



# THE MINERAL VEIN

Official Newsletter of

**THE MINERAL SOCIETY OF MANITOBA**

**FEBRUARY 2015**

## **FEBRUARY PRESENTATION SUMMARY**

**By Marjorie Turton**

February 4, 2015 we had the pleasure of Chris Pederson presenting Rare Earth Elements in Ilimaussaq and Nechalacho intrusions. It was, in fact, a rare earth minerals travelogue to Greenland and the North West Territories. Greenland and North West Territories each have very large intrusions of rare earth minerals. We had a previous presentation of rare earth elements found in pegmatite in Manitoba. But these were definitely different.

The term rare earth element and rare earth metals tend to be used interchangeably.

As defined by IUPAC, a **rare earth element** or **rare earth metal** is one of a set of seventeen chemical elements in the periodic table, specifically the fifteen lanthanides, as well as scandium and yttrium: (Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu and Sc, Y). Scandium and yttrium are considered rare earth elements (REE) because they tend to occur in the same ore deposits as the lanthanides and exhibit similar chemical properties. The 17 rare earth elements are found in all rare earth elements deposits but their distribution and concentrations vary. They are referred to as 'rare' because it is not common to find them in commercially viable concentrations. Rare earth elements generally fall into one of two categories – light rare earths (LREE) and heavy rare earths (HREE), with varying levels of uses and demand. REE mineral deposits are usually rich in either LREE or HREE, but rarely contain both in significant quantities.



Chris Pederson

In general, they are vital to some of the world's fastest growing markets: clean energy and high technology.

Despite their name, rare earth elements are generally plentiful in Earth's crust. However, because of their geochemical properties, rare earth elements are typically dispersed and not often found concentrated as rare earth minerals in economically exploitable ore deposits. It was the very scarcity of these minerals (previously called "earths") that led to the term "rare earth". Rare earth elements/minerals are further divided into light and heavy rare earths.

### **Heavy Rare Earths**

(Less common and more valuable)

Europium (Eu), Gadolinium (Gd), Terbium (Tb), Dysprosium (Dy), Holmium (Ho), Erbium (Er), Thulium (Tm), Ytterbium (Yb), Lutetium (Lu), Yttrium (Y)

### **Light Rare Earths**

(more common)

Lanthanum (La), Cerium (Ce), Praseodymium (Pr), Neodymium (Nd), Samarium (Sm)

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## THE MINERAL SOCIETY OF MANITOBA

c/o The Manitoba Museum  
190 Rupert Avenue  
Winnipeg, MB, R3B 0N2

[mineralsocietyofmanitoba.weebly.com](http://mineralsocietyofmanitoba.weebly.com)

### *The 2014-2015 Executive:*

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Lisa Grabowski, *ph. 204-774-5097*

#### **Field Trip Chairman**

Marion Foster, *ph. 204-775-0625*

#### **Newsletter Editor**

Jacques Bourgeois, *ph. 204-467-3282*

#### **Website**

Josh Myers, *ph. 204-330-0076*

#### **Members at Large**

Marion Foster, *ph. 204-775-0625*

Josh Myers, *ph. 204-330-0076*

Peter Harms, *ph. 204-*

Yvonne Searle *ph. 204-663 6637*

#### **School Programs**

Yvonne Searle, *ph. 204-663 6637*

*The Mineral Vein* is published monthly from September to June.

**Meetings** are held on the first Wednesday of each month from September to May inclusive at the Manitoba Museum in room P47 on the Planetarium level. They begin at 7:30 PM and feature announcements, an invited speaker and a raffle. Members are encouraged to bring along any new, interesting specimens, or specimens appropriate to the speaker's topic.

**Field Trips** take place from May to September to interesting sites in Manitoba or neighbouring provinces and states.

**Membership:** A single membership is \$15 while a family membership is \$20. Memberships run from October to October.

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### **UPCOMING EVENTS**

**March 4th, 2015:** MSM regular monthly meeting begins at 7:30 p.m. at the Manitoba Museum.

"Stepping Stones. The path from Liaison to Collaboration" - Linda Murphy (Aboriginal Liaison - Manitoba Geological Survey)

**April 1st, 2015:** MSM regular monthly meeting begins at 7:30 p.m. at the Manitoba Museum.

"Travels in the Ordovician of the Hudson Bay Lowlands" - Dr. Graham Young (Manitoba Museum)

**May 6th, 2015:** MSM regular monthly meeting begins at 7:30 p.m. at the Manitoba Museum.

"Amethysts" - Bram Hasler



Founded in 1971, the Mineral Society of Manitoba is dedicated to promoting the study of minerals, rocks and fossils for their scientific and recreational value.

The Mineral Society of Manitoba hosts monthly meetings covering a variety of mineral related topics. In addition, the Mineral Society organizes summer field trips to collecting localities, and hosts educational exhibits about minerals and fossils.

## FEBRUARY PRESENTATION SUMMARY (cont)

Yttrium is lighter than the light rare earths, but included in the heavy rare earth group because of its chemical and physical associations with heavy rare earths in natural deposits.

Promethium is a synthetic element which does not occur naturally and Scandium's properties are quite different from the other REEs.

Silvery-white or gray in colour, many of these metals have a high lustre and tarnish readily when exposed to air. REEs are found in most everyday applications because of their unique chemical and physical properties. New applications have arisen consistently over the past 50 years, including important environmental innovations such as catalytic converters and the development of permanent magnets which have enabled greater efficiency, miniaturization, durability and speed in electric and electronic components. Any modern car contains over 40 rare earths, mainly in permanent magnets. Substitutes exist, but rarely work as effectively.

Often referred to as the `seeds of technology` by the Japanese, REEs are a major constituent of many advanced materials, especially in the high tech and green energy sectors where robust performance, durability and low carbon emissions are so important. China has diminished supplies and is eager to contain sources of REE. It controls 90 percent of the supply of lithium.

The fastest growing markets for REEs are permanent magnets, rechargeable batteries, phosphors and polishing agents, with neodymium, praseodymium, dysprosium, yttrium, and terbium having the greatest exposure to these segments.

### **REEs Play a Key Role in the Green Energy Sector**

Electric and hybrid cars can contain 20-25 pounds of rare earths, which is double that found in a standard gasoline vehicle. The battery itself is made from several pounds of rare earth compounds. REEs are also used in regenerative braking systems and electric traction motors. The motors consist of powerful magnets made from neodymium and dysprosium.

## Ilimaussaq, Greenland.



Greenland is mainly covered by glacier. See image. Human habitat is around the edges of the glacier. This trip was focused on the red dot area at the south-west tip of Greenland.

South-west Greenland, beautiful scenery, close to mountains and sea, the main economy is fishing and sheep farming. It is part of Denmark. There is a ruby industry attempting near the capital. Although the areas not covered by glacier are green, they are devoid of trees. The mountains seem really high but aren't that high just close and with little weathering material at the base. No foothills? The boulders that are scattered about do display extensive weathering due to wind with pebble erosion. The air is so clear that the glacier fields when seen from a distance seem to emit a white glow.

It is possible that under Greenland's vast ice sheet could lie enough rare earths to satisfy at least a quarter of global demand in the future.



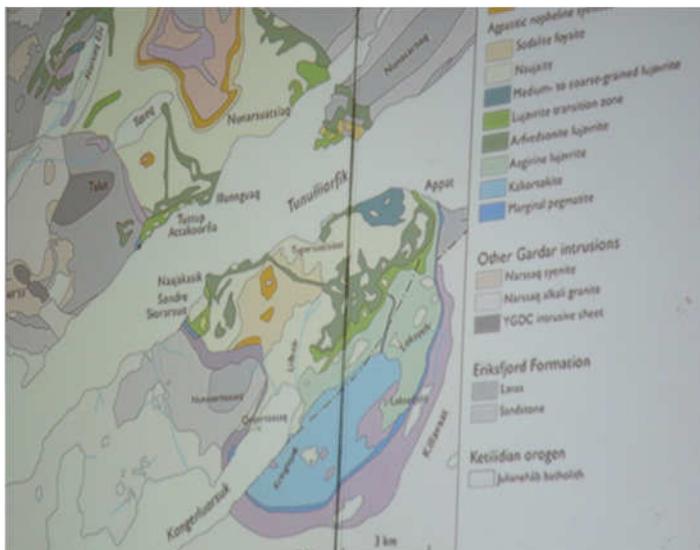
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## FEBRUARY PRESENTATION SUMMARY (cont)

Prospecting is interesting. Geologist, etc., are deposited by helicopter to the surface of the ice cap and they rappel down collecting samples along the way. The ore seems are relatively close to the surface.



The Ilimaussaq alkaline complex is made up of three magmatic phases, where intrusions of augite syenite, alkali acid rocks and apgaitic nepheline syenites took place. Their mineralization occurs in pegmatites, hydrothermal altered pegmatites and hydrothermal veins. Most of the locations concentrate at the banks of the fjords Kangerluarsuk and Tunulliarfik (Eriksfjord) as well as in the centre of the Narsaq peninsula.



Many of the inhabitants as well as visitors are mineral collectors. It is almost a national pastime. Can't help it for many of the minerals are relatively easy to obtain and many are colourful.



Tugtupite on quartz from Ilimaussaq complex

There is lots of variation in the rocks. Entire mountains contain large feldspar crystals (over a foot long). Many of the minerals mentioned are over the knowledge level of this writer. Most of the rocks are in unaltered states and relatively accessible as opposed to the North West Territories.

## Nechalacho

In Nechalacho Intrusion, North West Territories rocks are all altered. Veins are not readily accessible. Outcrops are very weathered. Travel to areas of interest is mainly by aircraft and summer barge.

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## FEBRUARY PRESENTATION SUMMARY (cont)

The Nechalacho deposit is located on the Thor Lake property, in Canada's Northwest Territories, 100 km southeast of the capital city of Yellowknife and five kilometres north of the Hearne Channel on the East Arm of Great Slave Lake.



The Nechalacho Rare Earth Elements (“REE”) Project, Thor Lake, NWT, Canada, is the most advanced large heavy rare earth development project in the world outside China, and is also host to substantial zirconium, tantalum and niobium resources.

This is heavy rare earth element territory. Outcrops are very weathered. Here is the largest beryllium deposit in the world. Although the minerals are layered in a domed configuration, fluid action remobilized rocks. Heavy rare earths in lower levels and lighter rare earths are higher in the layering. Underground crystals or veins exist. The fluorides have an ice blue fluorescence. Later stage veins have galena, quartz, calcite and siderite.

It was a very informative presentation, overwhelming this author with mineral terms. The question and answer was lively. The slide shows and Chris’ enthusiasm encouraged wanderlust in the audience. He wants to go back to Greenland and most of the audience would like to go as well.

## FIELD TRIP PLANNING

### By Marion Foster

We need to get the membership to start thinking about this summer's field trips.

Jack Bauer and myself had a meeting and came up with three possible field trips:

1. Thunder Bay – this trip would be led by Jack and would probably be going to Blue Point and the nearby amethyst mine owned by Greg Hasler.

2. Lake Winnipegosis Narrows quarry with Devonian fossil material. We would plan on visiting other quarries on the way. A good deal depends on the amount of rainfall this summer.

3. Cat Lake, hopefully near the end of June

At the next meeting there will be lists for people to sign up for these trips

Please note: the membership was asked to submit suggestions of where they would like to go for field trips. So far there has been no response, are we to assume there is no interest?

We will have a trip to Gillies quarry rubble pile, you will be notified of date via an email, hopefully some will show up.

We will be working on a Snow Lake trip for 2016.

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## NEW WEBSITE!

Please join me in thanking **Josh Myers** for the new Mineral Society of Manitoba website.

[mineralsocietyofmanitoba.weebly.com](http://mineralsocietyofmanitoba.weebly.com)

Please take some time to check it out and let us know what you think.