RESPONSIBLE
MINING

SELENIUM CONCERNS

CONCERN: Selenium, which is a by-product of mining, has the potential to harm fish and birds. Any selenium release will hurt wildlife and can't be allowed.

Selenium is a mineral found naturally in the environment. Selenium is present in rock, soil and water in Alberta. It is an essential element required by living things to survive and thrive, but can be toxic in high concentrations. Too little selenium can cause problems as can too much.

Water quality guidelines for streams, rivers and lakes are designed to ensure that egg-laying animals such as birds and fish don't ingest too much selenium. The goal is to ensure that selenium levels in waters remain at natural, non-toxic levels. Current legislation and regulations are designed to ensure that selenium levels do not pose health risks to living organisms.

In addition, site-specific water quality standards are used to enhance the provincial regulatory requirements. These requirements are set for a specific location, taking into consideration the natural background selenium concentrations, the presence of other substances (e.g., sulphate), and the profile of fish or bird populations within the receiving environment, to ensure their protection.

CONCERN: Can selenium be dangerous to humans.

Maximum allowable selenium levels for humans are many times higher than those for fish and birds, because mammals are better able to metabolize selenium. When coal mines meet the selenium water quality requirements put in place to protect fish and birds, humans, cattle, and other mammals including wildlife are also protected by a much larger margin.

CONCERN: Do multiple mines in an area have cumulative effects in the ecosystem? Should this be allowed?

The cumulative effects of resource development in any one area are a concern to all stakeholders, including mine operators. Provincial and federal Environmental Assessment rules and processes require that cumulative effects be identified and evaluated in the context of existing and future developments.

Proponents of new mining operations are required to survey existing AND planned future development surrounding its mine site and to account for, monitor, and mitigate, any contribution they could make to cumulative impacts. Determining the potential impact of elevated selenium on water quality is a key requirement of all Environmental Assessments today, and subsequent metallurgical coal mine permits.

CONCERN: I keep hearing that treatment to reduce selenium doesn't really work, and it hasn't been successfully demonstrated to work.

One of the most important ways to reduce selenium risk is to not release it in the first place. Older mines (even those that are still operating today), were not aware of the potential risks posed by selenium when they began operations, and these mines were not originally designed to prevent it from being released into the downstream watershed.

Even before water treatment is initiated, modern mine design and engineering of waste rock storage facilities can reduce selenium to as little as 30% of the selenium released by older mines. Modern, science-based water treatment processes and technologies then reduce selenium levels even further, ensuring compliance with government regulations.

Reducing the amount of selenium released is only the first component in a site-wide water management strategy. During operations, mine-affected water is captured and treated using one or more of many semi-passive and/or active treatment technologies put in place to meet water quality requirements.

Treatment technologies include active Moving Bed Bioreactors or Fluidized Bed Reactors, semi-passive saturated rock fills (SRF) and passive biochemical reactors (BCR) These various treatment methods can remove as much as 99% of selenium from mine-affected water.

A recent state-of-knowledge review of selenium treatment technologies (Golder Associates Limited, 2020) can be found at: *https://www.namc.org/docs/00300393.pdf.*

QUESTION: Isn't there a way for companies operating in the same watershed to work together to reduce cumulative effects?

Yes, in fact, mine proponents in southern Alberta are already coordinating efforts to work together on water use and protection. Such an approach takes water management from a local, mine-specific level to a regional watershed level.

Need more information on available mitigation strategies and technologies to remove selenium from water? Please visit:

- the Selenium Working Group within the North American Metals Council at: *https://www.namc.org/selenium.html*
- a State-of-Practice Review of Selenium Management for Alberta Coal mines at: *https://your.alberta.ca/coal-policy-committee/widgets/91480/documents* - Gilron & McKenna
- Additional Selenium Management Resources at *www.responsiblemining.ca/selenium-specific*

Need more information on how one treatment technology is working? Please read the recent news article related to Teck Corporation's operations in the Elk Valley at: *www.thefreepress.ca/news/teck-spends-up--big-to-filter-the-elk-valleys-water*