

MINE WATER MANAGEMENT

Geosyntec focuses on practical solutions to complex problems. As leaders in the field of mine water management, we help our clients understand their site water balance and identify strategies that allow for responsible use and management of water at their sites.

We understand the unique challenges around water management at mine sites and leverage our global expertise to provide local solutions that are practical, fit for purpose, and sustainable.



For more information
[geosyntec.com/markets/
mining/mine-water](https://www.geosyntec.com/markets/mining/mine-water)



Mine water management is a cornerstone of responsible mine design, operation, and closure. It encompasses the control, treatment, and strategic reuse of water impacted by mining, which can include dewatering discharges, process waters, tailings seepage, and acid mine drainage and metalliferous runoff.

Effective mine water management supports environmental compliance, protects surrounding ecosystem and stakeholders, and aids long-term operational sustainability.

TO ADDRESS ENVIRONMENTAL COMPLEXITIES WHILE MAXIMIZING PRODUCTION AND SAFETY, WE OFFER MINING CLIENTS WIDE-RANGING SUPPORT, INCLUDING THE FOLLOWING:

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| | Water Balance and Water Quality Modeling | | Geotechnical Engineering of Earthen Structures and Impoundments |
| | Groundwater and Surface Water Modeling | | Water Supply Investigations and Design |
| | Mine Water Management Strategy and Design | | Watershed Hydrology Analysis |
| | Water Sustainability Reviews and Pre-Design Optimization Studies | | Stormwater and Surface Water Erosion Control, Conveyance, and Diversion Design |
| | Compliance and Permitting | | Flood and Breach Analysis |
| | Mine Water Treatment Strategies and Design | | Inundation Studies and Hazard Potential Classification |
| | Source Control and Containment of Mine-Impacted Water | | Tailing Delivery System Design |
| | Water Quality Evaluation and Analysis | | Decant Pump-Back Design |
| | Innovative Water Treatment Solutions (Biological and Physicochemical Treatment) | | Corporate Social Governance and Environmental Social Governance (ESG) Sustainability |
| | Bench and Pilot Treatability Testing | | Leach Irrigation Design |
| | Groundwater Quality Evaluation and Assessment | | Mine Site Closure, Cleanup, and Reclamation |
| | Mine Waste Geochemical Characterization and Modeling | | Pipeline Design and Analysis |
| | | | Mine Waste Facility Seepage Assessment and Remediation |

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GEOSYNTEC OFFERS MINE WATER MANAGEMENT SERVICES TO SUPPORT CLOSURE PLANNING AS FOLLOWS:

- Water quality characterization and watershed evaluations, including mass balance assessment and hydrologic modeling
- Design and facilitation of water quality monitoring programs and effluent chemical characterization to align with closure planning, treatment assessment, and regulatory requirements
- Water treatment treatability studies through Geosyntec's inhouse SiREM laboratory
- Design of mine water processes and water treatment technologies to address metal and metalloid impacted water and acid and metalliferous drainage (passive water treatment, in situ fixed film bioreactors, gravel bed reactors, etc.)
- Partnership alliance with CanNorth Environmental Services, a 100% First Nations owned company, for sublethal toxicity testing and biological monitoring of receiving environments

Highly engineered approaches can be a challenge for mining and industrial applications. Geosyntec has expertise in the design and implementation of selenium treatment technologies for industrial wastewater, surface water, and groundwater. We are a long-standing leader in mine water treatment, especially with sulfate and metals removal for pre-closed and closed mines.

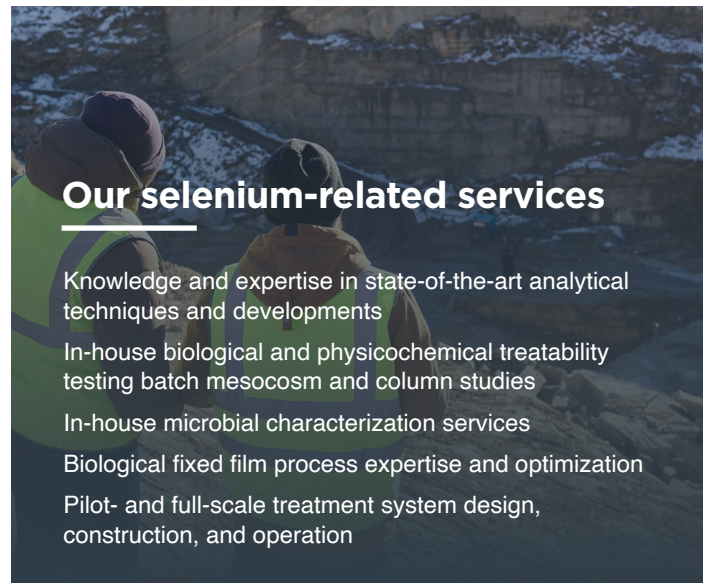
WATER TREATMENT TECHNOLOGIES FOR METALS:

- Gravel bed reactors: biological (selenium and nitrate) and chemical (for arsenic, pH, and other metals)
- Passive treatment systems (permeable reactive barriers and biobarriers)
- Constructed/engineered wetlands (copper, lead, zinc)
- In pit/pond treatment (nickel, cobalt, selenium, nitrate)
- Engineered phytoremediation (selenium, mercury, manganese, nickel, cadmium, cobalt, zinc, sulfate, nitrate)
- Saturated rockfills (selenium, nitrate, nickel, cadmium)

The Geosyntec Difference

- **More than 20 years of experience in mine water treatment technology development**
- **Hands-on technology implementation experience and expert advisory**
- **A peer-reviewed publication record and investment in selenium research**
- **In-house treatability testing capabilities**

Geosyntec's pioneering work developing treatment technologies for selenium and operating treatment systems provides clients with innovative solutions while realizing cost savings.



Our selenium-related services

- Knowledge and expertise in state-of-the-art analytical techniques and developments
- In-house biological and physicochemical treatability testing batch mesocosm and column studies
- In-house microbial characterization services
- Biological fixed film process expertise and optimization
- Pilot- and full-scale treatment system design, construction, and operation

About Geosyntec

Geosyntec is a consulting and engineering firm that works with private and public sector clients to address new ventures and complex problems involving our environment, natural resources, and civil infrastructure.

With a combined staff exceeding 2,800 engineers, scientists, and related technical and project support personnel, we serve our clients from more than 130 offices in the United States, Canada, the United Kingdom, Ireland, Sweden, Finland, Spain, Saudi Arabia, the United Arab Emirates, and Australia.

Geosyntec
consultants