids. The use of percentages to describe mineral fraction of tailings consolidated to sludge obscures the fact that about 75% of the of the original AR water inputs meet an unspecified fate; “recycled” or “released” (Mikula et al., 1996, Fig. 3; BGC Engineering Inc., 2010, p. 3-4). This means that for every unit of bitumen produced about 10 units of OSPW disappear from the TIA facility.

Information suggests that OSPW drains downward from TIA dykes and foundations. This downward drainage and not ‘recycling’ is the main reason that from the air, very little of TIA’s appears as OSPW. Instead, viewers observe mostly sludge. OSPW released to groundwater resources migrates downward toward the main channel of the nearby Athabasca River. Once released to groundwater resources, OSPW migrates perpendicular to the hydraulic gradient and enters the hyporheic zone of the Athabasca River. From there, OSPW upwells to the main channel. Since NAs are hydrophilic or, water loving, there is no reason to think the route of exposure through geological units reduces the toxicity. Research shows that tailings diluted to a 20% concentration still kill 100% of fish in forensic, 96 hour tests (Hrudey, Sergy, & Thackeray, 1976, p. 40).

The sludge, with a thickness similar to yogurt, remains impounded in the TIA. The salient parameter of this sludge is the water content, which exceeds 65% for more than 15 years (Mikula et al., 1996, Fig. 8). Currently, there is about a gigatonne of sludge impounded in Suncor TIA’s. The concern is that since the sludge is mostly OSPW, Suncor intends to redefine or, pass off, the sludge as OSPW and discharge sludge to the Athabasca River.

Detailed Comments:

1.1. Factors to be considered in the Impact Assessment

- (a) (i) like, catastrophic failure of tailings impoundment areas
  (iii) any effects associated with release of OSPW or MFT
- (b) For all mitigation measures
  - (i) Define technical feasibility
  - (ii) For all technically feasible mitigation measures, prepare a report on the economic feasibility that clearly indicates diseconomy. Include how the proponent determined the economics. Include liberal and conservative estimates of how the cost of abatement technologies will vary over the life of the project

(e) (i) include the method discovered by MacKinnon and Retallack in 1982; based on mild acidification, flocculation with anionic polyelectrolytes and neutralization. This method results in water that does not kill fish and cost about $0.25/m3 (Baddaloo, 1985, p. 112). This technology enables reuse of process water.

(i) (i) the extent to which release of contaminants to the Athabasca River hinders the Government of Canada's environmental obligations and commitments in respect of Free Trade Agreements
(t) include what level of environmental degradation would offset economic benefits. Show a range of benefits that reflects potential unforeseen economic conditions like, low commodity prices. Discuss the financial benefit the proponent receives by releasing contaminants to the environment. What would it cost to abate the pollution?

3.1 Project overview

In April 1998, Suncor designated the design life of the mine plan at 30 years. In 2030, about 100 years will have elapsed since Karl Clark developed the basic design of the CHWP. These factors support a full assessment of the BMX Application. Please remove references to "inadvertent re-assessment."

3.4. Project components and activities

Include the role of water in the processes. Track water through the project footprint and the process showing diversion points, discharge points, treatment processes, releases and the fate of contaminants. Include quantities of water and contaminants.

Include maps of OSPW treatment areas and pathways for reuse. Include schematic of water treatment facilities. Note, the detailed project description Table 2 indicates a pipeline for "water recycle" this aspect should include detailed description of the treatment methods, position of the pipeline and the cost of treatment methods. The Millennium application included a host of commitments to do a better job dealing with sludge and to recycle water. Apparently, none of that happened and toxic sludge keeps on proliferating. Let us not accept Suncor promises to do better until they demonstrate their ability to meet the commitment. Until then, the regulator should assume Suncor will only relax the stringency of their present methods.

Include detailed definitions of all existing classifications of water and the treatment thereof. Include the fate of all water in existing processes.

4.3. Alternatives to the project

Must include all the materials used in the Steepbank and Millennium Applications including studies quoted by supporting documents. For examples, in Approaches to Oil Sands Water Release, the material refers to a Suncor dyke drainage water study and a review of their current operational, future operational, and reclamation water releases (*Approaches to Oil Sands Water Release*, 1996, p. 9 & 21). These should be made available.

In Athabasca River Water Releases Impact Assessment, Golder refers to "Golder Associates Ltd. 1994b. Tar Island dyke seepage environmental risk assessment. Submitted to Suncor Inc., Oil Sands Group. Calgary, Alberta" (*Athabasca River Water Releases Impact Assessment*, 1996, p. 94).

Include what level of environmental degradation would offset economic benefits. Show a range of benefits that reflects potential unforeseen economic conditions like, low commodity prices. Discuss the financial benefit the proponent receives by releasing contaminants to the environment. What would it cost to abate the pollution?

6. Description of engagement with Indigenous groups

The proponent should not file a completed design unless and until the crown completes Treaty and Aboriginal Rights consultations with affected First Nations properly.

7.1. Baseline methodology

The proponent must provide Lake Athabasca and Athabasca River fish health prior to large-scale developments, Pre-1965. The proponent must provide fish health from northern basin study. The proponent must take into account the loss of Lake Athabasca commercial fishery.

8.5.2 Changes to groundwater and surface water

Describe the quantity of contaminants likely released. Explain the methodology for estimating releases.
Describe the mitigation capacity of hydrogeological units for hydrophilic toxins like, NAs

16.1. Follow-up program framework
With respect to "the future potential effluent release plans should regulations come into force", the public is at a distinct and unreasonably, unfair disadvantage. The government and industry excluded the public from what appears to be years of consultations and deliberations intended to authorize the release of OSPW and probably sludge. The application should not go forward until the public knows the outcome of efforts to relax contaminant release regulations. The project benefits from the moving baseline where degradation of the environment up to the present state results in an advantage to the proponent but this idea that the public should not know about the rules for discharging waste is unreasonable. In order to evaluate the impacts, the public needs to know about the relaxations of stringency. What possible reasons could outweigh the government's duty to inform the public about the plan to release gigatonnes of toxic waste to the Athabasca River, a Heritage River?

21. Appendix 2 – Additional guidance

Activities related to water management or effects

Include all measures to monitor, prevent or mitigate OSPW migration downward from OSPW and tailings storage or impoundment facilities. This is in addition to any measures designed to monitor or measure lateral migration of OSPW.

Annex I – Draft Terms of Reference for the provincial environmental assessment

2.8.1 Water Supply [A]
(c) describe process water requirements: what clay content, what NAs content, what saline content, what sodium hydroxide content?
(j) define recycling. Relate the definition to existing and current definitions. What is the current meaning of recycling? Define “water recycling” to very detailed level.

2.8.2 [A]
(a) Include all measures to monitor, prevent or mitigate OSPW migration downward from OSPW and tailings storage or impoundment facilities. This is in addition to any measures designed to monitor or measure lateral migration of OSPW.

[C] include quantities, confidence on quantities and quality of discharged water. Describe measures taken to account for all fluids discharged to current TIAs

2.8.3 Wastewater Management

As part of the strategy, describe whether the cost of monitoring programs could pay for the treatment of OSPW. Describe the total amount spent on monitoring since 2000. Describe the treatment cost of the MacKinnon and Retallack, 1982 (above) process applied to the sludge stockpiles that accumulated since 2000. Contrast and compare the utility of treatment vs. monitoring.

Explain what happened to the zero discharge policy?
(e) describe the design of current facilities that will collect, treat, store and release wastewater streams.

3.2.1
Baseline information
[A] Provide core hole information that describes the quality of ore in the area of interest. In particular, the clay content of target ore bodies. Explain how the various clay contents affect the production of tailings and the amount of water required in the separation process. Explain how the clay content in the new target area compares to the clay content of previously mined areas.

3.2.2
Impact Assessment
Describe the route of exposure as it applies to OSPW releases from Suncor facilities. Describe the potential impacts and fate of contaminants released.

10 Monitoring
What measures does Suncor deploy to ensure independence of monitoring programs? How does Suncor measure their performance at independent monitoring?

References

Alberta Environment Licence to Divert and use Water, 10400 (1994). Edmonton: Alberta Environment.

Approaches to Oil Sands Water Release. (1996). Edmonton. Retrieved from http://aep.alberta.ca/forms-maps-services/publications/documents/ApproachesOilSandsWaterRelease-Mar1996.pdf

Athabasca River Water Releases Impact Assessment. (1996). Calgary. Retrieved from https://era.library.ualberta.ca

Baddaloo, E. G. (Alberta E. (1985). Proceedings of Alberta Oil Sands Tailings Wastewater Treatment Technology Workshop (p. 129). Edmonton: Research Management Division Alberta Environment.

Bullis, K. (2013). *Historical Water Use by Suncor Oil Sands Open Pit Mine Projects from Athabasca River*. Edmonton: Alberta Environment.

Camp, F. W., & Chester, W. (1970). Utilizing ion exchange to reduce fresh water requirement of hot water process. USA.

Canada National Energy Board. (2006). *Canada's Oil Sands Opportunities and Challenges To 2015: An Update*. Calgary.

Council of Canadian Academies. (2015). *Technological Prospects for Reducing the Environmental Footprint of Canadian Oil Sands: The expert panel on the potential for new and emerging technologies to reduce the environmental impacts of oil sands development*. Retrieved from http://www.scienceadvice.ca/uploads/ENG/AssessmentsPublicationsNewsReleases/OilSands/OilSandsFullReportEn.pdf

Energy Resources Conservation Board. (2012). *Regulatory Action in Alberta's Oil Sands*. Calgary. Retrieved from https://www.aer.ca/documents/reports/RegulatoryActioninAlbertasOilSands_201104.pdf

Hrudey, S. E. U. of A., Sergy, G. A. U. of A., & Thackeray, T. U. of A. (1976). Toxicity of Oil Sands Plant Wastewaters and Associated Organic Contaminants. In *11th Canadian Symposium Water Pollution Research Canada* (pp. 34–45). Edmonton.

Mikula, R. J., Kasperski, K. L., Burns, R. D., & MacKinnon, M. D. (1996). Nature and Fate of Oil Sands Fine Tailings. In *Suspensions: Fundamentals and Applications in the Petroleum Industry* (pp. 677–723). Washington, DC: American Chemical Society.

Sheppard, M. C. (1989). *Oil Sands Scientist. the letters of Karl A. Clark*. Edmonton: University of Edmonton Press.

Suncor. (1998). *Project Millennium Application* (Vol. 1). Calgary.

Suncor Energy Inc. (2012). *Summary Report on Sustainability*. Retrieved from http://sustainability.suncor.com/2012/pdf/2012_Suncor_Summary_Report_on_Sustainability_EN.pdf

Suncor Energy Inc. (2013). *Annual Information Form*. Calgary.

Suncor Energy Inc. (2019). *2019 Report on Sustainability*. Retrieved from http://sustainability.suncor.com/2012/en/about/about-suncor.aspx