



Commerce Resources: making sense of rare earth elements

We've been mining gold, silver and base metals for centuries while commercial markets for most rare earth elements (REEs) have arisen in only the past 50 years. Typically used in small amounts, REEs allow magnetic, electrical and chemical processes to occur at significantly lower energy levels resulting in increased efficiency and smaller scale products. They have become a vital component in mobile electronics, electric vehicles and other products in the shift to energy efficiency.

The current overall market for REEs is less than 200,000 tonnes of total rare earth oxides (TREO) per year with 97% of all production coming from China. The Chinese Ministry of Land and Resources recently suspended applications for new mining and exploration projects, with exception to its larger producers, for rare earth elements over the next three years in an effort to consolidate the rare earths sector in China. Prices for REEs declined in 2015 along with other resources but with the recent constraints and new technological innovation, a focus on REEs is expected to continue for the foreseeable future.

Rare earth elements, 16 in total, are perhaps not as rare as the name implies. Cerium, the most abundant REE, comprises more of the earth's crust than copper or lead. Many REEs are more common than tin and molybdenum and all are more common than silver or mercury.

However, only those REE deposits found to be significantly economic are dependent on the host rock being carbonatites and on its mineralogy – in particular, those deposits containing the minerals monazite, bastnasite, and xenotime that are all easily broken down. All three minerals are found on **Commerce Resource's** [CCE-TSXV; CMRZF-OTXQX; D7H-FSE] Ashram rare earth deposit in mining friendly northern Québec.

Commerce discovered the Ashram deposit, that sits within its Eldor carbonatite property in 2009, after airborne geophysics and soil sampling led them to a mineralized outcrop with over 3% TREO. In 2010, drilling returned 1.72% TREO over 215.30 metres in hole EC10-027, now referred to as the discovery hole. The Ashram deposit has since had over \$30 million spent on exploration and deposit definition, giving it the potential to be one of the largest and longest operating rare earth element producers in the world.

In May 2012, the company reported robust economics from a Preliminary Economic Assessment (PEA) for Ashram. The study showed a strong positive cash flow from a 4,000 tonne per day open-pit operation with a 25-year mine life, a pre-tax and pre-finance Net Present Value (NPV) of \$2.32 billion and an Internal Rate of Return (IRR) of 44% with a payback period of 2.25 years. Using a cut-off grade of 1.25% TREO, the estimate provided a



From left to right, Peter Duncan, Chief Pilot for Nunavik Rotors (helicopter company based out of Kuujuaq), Chris Grove, President Commerce Resources, Patrick Muzzi, Director, Société du Plan Nord, Jerome Nadeau, Project Manager, Investissement Québec, Denis Williams, Director General, Investissement Québec, Darren Smith, Ashram Project Manager, Alain Dorval, Manager, Mining and Mineral Processing, Norda Stelo (formerly Roche Ltd), and Chris Berry, House Mountain Partners/ Zimtu Capital Corp. The group is standing in front of the original outcrop that was sampled in 2009. Photo courtesy Commerce Resources Corp.

measured resource of 1.6 million tonnes at 1.77%, an indicated resource of 28 million tonnes at 1.90% and an inferred resource of 219.8 million tonnes averaging 1.88% TREO.

What separates Commerce's Ashram deposit from various other advanced stage REE deposits is its simple mineralogy combined with high-grade mineral concentrates of greater than 40% TREO. Mineralization starts at surface with minimal overburden allowing for a low cost open pit operation. The deposit contains high demand, short supply REEs in significant amounts with a balanced distribution of the critical and magnet feed REEs. The Ashram Project has capital expenditures (CAPEX) of \$773 million. However, that is relatively low considering the 2.25-year payback and the +25-year mine life. Perhaps most important, are its low operating expenditures (OPEX) of \$95.20/tonne of ore treated. After all, like any mine, it's not how much ore can be produced but how much profit can be generated from each tonne of ore mined. In this, the Ashram deposit scores high along with its favorable jurisdiction and experienced management team.

Commerce has been cognizant of changes in the market over the past few years. While a Pre-feasibility study has been ongoing, the company is exploring different mining scenarios along with economic trade-off studies to adjust to an ever-changing market landscape. For example, by reducing annual production suggested in their existing PEA, they could reduce CAPEX allowing the company to move to production quicker.

Also, by dividing the property into North and South project areas, the hydrometallurgical processing would be more cost-effective if located closer to existing infrastructure rather than being processed at the mine site. Commerce is comfortable with the cost of building a haul road to transport mineral concentrate from the mine north to the coast or south to existing infrastructure as part of the expenditures laid out in the existing PEA. They are also confident that Québec's Plan Nord will include much of the highly prospective surrounding area in their infrastructure development plans.

Ten different metallurgical studies have now been completed with each one more impressive than the last. Most recently, REE recoveries have increased from 71% to 76% while maintaining a grade of greater than 40% TREO. In addition, a secondary leach has been eliminated simplifying the leaching process. With strong metallurgical results and all the data for a pre-feasibility study in place, Commerce has begun producing samples from their pilot plant for potential clients throughout the world.

There is much about rare earth deposits that makes analysis more difficult than for other mineral type deposits. The simple fact that so few producing REE mines exist in the world indicates a shortage of expertise in the mining of up to 16 different rare earth elements – each with their own supply and demand fundamentals. To date, the Ashram deposit has developed on its tangible data benefiting from a well-balanced combination of

simple mineralogy, tonnage, grade, REE distribution, economics, jurisdiction, and infrastructure putting it at the forefront of newly emerging REE deposits throughout the globe. ■

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