

# Rare Earth Element Mineralization and Exploration in Ontario

# REEs in Ontario

Rare earth elements are among the non-traditional metals currently being targeted for exploration in Ontario, along with lithium, niobium, and tantalum.

The rare earth elements comprise a relatively abundant group of 17 elements composed of scandium, yttrium, and the lanthanide series of fifteen elements with atomic numbers 57 through 71 (from lanthanum to lutetium). The principal economic sources of rare earth elements are the minerals bastnasite and monazite.

In Ontario, rare earth element, lithium, niobium, and tantalum mineralization occurs in pegmatites, in carbonatites and, in the case of rare earth elements, in paleoplacer deposits. Demand for these metals has grown substantially in recent years, primarily due to increased use of permanent magnets and rechargeable batteries. Long-range projections of market demand predict that 2 million tonnes of rare earth oxides will be required by 2025 to meet the requirements of hybrid, electric and hydrogen vehicles. Forecast demand for 2010 is about 150,000 tonnes.

Magnets containing rare earth elements are the world's strongest permanent magnets. Neodymium magnets are key components in electric motors and regenerative braking systems used in hybrid, electric and hydrogen vehicles, as well as in the miniaturization of high-technology applications such as hard disc drives, DVDs, cell phones and iPods. Nickel metal hydride (NiMH) rechargeable batteries, used in hybrid and electric vehicles, contain cerium and lanthanum. A typical hybrid vehicle may contain 20 kg of REEs.

In 1986, Denison Mines built a plant in Elliot Lake to extract yttrium oxide as a by-product from uranium production. The plant closed in the early 1990s. Recent dramatic increases in demand and higher prices for rare earth products including cerium, rare-earth and yttrium compounds has seen renewed interest in exploration for these metals.

The Ontario Mineral Deposit Inventory documents over 200 known rare earth element, lithium, niobium, and tantalum mineral occurrences across the province.

Recent exploration highlights are summarized in the various reports for the Resident Geologist Districts in the province. They are available on-line at:

[http://www.mndmf.gov.on.ca/mines/ogs/resgeol/default\\_e.asp](http://www.mndmf.gov.on.ca/mines/ogs/resgeol/default_e.asp)

Some known rare earth element properties in Ontario are listed below, and shown on the map on the other side of this page.

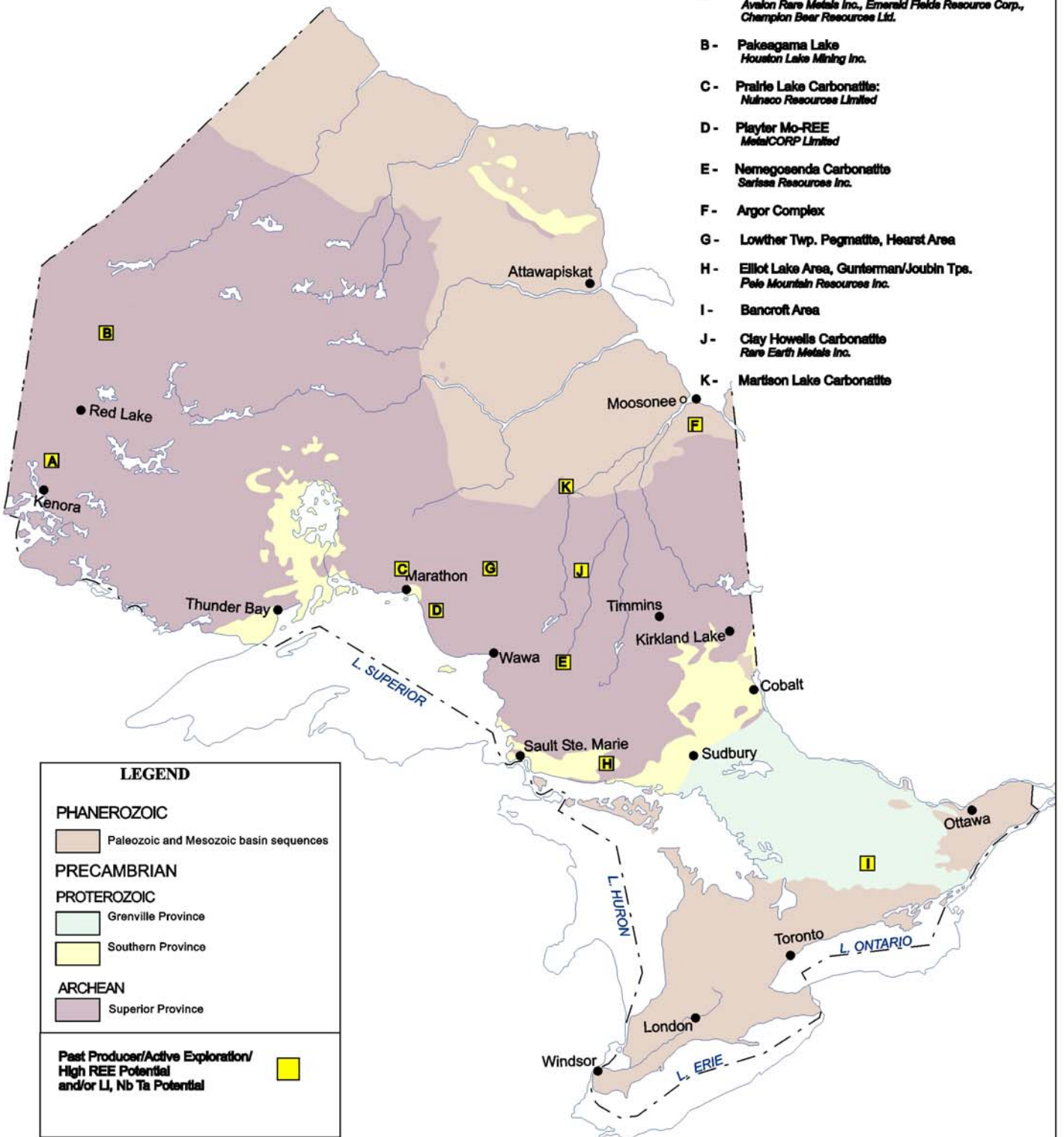
Map No.	Status	Name	Tonnes	Grade %
A	DNBM / R	Big Whopper, Patterson Lake	7 081 700	1.285% Li <sub>2</sub> O; 0.346% Rb <sub>2</sub> O
B	DNBM	Pakeagama Lake (Li, Cs, Be, Ta)		
C	DNBM / R	Prairie Lake Carbonatite	180 000*	0.25% Nb
D	DNBM	Playter (Mo – Re)		
E	DNBM / R	Nemegosenda Carbonatite	20 000 000*	0.47% Nb
F	DNBM / R	Argor Complex	62 000 000*	0.52% Nb <sub>2</sub> O <sub>5</sub>
G	DNBM	Lowther Township Pegmatite Hearst area		
H	PP	Elliot Lake Gunterman / Joubin Tp.		
I	PP	Bancroft Area		
J	DNBM / R	Clay Howells Carbonatite		
K	DNBM / R	Martison Lake Carbonatite		

Notes: R – Reserves; PP – Past Producer; DNBM – Deposit Not Being Mined  
\* Reserves cited are from published sources and may not be NI43-101 compliant.

# Ontario REEs

## Past & Present Mining & Exploration

- A- Kenora Area Pegmatites - Big Whopper, Big Mack  
*Avalon Rare Metals Inc., Emerald Fields Resource Corp., Champion Bear Resources Ltd.*
- B- Pakeagama Lake  
*Houston Lake Mining Inc.*
- C- Prairie Lake Carbonatite:  
*NuInco Resources Limited*
- D- Playter Mo-REE  
*MetalCORP Limited*
- E- Nemegosenda Carbonatite  
*Sarisa Resources Inc.*
- F- Argor Complex
- G- Lowther Twp. Pegmatite, Hearst Area
- H- Elliot Lake Area, Gunterman/Joubin Tps.  
*Pele Mountain Resources Inc.*
- I- Bancroft Area
- J- Clay Howells Carbonatite  
*Rare Earth Metals Inc.*
- K- Marlson Lake Carbonatite



### LEGEND

#### PHANEROZOIC

Paleozoic and Mesozoic basin sequences

#### PRECAMBRIAN

##### PROTEROZOIC

Grenville Province

Southern Province

##### ARCHEAN

Superior Province

Past Producer/Active Exploration/  
High REE Potential  
and/or LI, Nb Ta Potential

