“EURARE: Development of a sustainable exploitation scheme for Europe’s REE ore deposits”

WP2: What Have We Learnt

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All the Deposits Tested

- **Kringlerne**
- **Nora Karr** → Eudialytes 0.6% REO in ore
- **Olserum** → Monazite and Xenotime 0.5% REO in ore
- **FEN Minerals**
  - **Rodberg** → Iron Rich
  - **Sovite** → Carbonate Rich
  - **Rauhaugite**
- **Bastnat**
  - **New** → Complex Mixture and High Grade
  - **Joh**
- **Greek Placer** → Allanite
- **Kvanefjeld** → Steenstrupine

Mixture of RE Value Minerals
Kringlerne – Greenland

- Low grade and very large deposit
- Value Mineral is Eudialyte
  - Measured pure mineral assay of ~3% (Variable)
- Coarse grain size allows for physical separation of value mineral
- Different Magnetic Properties of the minerals
  - Non-magnetics, paramagnetics and Ferromagnetics
- 1.5% REO concentrate at ~70% Recovery
  - Done at bench scale only in EURARE
  - Significant Zr content just as valuable as REE
- Tanbreez will be contributing conc to MEAB Demo Plant
Nora Karr – Sweden

- Low grade ~0.6% with 50% HREO!
- Value Mineral is Eudialyte
  - Measured pure mineral assay of ~6% (Variable)
- Coarse grain size allows for physical separation of value mineral
- Different Magnetic Properties of the minerals
  - Non-magnetics, paramagnetics and Ferromagnetics
- 1.5% REO concentrate at >70% Recovery
  - Done at bench and pilot scale in EURARE
  - Significant Zr content just as valuable as REE
- MEAB Demo Plant on concentrate next year
Oleserum – Sweden

- Low grade ~0.6% with 36% HREO
- Value Minerals are Monazite Xenotime
  - Pure mineral assay of ~40% (Variable)
- Medium grain size suitable for flotation
- Monazite and Xentime float performance understood
- 20% REO concentrate at ~70% Recovery
  - Done at bench in EURARE
  - First done successfully with EURARE
- Still an exploration project with some potential
Rodberg – Norway

- Medium Grade ~1.5% and high Th (1%)
  - 96% LREO proportion

- High Iron ore
  - Finely disseminated variety of rare earth minerals

- Fine grain size of REO minerals
  - Makes beneficiation difficult

- Smelting of the ore effective
  - Concentrates the REO into the slag

- Mild Atmospheric Leaching Effective
  - Some selectivity for REE over gangue elements

- Atmospheric Leaching Process to be developed
Sovite – Norway, FEN

- V Low grade ~0.2%
  - 88% LREO proportion
- Very High Carbonate Content
  - Finely disseminated variety of rare earth minerals...again.
  - Apatite present
- Fine grain size of REO minerals
  - Makes beneficiation difficult
- Beneficiation effective for apatite only
  - Direct leaching most suitable
- Still an exploration project
- Possible application as neutralising agent or fertilizer
Rauhaugite – Norway, FEN

- Medium grade ~1.5%
  - 88% LREO proportion
- High Carbonate Content
  - Variety of REE minerals
  - Finely disseminated variety of rare earth minerals…still.
- Fine grain size of REO minerals
  - Makes beneficiation difficult
- Whole of ore treatment
  - Direct leaching may be suitable
- Still an exploration stage ore deposite
Bastnas – Sweden

- High Grade Ore ~15% REO
  - 95% LREO proportion
- Mixture of Minerals
  - Variety of REE minerals
  - Coarse minerals
- Good potential for beneficiation
  - Due to coarse grain size
- Refractory Minerals
  - Diversity and touch nature will make hydromet treatment difficult
- Interesting exploration opportunity
Greek Placer – Greece

- V Low Grade 90% LREO proportion
- Allanite the major mineral
  - Already liberated as sand grain
- Good potential for beneficiation
  - Due to coarse grain size
- Good work initial beneficiation work performed
  - 80% of REO into 20% of the mass
  - 1.5% REO concentrate grade achieved
  - Possible pre-concentration step
  - Tailings are likely very benign
- Examine flotation to further increase grade
  - High cost refining likely
Kvanefjeld – Greenland

- Medium grade (1.3%) 85% LREO proportion
- Steenstrupine the major mineral
  - Britholite, monzite, townendite
- Medium coarse grain size
  - Well suited to beneficiation
- Extensive work performed (including EURARE)
  - 80% of REO into 7% of the mass
  - 15% REO concentrate grade achieved
  - Piloted 3 times
  - Feasibility Study Design Complete
- Beneficiation and Refinery Demo Plants Complete
  - Separation through MEAB next
Thanks for your Attention