Geophysical Research Abstracts
Vol. 17, EGU2015-8025, 2015
EGU General Assembly 2015

Initial Impacts of the Mount Polley Tailings Pond Breach on Adjacent Aquatic Ecosystems

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On August 4th 2014, the Mount Polley Tailings pond breach near Likely, B.C., released approximately 24 million cubic metres of tailings material into Polley Lake, Hazeltine Creek and Quesnel Lake. The discharge scoured and eroded a swath of soil and sediment delivering an unknown amount of metals and sediment into this tributary ecosystem of the Fraser River. Subsequent efforts by the mine operator to remediate by pumping tailings water from Polley Lake into Hazeltine Creek, which flows into Quesnel Lake, resulted in additional and continuous release of unknown volumes of contaminated water and sediments into the watershed. Heavy metals (e.g., selenium, copper, or mercury) reported as stored in the tailings pond entered the downstream aquatic environment and have been monitored in the water column of Quesnel Lake since August. These contaminants are likely particle-bound and thus subject to transport over long distances without appreciable degradation, resulting in the potential for chronic exposures and associated toxicological effects in exposed biota. While significant dilution is expected during aquatic transport, and the resulting concentrations in the water will likely be low, concentrations in exposed biota may become of concern over time. Metals such as mercury and selenium undergo bioaccumulation and biomagnification, once incorporated into the food chain/web. Thus, even small concentrations of such contaminants in water can lead to greater concentrations ($\sim$100 fold) in top predators. Over time, our predictions are that food web transfer will lead to an increase in concentrations from water (1-2 years)–>invertebrates (1-2 yrs) ->fishes (2-5 yrs). Pacific salmon travel great distances in this watershed and may be exposed to contaminated water during their migrations. Resident species will be exposed to the contaminated waters and sediments in the study lakes year round. Little or no background/baseline data for metals in biota from Quesnel Lake exists. Notably, some of these fish provide food to recipients as diverse as aboriginal communities and large commercial markets embedded within a global marketplace. Moreover, metals can be accumulated in aquatic organisms, thus it is very important to understand its long-term biomagnification and potential health effects on organisms. We present initial findings from physical and chemical limnological early response-sampling and recommendations for future monitoring in the affected watershed.