

Research Finds Rising Levels of Carcinogens in Athabasca River Sediment Linked to Bitumen Production

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Edmonton, 3 May 2011. A new study published in *Environmental Science and Technology*, the prestigious journal of the American Chemical Society, demonstrates that a group of toxic compounds known as polycyclic aromatic hydrocarbons (PAHs) are increasing in Athabasca River Delta (ARD) sediments. The study found that concentrations of PAHs in sediment downstream of industry were correlated with measures of industrial activity such as annual bitumen production, mined sand volume, extent of landscape disturbance, and industrial particulate emissions. The study found that as of fall 2009, the mean PAH concentration in Athabasca River Delta sediment was 1.72 mg/kg and had increased at a rate of 0.05 mg/kg per year over the past decade. Present concentrations of total PAHs in sediments of the lower Athabasca River exceed by a factor of about two to three the threshold observed to induce liver cancers in fishes.

Percent total organic carbon in sediment was also correlated with both total PAH concentration and time, indicating that both PAHs and total organic carbon are increasing over time, which suggests that landscape disturbance within the watershed may increase loading of both PAHs and organic carbon. Discharge on the Clearwater River was correlated with mean sediment PAH concentrations in the ARD. During high discharge in this tributary, scouring of PAH-bearing materials and runoff from the disturbed landscape may contribute higher PAH loads to the Athabasca River. Within the tributaries themselves (Clearwater, Muskeg, Steepbank, and Mackay Rivers), only the Clearwater River showed a significant correlation between discharge and PAH concentrations. Similarly, discharge of the Athabasca River was not correlated with sediment PAH concentrations.

The Alberta Government (2011) continues to state that industrial activity is not detectable in the concentrations of PAHs observed in the region: "There is no doubt that PAHs are in the sediments downstream of the oil sands. This is due to the magnitude of the oily sand along the river banks through which the river has eroded naturally... The sources in the area are natural. There is evidence that PAH concentrations in delta sediments are lower in recent years than historically. This decrease is likely due to drier conditions in the last decade resulting in less erosion from these natural sources." Contrary to claims made by the Alberta government, the *Environmental Science and Technology* study found that mining production, land disturbance, and air pollution from industrial activity are correlated with levels of polycyclic aromatic hydrocarbons (PAHs) in river sediment, that PAHs in ARD sediments are increasing not decreasing, and that Athabasca River discharge is not related to PAH concentrations.

The study concluded that the relationships between industrial activities and PAH releases, the potential toxic effects of PAHs, the increase in sediment PAH concentrations in the ARD over the past decade, and rising bitumen production raise concerns over long-term environmental health that are exacerbated by inadequate monitoring. "In order to determine the factors that

affect sediment PAH concentrations, carefully-designed studies are required that lie beyond the capability of current monitoring programs and the structure and quality of existing datasets."

The research corroborates recent studies that demonstrated increases in PAHs and other industrial pollutants related to bitumen industrial stack emissions, mining, and land clearing (for example, Bytnerowicz et al. 2010; Curtis et al. 2010; Kelly et al. 2009, 2010; Parsons et al. 2010; Timoney and Lee 2009). It also supports the findings of recent reviews (Auditor General of Canada 2010; Ayles et al. 2004; Dowdeswell et al. 2010; RAMP Review Panel 2011) that found that current monitoring by government and industry is inadequate to measure and assess environmental changes wrought by industry.

Requests for reprints of the research paper (*Polycyclic Aromatic Hydrocarbons Increase in Athabasca River Delta Sediment: Temporal Trends and Environmental Correlates*) can be directed to the authors.

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