

# ENVIRONMENTAL ADVANCES IN MINING

●●● Reducing costs and risks of technology adoption



## BRIDGING THE INNOVATION GAP

The environmental impact of mining is one of the most significant cost-drivers and liabilities for the industry. This demands solutions that go beyond incremental operational improvement towards step-change innovation. Engaging key players in the mining supply chain, the National Research Council Canada (NRC) helps bridge the gap between concept development and implementation of transformative technology.

## TACKLING UPSTREAM AND DOWNSTREAM CHALLENGES

The NRC works with mining companies, environmental service providers and other private and public organizations to target complex problems related to the avoidance, detection, and mitigation of environmental risks and liabilities. We bring together some of Canada's top scientific and technical expertise to tackle complex challenges throughout the mining life cycle, from mine development to processing to closure.

## AVOIDANCE

During the development and planning stage, the NRC can help develop innovative strategies for tailings management, wastewater treatment, soil and groundwater remediation. These strategies can help conserve water and energy, reduce the operational costs of effluent treatment prior to discharge, and segregate and treat individual waste streams to avoid high cost end-of-pipe treatment. We also conduct techno-economic analysis, feasibility and pilot scale studies on the design, installation, operation and monitoring of new systems and processes.

## DETECTION

The NRC has world-class expertise in real-time monitoring and analysis, advanced materials characterization, separation technologies and biomonitoring techniques, which can help address environmental risks during operations, before they become costly long-term liabilities. Our scientists and engineers are leaders in the development of real-time process sensors under varied conditions (cold, pH, high concentration), with deep understanding of the unique physico-chemical and biological processes at mining sites.



### MITIGATION

After mine closure, analysis and characterization of contaminant materials and microbial populations in soil, water and sediments can be used to identify optimal remediation and reclamation conditions. This can include optimizing processes for removing target compounds to reclaim contaminated sites to their natural condition.

### TECHNOLOGY RISK MANAGEMENT

The NRC researchers combine multidisciplinary capabilities in material science, biology, chemistry, process diagnostics, modeling and engineering, with deep knowledge of emerging technologies and decades of applied field experience. Supported by state-of-the-art equipment at the NRC and specialized facilities across the country, we work with end users and suppliers to pilot customized solutions at beta sites prior to deployment in commercial operations.

This validation reduces the risk of introducing innovative technologies into mining operation and strengthens the whole supply chain as new environmental solutions are implemented in a systems context. This will reduce environmental costs and liabilities of mining while improving the competitive economic positioning of Canadian mining companies and suppliers in Canada and abroad.



### OUR COLLABORATIVE APPROACH

In collaboration with industry and academia, on-site tests were conducted using indigenous plants for tailings reclamation towards site reconstruction. These tests started at lab scale and based on the results a low risk approach was designed for site demonstration. This approach was inexpensive, low maintenance, robust enough to survive the winters on site and the plants grew to over 6 feet. Through monitoring of the plants and associated tailings, effective site treatment was validated.

### LET'S WORK TOGETHER

The NRC serves clients on an individual basis, as well as through strategic alliances and other multidisciplinary collaboration models. Contact us to find out how we can work together to introduce game changing environmental risk management solutions to your business.

### CONTACT

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