MIKISEW CREE
FIRST NATION

Written Brief of the Mikisew Cree First Nation to the Standing Committee on Environment and Sustainable Development

Dated November 15, 2016

An indigenous perspective on why Canada's pollution laws matter

Mikisew Cree First Nation (Mikisew) is a Treaty 8 First Nation whose lands and rights depend on the Peace-Athabasca Delta and surrounding waters. The heart of our traditional territory is the Peace-Athabasca Delta, which is a UNESCO protected site partly within Wood Buffalo National Park, as well as the Athabasca River system, which is the epicenter of the oil sands region of Alberta. Being on the land and harvesting is an intrinsic part of maintaining the spiritual connection between our community and our lands.

From a Mikisew perspective, the physical, cultural and spiritual health of our community is inseparable from the health of our lands, waters and resources. When the natural environment is impacted, Mikisew is impacted: we can be on the land when it is healthy and being on the land is a way that our members can lead healthy lifestyles. This is true historically, but is particularly true today when our community is affected by the legacy of residential schools, drugs, alcohol, youth suicide and poverty. Even today most of our members in Fort Chipewyan rely on "country foods", including fish, different birds, moose and bison, for a significant portion of their diet.

Our confidence in the health of our waters and resources is similarly connected to the health of our community and our ability to maintain our distinctive way of life. When we lose confidence in the quality of our environment, we lose our ability to hunt and trap animals, fish, gather plants and berries, and teach our young people our way of life. No one should have to worry that teaching their culture could put their child's health at risk.

It is for these reasons that federal environmental protections – from monitoring activities to the regulation and prohibition of contaminants – is particularly relevant to Mikisew. Federal protection of the environment also has important implications for reconciliation in the oil sands

region: measures that recognize the linkages between the protection of the environment and treaty rights can promote reconciliation while approaches to environmental protection that ignore the needs of those holding treaty rights can equally undermine reconciliation.

Federal protection of the environment is also particularly relevant to the World Heritage Site that is downstream of the oil sands industry, Wood Buffalo National Park. As one former official from Wood Buffalo National Park put it: "Wood Buffalo and the Peace-Athabasca Delta in particular, sitting at the terminus of the Peace and Athabasca Rivers, is the potential recipient of upstream inputs and impacts to both rivers, essentially acting as the septic tank in the system."

Mikisew experiences of declining environmental quality in the oil sands region

In recent years, traditional Knowledge holders, Elders and Mikisew land users have noted negative changes to environmental quality concurrently with the increase in oil sands production. As well, a high number of rare types of cancer incidences and deaths have left community members wondering about the links between water quality, oil sands development and health in the community. The figure below from a 2014 study by researchers from the University of Manitoba shows the strong linkages that community members see between their health and environmental contamination.

Health	Mean	N	SE	+	-
Polluted traditional foods are a major cause of cancer in Fort Chipewyan	4.49	96	0.10	84.4	8.3
Polluted traditional foods are a major cause of poor human health in Fort Chipewyan	4.38	99	0.11	81.8	10.1

Note: 5=Strongly Agree, 1= Strongly Disagree, neutral values eliminated for proportion calculation; SE: standard error

Figure 1. Community concern that pollution of traditional foods affects health

The result is that today, despite the critical role that being on the land plays in the life of our community, many Mikisew members are scared to continue traditional practices out of a concern that oil sands activities have contaminated the ecosystems that are used by the Mikisew community. The impacts of oil sands on the Peace Athabasca Delta and Athabasca River are eroding our confidence, or *Kistinawi* in Cree, in the safety of water and the health of resources in areas we rely on for harvesting. As shown in the following figure from the same 2014 study highlighted above, many members worry about contaminants in traditional foods.

Worry and concern	Mean	N	SE	+	-
I worry about the environmental contaminants in the traditional foods I consume	4.45	101	0.09	83.2	5.0

Note: 5=Strongly Agree, 1= Strongly Disagree, neutral values eliminated for proportion calculation; SE: standard error

Figure 2. Community worry about environmental contaminants

In this part of our submission, we highlight three aspects of the decline in environmental quality that we have observed in the oil sands region and the Peace Athabasca Delta, including a more detailed focus on polycyclic aromatic hydrocarbons (PAHs).

Animal health

Due to the gaps in provincial and federal initiatives to gather information about the effects of pollution on environmental quality, Mikisew established its own Community Based Monitoring ("CBM") program in 2008. This CBM program tracks changes in indigenous knowledge indicators of ecosystem health as well as western science parameters of water quality and animal health.

One function of the CBM program is to serve as an intake for wildlife of concern collected by Mikisew members. In this role, the CBM program has collected oiled ducks, dead and deformed fish, rabbits with extra genitals, and muskrats, otters, beavers, fox and mink which were found dead for no apparent reason. The CBM program has also recorded and sampled two large fish kills in the Peace Athabasca Delta and one incident of a large seagull die off (approx. 125 birds).

The CBM program has also participated in two biomonitoring studies in conjunction with the Universities of Manitoba and Ottawa to better understand how contaminants affect animal health. Results from this work show elevated metals such as selenium, arsenic and cadmium, as well as total PAH levels (discussed below) in wildlife that warrant further examination of source. Muskrats collected by the CBM program in the Peace Athabasca Delta have high incidences of parasites, and otters collected have some of the highest body burden of mercury known (in partnership with Environment and Climate Change Canada).

Water quality decline

Mikisew members no longer drink water from lakes, rivers and sloughs in our territory and have observed more algae, foamy scum, dirtier water, scum on rim of the tea pots and boats, as well as a stronger smell to the water.

Water quality sampling in our territory similarly points to a decline in water quality. Sampling shows the persistence of phosphorus levels above CCME guidelines. Phosphorus is a driver of the eutrophication beginning to seriously alter the Peace Athabasca Delta ecosystem and possibly the cause of recent fish kills. Water sampling has also found frequent exceedances of the CCME guidelines for heavy metals, such as mercury, lead, silver, cadmium, arsenic, selenium, zinc and chromium, which are also contaminants generally associated with the oil sands industry. This increase in mercury, in particular, can affect food security for a remote community already plagued by high cost of living owing to exorbitant store-bought food prices.

Recent work by Mikisew's CBM program have extended the range of collections for Environment Canada's snow sampling, which indicate a source of mercury originating from oil sands mining activities, as shown in the following figure produced by Environment and Climate Change Canada.

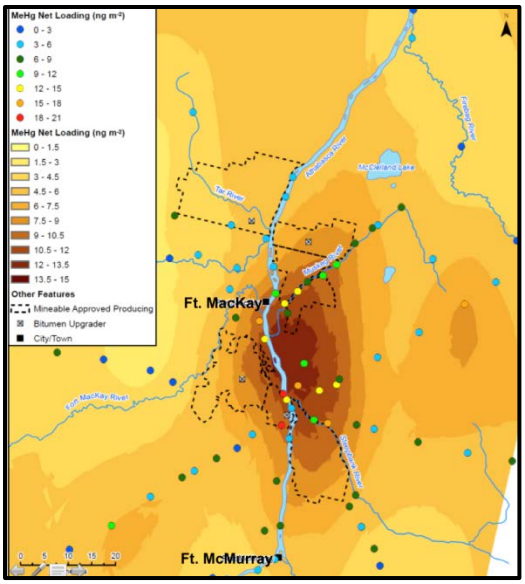

Figure 3. Mercury rates in the Oil Sands mining areas

These mercury findings are concerning to Mikisew, as other research done by Environment Canada shows elevated levels of mercury in gull and tern eggs and aquatic mammals in the Peace Athabasca Delta suggesting a possible link to our traditional foods. This research also rules out long-range transport of mercury leading to further indications that the origin of this mercury stems from oil sands activities.

Alkylated Polycyclic Aromatic Hydrocarbons

Polycyclic aromatic hydrocarbons (PAHs) are a group of chemicals that are formed as a result of the rapid, incomplete and high temperature combustion of organic matter. There is a global consensus that at least some PAHs pose a threat to human health and environmental quality. PAHs are a serious concern for Mikisew because some are known to be toxic and their toxicity may be increased through synergistic effects with other compounds in the environment and bioaccumulation.

There are already clear signs of potentially toxic PAHs in the Athabasca River and Peace Athabasca Delta. We highlight two examples of this from the work undertaken by our CBM program. Environment and Climate Change Canada has also found evidence of PAHs in Mikisew's traditional territory.

First, Mikisew members and the CBM program have collected fish, one of which is depicted below in the Figure below, from traditional use areas that demonstrate deformities and liver tumours (also known as neoplasms) as well as skin tumors. Many studies have demonstrated that the occurrence and intensity of liver tumors or lesions in fish can be related to PAH concentrations in sediments. Some fish from environments high in PAHs may also display what are known as toxicopathic hepatic lesions. As such, the occurrence of these liver tumors and lesions can be used as an indicator of PAH exposure.

Figure 4. Neoplasm on walleye caught at Quatre Fourches (PAD)

Second, these incidences of deformed fish, along with increased observations of negative water quality, prompted Mikisew to undertake its own research looking at the distribution and source of

PAHs in parts of Mikisew's territory. That work has confirmed the presence of oil sands related PAHs in the Athabasca River and parts of the Peace Athabasca Delta.[1]

In particular, a clear oil sands contaminant signal from upgrading and mining activities was detected in the Athabasca River near the source locations. An oil sands signal was still detectable at the Quatre Fourches and the Athabasca River mouth sites that are within the Peace Athabasca Delta, a UNESCO World Heritage Site. Sites in the Athabasca River, at the mouth of the Athabasca River and the Quatre Fourches sites are influenced by petroleum derived PAHs, while the reference sites are mostly influenced by the combustion of wood (most likely a reflection of forest fire activity and/or residential wood burning).

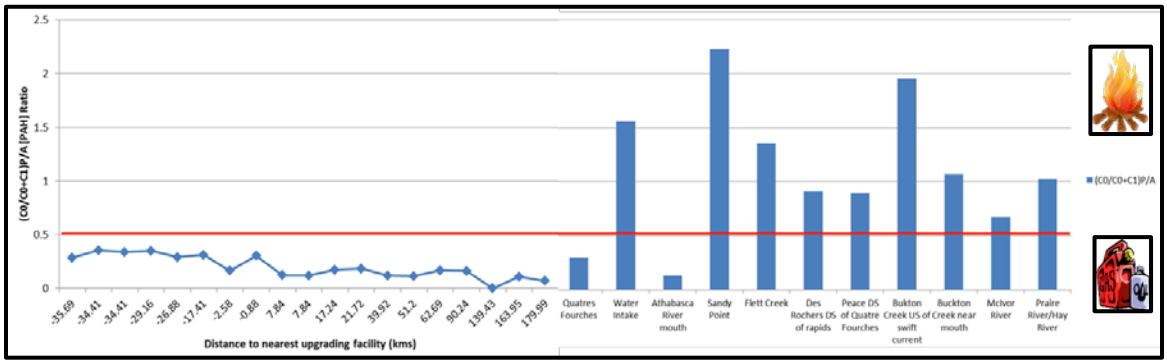

Figure 5. Diagnostic ratio of CO/(CO+C1)P/A displayed in distance from OS mining areas

Taken together, the findings of our CBM program highlight very real concerns about PAHs in our traditional territory and the risk they may very well be posing for human health and environmental quality.

What does Mikisew's situation tell us about CEPA, 1999?

Schedule 1 of CEPA, 1999 is under-inclusive with respect to PAHs

Sixteen PAHs have been designated as priority pollutants by the United States Environmental Protection Agency. As a result of their hydrophobicity and lipophilicity, their capacity for long range transport, their toxicity to aquatic organisms, their bioaccumulation potential and their strong interactions with sedimentary organic carbon, PAHs have also been included in the Convention for Long-Range Transboundary Air Pollution's Persistent Organic Pollutants protocol (UNECE 1998). Some PAHs are also listed under Schedule 1 of CEPA, 1999.

[1] A 2010 Environment Canada study had previously demonstrated a significant increase in PAHs near oil sands mining activities and Mikisew modeled its research and site selection after this methodology.

Currently, a gap exists in that Alkylated-PAHs, which are more common, often found in much greater concentrations, and which have chemistries that might render them more toxic are not listed in the Act. Indeed, in spite of the many PAH compounds known to science, research tends to focus on a few representative substances (e.g. list of 16 USEPA priority PAHs), and not on the ones most common in particular natural scenarios or after environmental spills, accidents and catastrophes (such as alkylated PAHs that often account for > 90% of PAH burdens in the environment).

This is a significant problem in light of the fact that there has been a substantial increase in PAHs (especially the more polar, alkylaromatic hydrocarbons and hetero-compounds) at lower trophic levels over the past 25 years. Because of increasing anthropogenic activities and disturbances, PAHs are being emitted at ever-growing levels, and their concentration in the broader environment has increased considerably (Shen et al. 2013).

<u>The approach to PAH research and regulation under Parts 4 and 5 of CEPA, 1999 is not reflective of the precautionary principle and the seriousness of community concerns</u>

The importance of understanding the impacts of PAHs cannot be understated, especially in a region that remains reliant on oil sands operations that are known to produce PAHs that travel considerable distances and have the potential to accumulate in water, sediment and wildlife.

Unfortunately, the approach to updating the Priority Substances List, toxicity assessments and elimination of toxic substances under the Act is not reflective of a precautionary approach or the clear need for immediate research. Simply put, existing research and approaches to assessing toxicity are not meeting the objectives of the Act.

To elaborate, the effects and underlying mechanisms triggered by exposure to complex PAH mixtures have been mostly drawn from experimental research under laboratory conditions, for single compounds, where ecological relevance was often omitted (in terms of concentrations, model organisms, and most importantly, PAH mixtures) and, as noted above, has focused on a few PAHs to the exclusion of more common and potentially toxic PAHs such as alkylated PAHs.

There have been few studies on exposure of terrestrial mammals to PAHs and their alkylated homologues. As such, the ecological significance and the effects of this exposure are inadequately understood, especially in long-lived species, where long-term survival and lifetime productivity may be adversely affected. Given the paucity of information on the levels and effects of PAHs on reproductive success, immune functions and population level responses, further investigative studies are warranted given the potential for toxicity concerns.

Monitoring residual contaminant levels in biota is important, but also important is the understanding of how these contaminants are impacting ecosystem health. An examination of how high trophic terrestrial vertebrates respond to these contaminants, and how their health is affected as a result, would not only provide the scientific community with better context when monitoring contaminant burdens in wildlife, but would help tailor cost-effective policies and risk mitigation measures. Contaminant levels need to be interpreted in light of their impacts on ecosystem health, and this represents a major knowledge gap when considering risks of exposure to PAHs, and particularly, the alkylated species with a high potential of bioaccumulation and biomagnification in apex predators.

More generally, the Act's approach to toxicity does not adequately take into account the fate, bioaccumulation, exposure and potential for adverse effects of chemicals released to the environment, especially PAHs, mercury (including MeHg), arsenic, cadmium and vanadium. Trophic biomagnification across a food chain or food web can considerably increase chemical concentrations; hence exposure and potential risk, at higher trophic levels compared to concentrations at lower trophic levels (Czub and McLachlan, 2004, Czub et al., 2008 and Kelly et al., 2007). There is thus a need to understand and include these magnification processes in both hazard and risk assessments. Bioaccumulation assessments seek to identify chemicals with high potential for bioaccumulation and employ several metrics and criteria as reviewed by several authors (Borga et al., 2012a, Borga et al., 2012b, Gobas et al., 2009 and Burkhard et al., 2013). Uncertainty is inherent whether the bioaccumulation data are measured from laboratory tests, through field monitoring campaigns, or calculated using models. Mass balance models provide mechanistic insights into bioaccumulation processes (Thomann et al., 1992, Arnot and Gobas, 2006, Kelly et al., 2007, Barber, 2003, Barber, 2008, Walters et al., 2011 and Kim et al., 2016). Food web mass balance bioaccumulation models also highlight the basic relationships between

various chemical, biological and ecological properties and processes and the metrics used to assess bioaccumulation and exposure (Mackay et al., 2013).

Reliable measurements and models foster confidence in scientific knowledge and in applying various sources of information for decision-making, or when targeting localized intervention or mitigative efforts.

The CCME Guidelines for PAHs are flawed

While the PAH levels found in the CBM program's study fell below CCME water quality guidelines, reliance on CCME guidelines for PAHs is not currently an effective way to understand their effects on environmental quality. We highlight three reasons. First, the levels set in the guidelines were produced under laboratory conditions, under strict environmental conditions in surrogate species (e.g., fish, invertebrates) for single PAH compounds. As such, the levels do not take into account synergistic and antagonistic effects of complex environmental mixtures. In the natural environment, the toxicity of the PAHs included in the Guidelines often differ in the presence of other compounds (including inorganic compounds such as heavy metals). In the absence of further research regarding complex environmental mixture toxicity, comparisons with the Guidelines should be undertaken with caution.

Second, PAHs are nonpolar, hydrophobic compounds that do not ionize. As a result, they have a strong affinity to sediment and particulate matter suspended in the water column. Sorption to sediment substrate therefore plays an important role in PAH transport, distribution, and bioavailability. For instance, up to 88% of benzo(a)pyrene in aquatic systems was associated with sediment, while 13% of fluorene and 20% of pyrene were associated with particulate (Broman et al. 1991). As a result, current monitoring may be underestimating actual PAH burdens in the aquatic environment.

Finally, comparing water or sediment PAH levels to currently accepted guidelines fails to provide any risk estimate to higher trophic biota that may be bioaccumulating these compounds under low-level chronic exposure scenarios. Biomagnification up the food chain is another driver of toxicity to higher trophic biota, and water and sediment quality guidelines may inadvertently underscore the risk to consumers of traditional foods.

CEPA 1999 is not adequately protecting aboriginal and treaty rights

Part 3 of CEPA, 1999 requires that the Minister maintain a system for monitoring environmental quality and provides the Minister with authority to enter into monitoring and research agreements with aboriginal people. However, Mikisew has identified a range of shortcomings in federal monitoring efforts in the Peace Athabasca Delta, many of which were communicated to the recent UNESCO Reactive Monitoring Mission to Wood Buffalo National Park. In addition, Mikisew continues to have difficulty obtaining Canada's commitment to involve Mikisew meaningfully in the design and carrying out of monitoring programs.

Where useful monitoring and research is being undertaken, the results do not appear to be informing decisions under CEPA, 1999 that may prevent or correct levels of harmful substances that are impacting the ability of Mikisew members to exercise their rights.

In addition, while CEPA, 1999 references aboriginal people at various points, Mikisew's experience has been that these provisions have not led to meaningful consultation or involvement in decisions under CEPA, 1999.

Other Concerns

Mikisew agrees with the June 3, 2016 submissions of Dr. Dayna Nadine Scott to this Standing Committee that CEPA, 1999:

- is not adequately protecting vulnerable populations,
- establishes barriers for realistic assessments of toxicity under Part 5,
- does not require sufficient preventative actions to adequately reflect the precautionary principle,
- does not effectively implement the Stockholm Convention, and
- does not sufficiently require information sharing.

Mikisew recommendations to better achieve the purpose of CEPA, 1999

1. **Better include PAHs in the Act**: All PAHs should be reviewed and added to the priority substances list as a focus on the 16 USEPA parent compounds alone grossly underestimates potential risk to wildlife consumers (especially fish consumers) and apex predators. Alkylated-PAHs are often found in much greater concentrations, and their chemistry might

render these more toxic. In addition, new measures are needed to prevent exposure from those PAHs that are included in the Act.

2. **Improve assessment approaches under the Act**: CEPA needs a more proactive approach in chemical evaluations and decision-making for adding contaminants to the Priority Substances List. This is especially important for new and emerging contaminants such as naphthenic acids (another group of organic contaminants that are emerging in the literature, but of which we know little about).

3. **Improve monitoring and the use of monitoring data under the Act**: Monitoring data from field studies should be considered more often in hazard risk assessments as toxicity laboratory studies provide information that often lacks environmental relevance (in terms of study model, number of compounds used in the study, toxicity of complex environmental mixtures under field conditions, etc.).

4. **Require the Ministers to develop and implement action plans for the monitoring and elimination of priority substances:** It is clear that PAHs continue to be released into the environment and that adequate steps are not being taken to properly understand their effects on human health and environmental quality or to ultimately eliminate PAHs of concern from the environment.

5. **Better implement existing mechanisms for aboriginal involvement:** While the Act allows the Minister to enter into agreements with aboriginal groups regarding a range of matters, it has been Mikisew's experience that these provisions are not being used in the oil sands region or the Peace Athabasca Delta. Mikisew asks the Committee to recommend that the Minister reaffirm Canada's commitment to reconciliation through entering into collaborative engagement and decision-making processes with indigenous peoples under the Act.

6. **Incorporate principles of reconciliation**: Modern legislation that has a bearing on Treaty rights must explicitly recognize principles of reconciliation. Consistent with this Government's position that the United Nations Declaration on the Rights of Indigenous Peoples is best implemented through topic-specific legislative instruments, the Act should:

    a. clearly state that one of its objects is reconciliation;

b. require consideration of how substances may impact the exercise of treaty rights and/or vulnerable populations (to be defined to include indigenous communities) when assessing substances to be regulated or eliminated under the Act;

c. recognize a category of "at risk ecosystems" where the Minister is empowered to develop additional pollution prevention measures in order to protect areas of national and cultural importance that are more sensitive to environmental degradation;

d. enshrine indigenous consultation requirements in the Act; and

e. require incorporation of indigenous knowledge when considering what substances are harmful

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