Environmental Issues and Challenges Associated with Uranium Exploration

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Abstract

Exploration impacts are discussed and illustrated including noise, light and engine vibration effects in pristine areas; open drill holes, spilled drilling fluids, placement of hazardous material containers on bare ground in Quebec; failure of program to require long-term restoration of drill sites; and risk to surface and subsurface water resources. Need identified for thorough environmental and social baseline data prior to intrusive exploration identified as need for development of "evidentiary quality" records of operator performance supported by frequent observations, including photo and video records, to verify exploration activities.

Both the social dialogue and permitting phase for uranium projects usually occur during the exploration phase, increasing the need for strong baseline databases, environmental assessments of projects and alternatives, and strong social engagement programs early in the uranium project development time line,

Challenges of identify and verifying "best practices" methods for operators and regulatory agency identified, including the need for expert professional staff to conduct independent evaluations for national, provincial and First Nations agencies. Uranium exploration and mining regulations in force in New Mexico are provided an example of a permit system current being applied to uranium exploration and mining projects.

The low likelihood of uranium exploration projects reaching the ore production stage based on the typical performance of exploration projects, long-term low prices for uranium, and extensive array of well-identified uranium deposits near or at the production stage around the world, severely limits the potential of uranium development to be significant in Quebec in the next several decades.

Environmental Issues and Challenges Associated with Uranium Mill Tailings Management

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Abstract

Worst-case tailings management problems have been illustrated by the August 2014 Mt. Polley, British Columbia and Cananea, Mexico tailings dam break and the four decades of remediation effort at the site of the Church rock uranium mill tailings dam break in 1979.

The challenge of creating tailings disposal sites that prevent the risk of major releases and tailings liquification and do not require extensive long-term active maintenance and repair is identified. Examples of technologies such as high density thickened tailings, dry stack tailings and below-grade disposal in purpose-built cells are identified as options to methods with active maintenance and repair requirement for the many decades, even centuries, during which sites require care. Challenges resulting from Mt. Polley and other dam failures include the need for improved operator performance and regulatory oversight if future dam failures are to be prevented.

Resources providing guidelines for uranium mill tailings management from the International Atomic Energy Agency, Canadian Nuclear Safety Commission (CNSC) and US National Academy of Sciences, along with other aspects of uranium developments and their impact are identified and summarized. An analysis of uranium mill tailings facilities in light of the Mt. Polley dam break has been announced by CNSC.

The challenge of addressing the risks from the radioactive and heavy metal constituents that remain significant for thousands of years is identified and discussed. Examples of long-term management approaches identified include the guidelines for tailings containment for up to 1,000 years but in no case less than 200 years from the US Nuclear Regulatory Commission and the failure of the US Department of Energy designed and operated Waste Isolation Pilot Plant (WIPP) nuclear waste disposal site in New Mexico to prevent releases for 15 years even though it was designed to prevent releases for 10,000 years.

Issues and challenges associated with the need to address the long-term decommissioning of sites prior to operations and develop detailed plans, and associated financial guarantees for cessation of operation at any time between start-up and exhaustion of identified uranium resources are discussed.

The challenge of jurisdictions developing the capacity to address both the regulatory and economic development aspects of uranium projects requires establishment and maintenance of strong regulatory programs during development of policy and associated regulations and throughout and beyond the life as well.

Extreme climate conditions need to be considered in the centuries to millenniums time period during which management of uranium mine and mill wastes must be accomplished. Similarly, areas where permanent disposal of uranium mine and mill wastes is inappropriate and should not be considered should be identified during siting considerations early in the project development and review process.