

OVERVIEW OF THE PROJECT

Quest is developing a vertically integrated producer of rare earth oxides for the world markets. The ore extraction and concentration will take place at the mine site adjacent to Lac Brisson on the Quebec-Labrador border, about 250 kilometers northeast of Schefferville. The processing and refining of the ore concentrate will be done in Bécancour, Québec.

FROM MINING TO REFINING

How will Quest extract and process the rock at Lac Brisson? Quest will operate an open pit mine and a concentrator at the mine site. The beneficiation will consist of a combination of physical ore sorting and flotation, a cost-effective and environmentally beneficial combination. The ore concentrate will show a high concentration of the very valuable REE required for the manufacturing of permanent magnets.

How will the mine site operations be powered? The bulk of the electricity required at the mine site will be generated by wind power. Quest has entered into an agreement with Tugliq Energie Co. for the construction and management of a micro-grid where industrial windmills designed for the Arctic climate constitute the production backbone. Tugliq already operates such a power system for Glencore at their Raglan mine close to Deception Bay in the Nunavik Far North.



What is the environmental impact of this micro-grid power system? Quest's approach to energy supply will significantly reduce the consumption of diesel and the emissions of greenhouse gases (GHG) as well as reduce environmental risks compared to the power system in use in most remote mining operations that generally rely on diesel and heavy oil.

Figure 1: Lockheed Martin LMH-1 Hybrid Airship



How will Quest ship the concentrate from Lac Brisson to Bécancour? Quest will ship the concentrate in containers from the mine site to Schefferville using Lockheed Martin LMH-1 hybrid airships operated by Straightline Aviation (Figure 1). From Schefferville, containers of ore concentrate will be transported by rail to the Port of Sept-Iles and from there by ship to Bécancour. The concentrate in confined transport systems will never be in contact with people nor the environment until it is fed into the processing facilities.

What are the alternatives to air transportation? The alternative to the airships is road transportation between the mine site to the Labrador Sea coast. Then transportation of the ore concentrate would be by ships during the ice-free, open water season of five months or less. This would require the construction of an all-weather gravel road across Labrador and building stockpiles of concentrate at the mine site and Bécancour for seven months or longer.

What is the environmental impact of airship logistics? Airships don't need roads, just a landing zone of about 750 m in diameter without obstacles larger than a few feet. The surface can be gravel, sand, snow, ice or even water. Due to the airships low noise, there is almost no discernible impact on wildlife.

What are the economics of the transportation options? The cost for a road in the north is in the order of \$2 million per kilometer, to which we must add the costs for bridges. Road maintenance in harsh climates is adding significant costs every year throughout the life of the mine. The capital for road construction must be invested long before the mine starts operating and the first revenues can be generated. Airships can be deployed as needed, including the transportation of equipment and material during the construction of the mine, concentrator and other facilities at the mine site.

THE ORE REFINING PROCESS

Where will Quest process the ore concentrate? Quest processing plants will be located in the existing heavy industrial park in Bécancour, Québec (Figure 2). This location is ideal because it provides access to (i) unlimited fresh water; (ii) inexpensive electricity; (iii) marine/ocean access and, (iv) experienced workforce.

Figure 2: Quest's Industrial Process – Bécancour site layout



How will the ore concentrate be processed in Bécancour? The ore concentrate will be treated with sulphuric acid in a closed-loop system to selectively extract the rare earth minerals from the concentrate, a process known as Selective Thermal Sulphation (STS). The acid will thus be recovered and reused. Utilizing the technology provided by world-class technology companies like Outotec, the process has the lowest energy consumption and minimal generation of chemical by-product.

At the Bécancour processing plant, Quest will only extract rare earth salts from the rock. All other metals such as iron, aluminum, zirconium, and others that can be found in small quantities in the ore do not dissolve in the leach liquor and will remain behind as solids. As a result, the hydrometallurgical treatment will not only be small compared to processing facilities where all metals have to be handled, it will also generate a very small fraction of the chemical waste produced in conventional operations. In fact, the STS waste streams will be stacked dry; there will be no tailings pond.

How does Quest's STS process differ from other processes? Compared to alternative technologies, Quest's proprietary STS process for the production of a high purity mixed rare earth oxide is:

- much simpler;
- requires fewer reagents and lower reagent dosages;
- separates rare earth elements from major contaminants (i.e. Fe, Al, Nb, Th, Ti, U and Zr);
- minimizes process effluent and produces smaller quantities of a more inert residue;
- allows for the bulk separation of low value and abundant cerium, lanthanum and yttrium from leached solution; and
- entails lower capital and operating costs.

What justifies your confidence in the superiority of the STS extraction process? Our confidence is based on the results of several rigorous and comprehensive tests performed by independent third-party organizations that have all confirmed the performance characteristics of the STS process and recovery of REE at a high purity level suitable for separation plant feed.

The STS process was subjected to a rigorous due diligence of the scientific basis and applicable evidence by the Canada Foundation for Sustainable Development Technology. In addition, testing of the beneficiation, thermal sulphation and solution treatment were carried out by:

- COREM (Québec)
- Hazen Research (Colorado)
- Process Research Ortech (Ontario)
- TOMRA Laboratories (with the support of the Helmholtz Institute for Resource Technology, Germany)
- RPC (Fredericton, New Brunswick)
- SGS Mineral Services (Lakefield)

SUSTAINABLE DEVELOPMENT

Mine site environmental impact assessment: The mine site is located within the Nunavik territory and its development is governed by the requirements of the James Bay Agreement. A project description has been submitted to the Federal, Québec and Nunavik government authorities in accordance with the applicable laws and regulations. An amendment to the project description will soon be presented to replace the trans-Labrador road option by the air transportation service between the mine site and Schefferville.

Have you maintained communications with local communities and businesses? Quest policy and practice is to maintain open communications and dialogue with the communities likely to be affected by the project. The decision to adopt the air transportation service using hybrid airships is a new development brought about by the availability of this new technology in a timely manner.

The airship operation will provide new employment opportunities for the local communities at the mine site and Schefferville area. In addition, airship crew will be required in significant numbers; training programs will be put in place to meet the needs, which will provide exciting opportunities also for local communities.

What is the carbon foot print compared to other operations? Given the fact that the power generation at the mine site is a combination of wind power and co-generation of electricity, the carbon footprint is already significantly reduced. The sorting of rocks prior to milling also saves a significant amount of energy and greenhouse gases. The processing in Bécancour will require a fraction of the energy for the hydrometallurgical treatment compared to conventional operations.

Will Quest contribute to other environmental sustainability objectives? Yes, and in a major way. In North America, the disposal of fluorescent bulbs creates a major environmental problem for landfills. Quest will provide a solution to this problem. Its STS process is designed to recover rare earths from the phosphor powder contained in fluorescent bulbs, thus creating the first such recycling facility in North America.

THE PROJECT SCHEDULE

What is the project schedule? The production for high purity mixed rare earth oxide is scheduled to begin in 2020/2021. Until then, much work lies ahead of Quest; advancing the Environmental Impact Assessments (EIA) at all levels of government concerned with one part or the other of the project. Extensive consultations are maintained as well as with Indigenous groups; progressing with respect to ore concentration and metallurgical processes in staged development from bench scale to mini-plant to full piloting of Quest eco-friendly selective thermal sulphation process (STS); completion of the Bankable Feasibility Study, construction of the mine, of the concentrator and refining facility in Bécancour by 2019/2020.

BENEFITS FOR CANADA

- The successful completion of the Quest project will lead to the creation of a leading company part of a critical supply chain enabling the low carbon economy. In so doing, Quest will leverage both a long-duration Northern Quebec rare earth deposit as well as recycled material from across North America.
- Significant long term employment – 600 direct, high wage jobs at Quest plus at least 700 construction jobs plus significant other employment from supplier contracts.
- Creation of the only Canadian rare earth oxide production facility, leading to opportunities to develop innovative applications of rare earth metals and export revenues in excess of CAN \$575 M/year.
- Opportunity to build on Quest's business to attract innovative technology application businesses using rare earths to Canada such as downstream alloy and permanent magnet manufacturers, phosphor and catalyst producers.

