

United Keno Hill Mines

Elsa Reclamation and Development Company Ltd.: Reclamation and Closure



Project Highlights

Ensero is a key partner in the remediation of the historic United Keno Hill Mines (UKHM). Over the past 15+ years, we've:

- Completed baseline environmental monitoring programs including surface water sampling, groundwater sampling, air quality sampling, soil sampling, aquatic effects monitoring, noise monitoring, and meteorology monitoring.
- Executed numerous studies including water treatment tests, natural attenuation evaluations, wildlife and revegetation studies, permafrost, geotechnical studies (covers, pipelines, regrading), etc.
- Completed separate environmental and socio-economic assessments under the *Yukon Environmental and Socio-economic Assessment Act*, including development of the district-wide Reclamation Plan.
- Completed two Type B Water Licences for 1) Care and Maintenance Activities and 2) the district-wide Remediation Plan.
- Prepared and submitted hundreds of deliverables over the past 15-years.

The Challenge

The historic United Keno Hill Mines (UKHM) site is in the Keno Hill Silver District (District) in central Yukon, 354 km north of Whitehorse, within the Traditional Territory of the First Nation of Na-Cho Nyak Dun (FNNND). Mines in the District were initially developed in 1914 and were declared abandoned by the government in 2001. The District is made up over 35 underground adits and old mines, including 19 open pits, numerous waste rock dumps, and three tailings sites.

In 2007, Indigenous and Northern Affairs Canada (INAC) entered into a contractual agreement with Alexco Resource Corp. (Alexco) and Elsa Remediation and Development Company Ltd. (ERDC) to remediate the historic UKHM site. Alexco developed their own internal group to execute the project, which became the independent Ensero Solutions in 2020.

The Ensero Solution

In a comprehensive, on-going program spanning over 15 years, Ensero is performing permitting, assessment, and remediation activities to achieve eventual site closure at all mine-impacted land within the District. Our services include all activities required to 1) assume care and maintenance activities for the former mines, 2) evaluate potential remedies, and 3) remediate and reclaim abandoned mines and mine-impacted land and water.

The first step in the closure process involved performing Baseline Site Assessments for each impacted property. We used this information to develop a site-wide risk register to understand potential environmental challenges and prioritize our focus based on current risk to human health and the environment and potential risk due to catastrophic failure or release. We initiated the Water Licence permitting process to assume care and maintenance responsibility for several of the sites and developed an Existing State of Mine Remediation Plan which governed the activities at each abandoned mine site within the District.



Germaine Lake and the Wernecke Tailings Delta

First page: The historic Keno Mine

Ensero completed several significant field programs as part of developing the Existing State of Mine Reclamation Plan, including site assessments, physical reclamation (waste rock and tailings covers, stream diversions, adit repair and monitoring, demolition, etc.), evaluating natural attenuation processes, water treatment studies including in-situ treatment of the Silver King mine, developing water quality objectives, and water quality modeling. Based on characterization results, Ensero initiated treatment pilot studies at several sites to evaluate remedies and designed-built-commissioned five water treatment plants to treat impacted adit discharge under the care and maintenance program.

Throughout the project, the Canadian government required Water Licence permit applications, Socio-economic Assessments, update reports, monitoring information, etc., and the approval and coordination with the First Nation prior to each step in the reclamation process. To support the permit applications, Ensero performed geochemical and water quality modeling, designed and executed monitoring programs (surface water, groundwater, and air), prepared dewatering plans and adaptive management plans, etc.

Vital Statistics

- The primary contaminants of concern are cadmium and zinc, though reagent requirements for treatment are driven by arsenic, iron, and manganese. Those are present in appreciable concentrations in several of the mine drainages.
- Care and maintenance of the Keno Hill Mine Site requires active water treatment at five locations (four underground adits and one tailings facility) on a year-round continuous basis. Together, these plants treat more than 1M m³ of mine water (approximately 250M gallons) per year.
- The care and maintenance requirements also include a surface and groundwater monitoring program that entails the collection of water samples from approximately 120 sites.



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