SRC Rare Earth Processing Facility

First in Canada

With support from the Government of Saskatchewan, the Saskatchewan Research Council (SRC) is constructing North America's first integrated, fully commercial, demonstration Rare Earth Processing Facility, with hydrometallurgy, separation and metal smelting units. The Facility will begin to establish an REE technology hub in Saskatchewan, forming an industry model for future commercial REE initiatives and supply chain development.

The Facility will be built near SRC's other laboratories and facilities in Saskatoon, Saskatchewan. The Monazite Processing Unit will be operation-ready in 2023. The Separation Unit and Metal Smelting Unit will both be operation-ready in 2024. All three units will be fully operational in 2025. A private sector landlord is handling the construction of the building, which will be leased to SRC.

Why Does Canada Need an REE Processing Facility?

Canada has some of the largest known reserves (measured) and resources (indicated) of rare earths in the world, estimated at over 14 million tonnes of Rare Earth Oxides (REOs) in 2021. Canada has about 7 per cent of the world's REE resources and is in tenth place in terms of reserves. The industry is growth-constrained due to little or no formal supply chain infrastructure, no commercial processing facilities and no coordinated commodity marketing or agreed upon product quality standards.

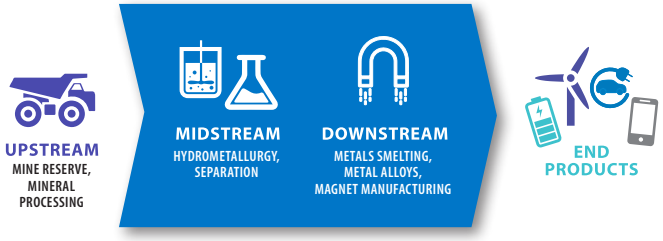
The SRC Rare Earth Processing Facility is positioned as a catalyst to stimulate the resource sector in Saskatchewan and across Canada, providing the early-stage supply chain needed to generate industry investment and growth.

SRC Rare Earth Processing Facility - A Midstream Initiative

The Monazite Processing Unit will treat monazite sands at approximately 60 per cent concentration. Monazite is a source of mainly light REEs (especially cerium, lanthanum, praseodymium, neodymium).

Intermediate mixed Rare Earth Product will be produced from that unit and then converted in a Separation Unit to produce individual Rare Earth Oxides. From there, the separated neodymium (Nd) and praseodymium (Pr) will be further processed in a Metal Smelting Unit to produce Nd/Pr magnet metals for sale to market. Nd/Pr metals are the key ingredient in permanent magnets.

RARE EARTH PROCESS



SRC SASKATCHEWAN RESEARCH COUNCIL

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The Case for SRC and Saskatchewan

SRC has decades of experience in concentration and separation technologies of REEs from various minerals, as well as operational experience. SRC has developed and piloted many REE concentration and separation processes for mining companies in Canada and across the world.

Saskatchewan is a world-class mining jurisdiction that has a vibrant and sustainable uranium industry. This industry also produces a REE-rich solution waste stream (mainly heavy REEs) that can be an additional feed source for the plant, as markets require.

Technoeconomic Evaluation of Rare Earth Processing Technologies

SRC has decades of experience in technoeconomic evaluation of rare earth technologies related to beneficiation, hydrometallurgy, separation and metal smelting.

Solvent Extraction: Pilot-Scale Studies

SRC has built a small-scale separation pilot plant that has 150 stages of mixers and settlers (each stage capacity of ~1 litre) and can be configured to different separation processes for either group separation or individual REE separation.

SRC has also built a commercial-scale Solvent Extraction Unit that has six stages of mixers and settlers (each stage capacity of ~1,200 litres) and is used to improve the impeller design, process control, and mixing and separation efficiencies.

REE Plant Operational Improvement and Support

SRC can provide experienced engineers and technologists who have a broad knowledge of REE process plant development and specification to support plant operations with an objective to achieve business benefits, such as reducing production costs, improving quality and increasing throughput.

Metal Smelting: Pilot-Scale Studies

SRC offers an industrial-scale rare earth metal smelting pilot plant. The electrolytic furnace has a capacity of ~43 tonnes per year. The pilot is used to refine the operating parameters, process sequence and operating procedures to yield the highest rare earth metal recovery and purity.

Mineral Analysis

SRC is Saskatchewan's most advanced and complete mineral analysis centre supporting resource industries. We have the necessary analytical tools, expertise and experience to provide you with a wide range of services and analytical packages.

Collaboration Opportunities

SRC is open to develop the following potential upstream, midstream and downstream collaboration opportunities in the future.

Upstream

- Mining of different REEs (e.g., Monazite, Bastnaesite)
- Preconcentration unit operations- beneficiation processes - total rare earth oxides between 50-60 per cent
- Potential to source REEs from tailings mining projects

Midstream

- Hydrometallurgy of various REE types
- Monazite Processing Unit expansion
- Separation Unit expansion
- New separation technology validation and commercialization
- REE separated from uranium raffinate
- Tailings repurposing
- Thorium and uranium processing
- Magnet recycling

Downstream

- Technology development and design
- Metals Manufacture
- Alloys Manufacture
- Magnet Manufacture

Renewable energy

AI application

Upstream – Monazite Supply Requirements

SRC is currently sourcing preconcentrated monazite from various jurisdictions around the world. SRC's Facility will require 3,000 tonnes per year of monazite concentrate on a minimum 80 per cent basis (equivalent to 60 per cent Total Rare Earth Oxide). SRC is open to discussing the offtakes for monazite feed and the Separation and Metal Processing Units product line.

Tailings Management

SRC has years of scientific, technical and management knowledge dealing with tailings, as well as experience working with regulators, communities, Indigenous groups and industry. Our capabilities in this area also include holding licences from the Canadian Nuclear Safety Commission (CNSC), as well as expertise at our Pipe Flow Technology Centre™ and through our remediation project in northern Saskatchewan that involves managing tailings remediation work at a large abandoned uranium mine site.