

128. A 2012 study conducted jointly by Environment Canada and Queens University, which measured PAH deposition to lakes within the Athabasca oil sands region (the "Kurek Study") found that a lake in close proximity to the Mildred Lake Upgrader- near the confluence of the Muskeg and Athabasca Rivers had PAH levels 23 times higher than background levels and attributed this to the disposition of airborne contaminants produced by Upgraders like those at Mildred Lake.<sup>156</sup> The same study also found that PAH was travelling much farther than previously expected, as evidenced by PAH levels at 2.3 times background levels as far away as Namur Lake.<sup>157</sup> It can be expected the increased production encouraged by LARP's prioritization of bitumen extraction will result in increased air and water pollution by PAH. This is of great concern to ACFN given the association science makes between PAH and cancer,<sup>158</sup> and the community's long standing concerns regarding pollution from oil sands, elevated cancer levels in the community, and the contamination of country foods, particularly wide ranging ungulates such as moose.<sup>159</sup>

129. The bioaccumulation of methylmercury has been identified as being a consequence of oil sands development in region.<sup>160</sup> Kirk et al. study focused on atmospheric dispersal patterns of mercury and methylmercury, analyzing snow packed samples at varying distances from Athabasca oil sands development.<sup>161</sup> The study "suggests that oil sands developments a direct source of MeHg to local landscapes and water bodies".<sup>162</sup> The researchers noted "areas of maximum THg and MeHg located primarily between the Muskeg and Steepbank rivers".<sup>163</sup> Further, the concentrations of THg and MeHg found in the samples were correlated "with numerous parameters, including total suspended solids (TSS), metals known to be emitted in high quantities from the upgraders (vanadium, nickel, and zinc) and crustal elements (aluminum, iron, and lanthanum), which were also elevated in this region".<sup>164</sup> As such, based on these findings it is believed "that at snowmelt, a complex mixture of chemicals enters aquatic ecosystems that could impact biological communities of the oil sands region".<sup>165</sup>

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<sup>156</sup> Kurek et al., *Legacy of a half century of Athabasca oil sands development recorded by lake ecosystems*.

Proceedings of the National Academy of Science, January 29, 2013, vol. 110, no.5. at 1763 [*Kurek Study*]; TAB D14.

<sup>157</sup> *Kurek Study* at 1763.; TAB D14.

<sup>158</sup> *Kurek Study* at 1763.;TAB D14

<sup>159</sup> *As Long as the Rivers Flow* at 25, provided in Applicant's Supplementary Submission, dated August 31, 2013.

<sup>160</sup> Kirk et al., *Landscapes and Waterbodies of the Athabasca Oil Sands Region*. *Journal of Environmental Science and Technology*, Just Accepted Manuscript, May 29, 2014. [*Kirk Study*]; TAB D17.

<sup>161</sup> *Kirk Study* at page 2.; TAB D17.

<sup>162</sup> *Kirk Study* at page 2.; TAB D17.

<sup>163</sup> *Kirk Study* at page 2.; TAB D17.

<sup>164</sup> *Kirk Study* at page 2.; TAB D17.

<sup>165</sup> *Kirk Study* at page 2.; TAB D17.