Tanbreez
And Rare Earths
The name TANBREEZ is derived from the chemical symbols for the main elements....

<table>
<thead>
<tr>
<th></th>
<th>Ta</th>
<th>Nb</th>
<th>REE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Number</td>
<td>22</td>
<td>22</td>
<td>44</td>
<td>41</td>
</tr>
<tr>
<td>At. No.</td>
<td>180.95</td>
<td>92.906</td>
<td>Rare Earths</td>
<td>91.224</td>
</tr>
<tr>
<td>Name</td>
<td>Tantalum</td>
<td>Niobium</td>
<td>Rare Earths</td>
<td>Zirconium</td>
</tr>
</tbody>
</table>

To which it looks like we should add W (Tungsten), along with other by-products such as arfvedsonite, feldspar, sodalite etc.....
Tanbreez, a Privately Owned Company

Being private has enormous advantages:
1. No stock market forms, requirements, worries about market perception, share price, management costs and the need to advertise etc
2. See (1.)

But with that also comes the disadvantages:
1. We have spent almost $50m (but we still are independent) and own 100%

The world of private financing is a bit different to the hard world of stock listed companies (see 1. previous). It does lead to far more efficient spending of funds (again see 1. above).

It also leads to areas you don’t expect ie 3 publications, plus a chapter in a book! There’s more to come while we are waiting!
Where we are at

We collected every bit of data on the deposit

Then in 2012 we submitted a Feasibility Study
In the last couple of years we found that recorded geology of this, one of the world’s best example of a cumulate deposit did not fit the facts.

Well, you cant change the geological facts as appearing on the ground, so now its probably the best example of metasomatic replacement. To the non-geologist amongst you, that’s like saying your dog has been a cat its whole life and you did not notice it!

This is a hard sell for academics.....

With the change of geological cause has come the predicting of new discoveries of new ore bodies, new style of rare earth bodies, eg the Haematite Breccia Type Deposits and the EALS type.
The Real Problem…

….. of trying to specialise in niche metal markets.

From the start the problem with all the Tanbreez products was the markets.

This presentation is mainly focussed on how Tanbreez faced this problem. During this speech I will only look at Tanbreez’s efforts in one commodity, the rare earths – although, I should point out this procedure is in place for all commodities, has taken millions of dollars and caused us to travel to all sorts of places.
At present Tanbreez’s JORC reserves / resources stand at 29 million tons of contained REE in some 4.7 billion tons.

However, the exploration target would suggest this figure is well over 100,000,000 of REO.
At present the grade is 0.6% REO (30% heavies). However, this can be upgraded to 2.5 – 2.7% for free – i.e. no opex.

Why free?

We Sell the waste

Also, the new discoveries of the EALS and Unit zero are virtually concentrate anyway
Magnetic Separation

Tiles

Arfvedsonite Concentrate

Eudialyte Concentrate

Feldspar Concentrate

Glass & Ceramics
Other Products in Eudialyte

Zirconium, Hafnium, Tantalum, and now Tungsten as bi-products, virtually means at the least, the cost of production is zero for the chemical plant as well (also we think we can sell the waste).

And, with that sort of cost of production we can now start to compete with the Chinese.

That is with a multi product approach ore, weak metals can be supporter by the others or even stock piled until markets improve etc.
At Home in Greenland

Unlike other rare earth mines, Tanbreez does not contain the radioactive elements – thorium, uranium, radon, actinium and the like, which present an enormous local hurdles.

More importantly, Tanbreez does not contain the soluble fluoride or phosphate minerals which are so deadly to the environment.
Thus, as Tanbreez will sell up to 97% of what it mines with the rest being used for inert landfill, there is no environmental issues for Tanbreez in Greenland.
Markets

It may be great having zero cost, but you still have to refine the rare earths, and this can be done by:

I. Sending product to China – but toll refining there is illegal
II. Build your own plant to separate the REE
III. Think “outside the box”
IV. Floating the project and leaving the problem to the next person
Choices Explained

I. Been to China and treatment plants many times and therefore aware of the no tolling policy.

II. Buy an existing plant – Tanbreez tried a couple of times but were not successful – we are still looking at a partially built plant

III. “Think outside the box” and this is one of Tanbreez’s great success stories

IV. Float on the exchange – Yes, one day
Research

From 2006, on seeing this problem of restrictive markets (along with some luck) Tanbreez started to spend money on “thinking outside the box”, along with some luck we have been successful.

For example, the research coming up with:

- Tanbreez Magnet
- Arfvedsonite Tiles
- Viking Zirconium
- Light Ree

But, let me concentrate on just one
Ce-La

However, it is the research into Ce-La where Tanbreez has had major success.

Here we have a totally new use for Ce-La as a catalyst in cars and power stations – essentially cuts CO$_2$ by 30%, using less fuel for the same power.
Experimenting

When we experimented, we found efficiency improved with a little Pr and Nd in the mixture.

Therefore, reducing the number of Sx units to separate from perhaps 100 – 200 to make pure 99.999% down to 5 – 7 Sx units (experimenting continuing)
Thus, we can….

I. Cheaply mine and concentrate the mineral
II. Large reserves
III. Cheaply separate
IV. To produce a new product with a unique market that is protected by patents
V. A product we would hope to sell to everyone who owns a car or power station
Tanbreez’s main aim has been to produce products which are isolated from competition and has done that with all or most of its products and even its wastes.

In this it has succeeded beyond Tanbreez’s wildest dreams. Now it needs to be able to take advantage of this before the markets are filled in by other producers and that would mean some help from the Greenland government, reducing its extreme red tape at as a minimum.
Thank you for your attention