MATAMEC

Rare Earth Elements (REE)-Yttrium-Zirconium Kipawa Deposit is the subject of a one page article in the Exposure section of the Industrial Minerals magazine September 2009 issue.

exposure

Profiling new and undeveloped industrial mineral deposits worldwide

Kipawa heavy rare earths

RARE EARTH (RE)'S importance in the electronics industry has driven a host of miners to look for new deposits (see *IM 3 March 2009: Rare earth supply tight in 2014*) such as Matamec Exploration Inc., a gold and uranium miner.

The Canadian company decided to invest in rare earth elements (REE) a while ago by acquiring the entire Zeus property in Temiscamingue, south-west Quebec (*IM 31 December 2008: Gold company turns to REE*).

As Matamec's president André Gauthier told **IM**, this strategic decision was made in 2003, when the company acquired a 100% interest in base metals, rare metal and REE properties "to reduce [its] risk business". Gauthier explained that a range of factors were then taken into consideration, including "a trend on REE market", especially for heavy rare earth elements (HREE).

Background

Matamec began exploration early in 2007 on the Zeus property to find gold-uranium mineralisation and "to acquire knowledge and experience in the REE exploration with people knowing REE industry."

The company has since then discovered significant RE showings on the Kipawa REE-yttrium (Y)-zirconium (Zr) deposit of its Zeus property. Gauthier told **IM** that, taking into consideration various exploitation factors and a forecast possible shortage on the world supply of HREE (such as terbium, dysprosium and associated yttrium) for 2014, it would be possible to complete the process to bring the Kipawa deposit to production by the same year.

Geology & mineralogy

Even though the value of the deposit still needs to be evaluated, the company believes that it has already discovered significant REE on its Kipawa deposit.

As Gauthier described to **IM**, the Zeus property covers most of the Kipawa Alkaline Complex (KAC): a concordant folded sheet of mildly peralkaline syenite and granite less than 200 metres thick. The KAC has been divided into two main units in the mineralised zone: a peralkaline granite gneiss unit and a syenite gneiss unit (with calc-silicates rocks interlayered within the syenite gneiss). The numerous REE-Y-Zr showings and zones doting the property are centred in and around those syenites.

"The main characteristic of the deposit is its three types of mineralisation," underlined Gauthier: an eudialyte dominated zone – RE oxide weight (REO Wt) up to 10%, - then a mosandrite/yttro-titanite dominated zone (REO up to 65%) and finally a britholite dominated zone associated with the lower calc-silicate rocks (REO up to 62%).

Zirconium is generally more uniformly distributed than yttrium in the deposit and occurs in some horizon independent of yttrium and REE. REE mineralisation features enrichment both in light REE (LREE) and in heavy REE (HREE) and shows well-crystallized medium grains which are amiability to physical separation and easy chemical dissolution.

The Kipawa deposit, defined over 1.3km with a width ranging 10-80 metres, has been subject of an historical resources calculation and is composed of two zones. The West Main Zone has 1.26m. tonnes at 0.15% Y_2O_3 and 0.96% ZrO_2. The East Main Zone has 1.009m. tonnes at 0.14% Y_2O_3 and 1.17% ZrO_2.

Objectives

As Gauthier underlined to **IM**, exploitation of the Kipawa deposit faces two challenges. The first one is "to increase the REE-Y gross tonnage contents of 42,000 tonnes to 100,000 tonnes to be interesting for an end-user," he declared.

The second one is to work on solving the liquid/solid separation step, ie silica gel forming during the dissolution of the REE in the ore. According to Leslie Heymann, Matamec's REE mineral processing expert, "the Kipawa deposit is a potential source of heavy rare earths. "It will compete with the South China clays and the dissolution of xenotime at the high value end of the RE market," she explained.

Meanwhile, Matamec's next step towards a plan NI 43-101 compliant resource report on the Kipawa deposit will be a 2km

HQ drilling programme in autumn 2009/ winter 2010, which will establish the new REE and zirconium resources. "Following this drilling programme and the continuity of the previous metallurgical study on new 100 tonnes bulk sampling, Matamec will probably be able to begin a scoping study in 2010," added Gauthier.

"Good potential"

This new Canadian deposit would come as good news for RE consumers as China dominates RE production, being responsible for 95% of global RE production (*IM June '09, p.6: Rare earths just got rarer*).

Gauthier believes that the REE market has good potential. "Regarding the evolution of REE market since 2000, we believe it will be increased depending of the volume of products and new technologies using REE," he forecast. According to him, the average price for REO concentrates is $9-11/kg. Also, new technologies use more HREE which have higher prices compared to a few years ago. Terbium has increased from $170/kg in 2003 to $340-360/kg; and dysprosium from $20/kg in 2002 to $107-112/kg.

"Some end-users are looking for potential suppliers outside China," underlined Gauthier, who believes that the Kipawa project could be one of the few deposits in the world which can produce economically HREE concentrates.

Zeus property – Kipawa Deposit – Important facts:

1. The 100% owned Zeus property is located in the Temiscamingue region of Quebec and totals more than 15,244 ha in area;
2. The Zeus property covers a large part of the Kipawa Alkaline Syenite Complex (KAC) and seven REE-Y-Zr mineralized zones are known on the property, including the Kipawa Deposit;
3. The Kipawa deposit is defined over a length of 1,300 metres with a width ranging from 10 to 80 metres;
4. The partially drilled Kipawa Deposit is the site of an historic Y and Zr resource calculation by Unocal Canada Ltd. in 1990.
5. The Kipawa Deposit is composed of the West Main Zone: 1.26 Mt @ 0.15% Y_2O_3 and 0.96% ZrO_2, the Central Zone containing no established resources and finally, the East Main Zone: 1.009 Mt @ 0.14% Y_2O_3 and 1.17% ZrO_2 (Please note that as a qualified person has not done sufficient work to classify the historical estimates as current mineral resources, the issuer is not treating the historical estimates as current mineral resources and the historical estimates should not be relied upon);
6. The Central Zone of the deposit, 620 metres long, has no established resources; however, 3 trenches and 3 drill holes have been done only at very wide spacing and every trench and drill hole in this part contains mineralization;
7. Due to its favourable location, an open pit method for the mining of mineralization was contemplated in 1990, resource blocks having been calculated down to an average depth of 35 metres;
8. The main characteristic of the deposit is its three types of mineralization. From the upper syenite portion to the lower calc-silicate dominant part of the calc-silicate/syenite complex, we find an eudialyte dominated zone ((REO Wt (Rare Earth Oxide Weight): up to 10%)), then a mosandrite/yttro-titanite dominated zone (REO Wt: up to 65%) and finally a britholite dominated zone associated with the lower calc-silicate rocks (REO Wt: up to 62%). Zirconium is generally more uniformly distributed than Yttrium in the deposit and occurs in some horizon independent of Yttrium and Rare Earths.
9. In addition, Yttrium values contained in the lower britholite and mosandrite/ytrro-titanite zones were considered to be too erratic to be included in a resource calculation. Drill holes were therefore designed to be short and only a few penetrated into the lower calc-silicate dominant part of the unit (12 DDH on a total of 34) and none tested the down-dip extension of the deposit at depth (i.e. towards the south-west).
10. The deposit is presently considered open both laterally and at depth.
11. Rare Earths mineralization features enrichment both in Light Rare Earths and in Heavy Rare Earths;
12. Rare Earths mineralization shows well-crystallized medium grains which are amiable to physical separation and easy chemical dissolution.
13. It should be noted that Unocal and its subsidiary Molycorp, owner of the Mountain Pass Rare Earths deposit in California (USA), worked on the Kipawa Deposit between 1985 and 1991 because they believed that easily-dissolved Ytrrium and Rare Earths in the yttrium-bearing eudialyte would be a source that could compete economically with the South China clays. At that time, the discovery of ion-adsorbed Yttrium and Rare Earths in the South China clays had a profound effect on the sources and world market price of these elements.
14. Furthermore, it should be noted that Rare Earths content was not systematically measured in drill holes at the time since the main element considered was yttrium. Rare Earths mineralization is therefore known through the analysis of bulk samples. Four of these were analyzed for Y and Zr and three were analysed for Y, Zr and Rare Earths as shown in the following:

Location	Sample number	Weight in kg	Y%	Ce%	REE%	Zr%
West Zone	88-K-1	20	0.53	–	0.86	–
	90KBS-1	350	0.53	0.33	–	1.2
	88-K-3	20	0.51	–	1.41	–
Central Zone	90KBS-3	350	0.25	1.01	–	0.32
	90KBS-5	350	0.41	1.01	–	0.95
East Zone	88-K-4	20	0.23	–	1.75	–
	90KBS-2	350	0.24	0.62	–	0.42

Summary of Unocal bulk samples (%)

15. In addition, on June 16th, 2009, Matamec received SGS Geostat independent report on the re-sampling of four of Unocal's thirteen historic trenches (see Matamec's press release on June 30, 2009). These four channels were reproduced by Matamec in order (1) to verify previous historic results and (2) to test Rare Earths distribution over their entire length. Two trenches tested the width of the West Main Zone (trenches T-1 and T-3), one tested the East Main Zone (trench T-8) and the last tested the Central Zone between the two which has no calculated historic resources (trench T-11). It should be noted that on trenches T-8 and T-11, sites of 3 historic blast sites (KBS-2, KBS-3 and KBS-5), could not be re-sampled due to highly-irregular trench floors (total length not sampled of 5 metres in T-8 and 20 metres in T-11).
16. Future work programs will likely have an impact on historic resources (see next section);
17. Outside of the Kipawa Deposit, best values obtained from December 2008 grab samples come from the Couleuvre and TH zones, respectively with value greater than 11.34% and 7.2% total REE, combined with 0.93% and 2.16% Yttrium.

What's next on the Kipawa Deposit?

By completing a new financing this fall, the next step towards the planned NI 43-101 compliant resource report on the Kipawa Deposit will be a 2,000 metres HQ drilling program in Fall 2009/Winter 2010, which will establish new Rare Earths, Yttrium and Zirconium resources. Following this program and the continuation of previous metallurgical studies on a new 100 tons bulk sample, Matamec will then be able to begin a scoping study in 2010.

Considering a possible short on the world supply of Heavy Rare Earths such as Terbium, Dysprosium and associated Yttrium forecasted for 2014 or before, the favourable Rare Earths distribution emphasizing Heavy Rare Earths of the Kipawa Deposit, the work done on the deposit to date and the time needed for the completion of the future steps partly described above, we believe more on the potential of the Kipawa Deposit.