

Environmental impacts of the largest coal slurry spill in North America: The Obed Mountain Mine release into the Athabasca River (Alberta, Canada)

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On October 31, 2013, a catastrophic release of approximately 670,000 m³ of coal process water occurred as the result of the failure of the wall of a post-processing settling pond at the Obed Mountain Mine near Hinton, Alberta. A highly-turbid plume entered the headwaters of the Athabasca River approximately 20 km from the mine, markedly altering the chemical composition of the Athabasca River as it flowed downstream. Over the next four weeks, the released plume traveled approximately 1100 km downstream eventually reaching Peace-Athabasca Delta (a Ramsar Wetland of International Significance located within Wood Buffalo National Park) and Lake Athabasca. The plume itself was tracked both visually and using real-time measures of river water turbidity within the Athabasca River. The plume initially contained high concentrations of nutrients (nitrogen and phosphorus), metals, and polycyclic aromatic hydrocarbons (PAHs); some Canadian Council of Ministers of the Environment (CCME) Guidelines were exceeded in the initial days after the spill. Aerial imagery assessment was used to identify 487 potential sediment depositional areas along the mainstem of the Athabasca River. A subset of these areas were surveyed in May 2014, and material from the release material was easily identified visually. Samples were collected for geochemical analysis and compared to source material from the mine. The released material contained elevated concentrations of both metals (arsenic, lead, mercury, selenium, and zinc) and PAHs (acenaphthene, fluorene, naphthalene, phenanthrene, and pyrene). The spill has the potential to exert negative long-term impacts especially in impacted areas closest to the mine.