



GREENLAND MINING & EXPLORATION FOCUS

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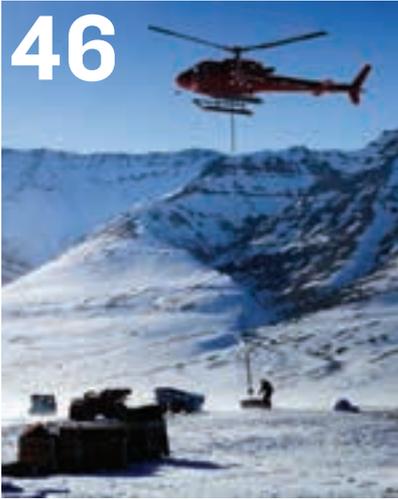
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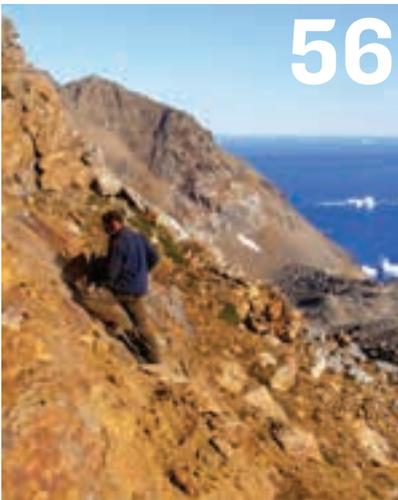


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The Tanbreez project in Greenland has the potential to disrupt the world market in a group of minerals that's making a political as well as a financial impact.

THE **VITAL** STATISTICS

AREA
2,166,086 KM²



POPULATION
56,370



CURRENCY
DANISH KRONE (DKK)



OFFICIAL LANGUAGE
GREENLANDIC



CAPITAL
NUUK

DID YOU KNOW?

81%

Of Greenland is
covered in ice

55%

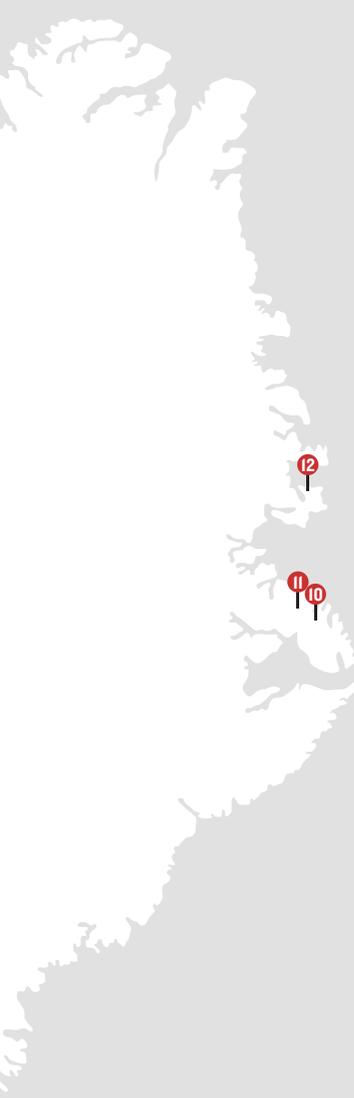
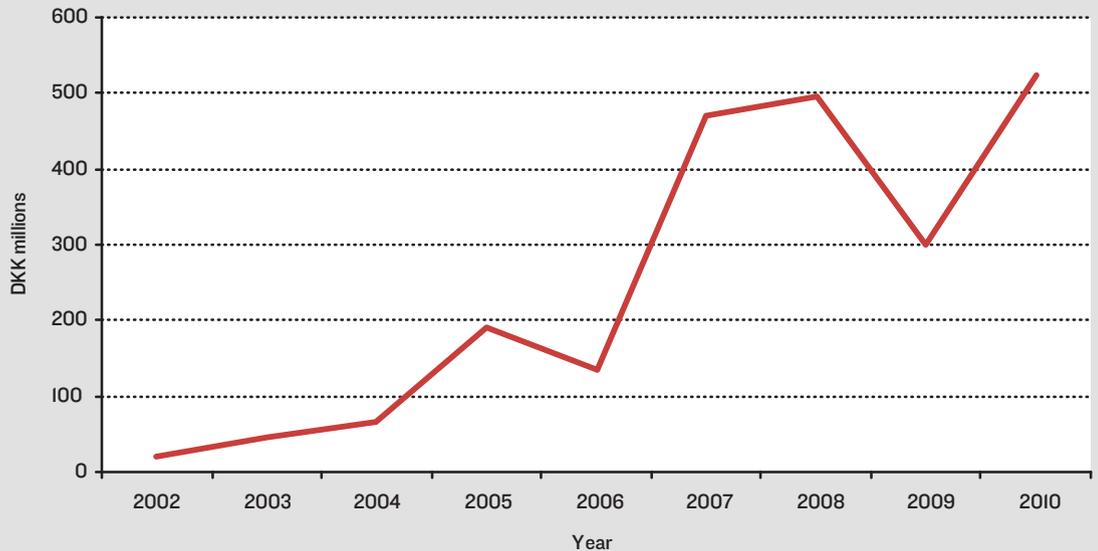
Of the companies in
Greenland are represented
by Australia and Canada

KEY MINE SITES

1. LANGØ
2. MAARMORILIK ('BLACK ANGEL')
3. QULLISSAT
4. EQALUSSUIT
5. SEQI
6. IVITTUUT
7. KOBBERMINEBUGT ('JOSVA')
8. AMITSOQ
9. NALUNAQ
10. MALMBJERG
11. SMESTERSVIG ('BLYKLIPPEN')
12. CLAVERING Ø



EXPLORATION EXPENDITURE 2002 TO 2010



MINERALS FOUND IN GREENLAND

METALS

- BERYLLIUM
- CHROMIUM
- COPPER
- IRON
- LEAD
- MOLYBDENUM
- NICKEL
- NIOBIUM
- THORIUM
- TUNGSTEN
- URANIUM
- VANADIUM
- ZINC
- ZIRCONIUM

PRECIOUS METALS

- GOLD
- OSMIUM
- PALLADIUM
- PLATINUM
- SILVER
- TITANIUM

SEMI-METALLIC

- ANTIMONY

GEMSTONE

- DIAMOND
- RUBY

MINERALS

- BARITE
- CELESTITE
- COAL
- CRYOLITE
- GRAPHITE
- OLIVINE
- PHOSPHORUS

A LAND OF O

From the near collapse of its melting ice sheets a century ago Greenland has transformed into one of the most exciting locations for major scientific discoveries.

WRITTEN BY:

OPPORTUNITY

*Mineral resources sector a decade
has turned itself into one of the world's
hotspots for exploration and development*

WILL DAYNES

Friday 21 June 2013 marked a very special day in the calendar of the people of Greenland, being as it was the country's National Day, a day used to celebrate the country's cultural value and national identity. The date is also significant in that it marks the fourth anniversary of the signing of the Act that ushered in Greenland's self-governance.

With the passing of this Act the government of Greenland also gained the right to take over a number of key responsibilities, including mineral-resource development. Following on from the country's move to self-governance came the passing of the Inatsisartut Act No7 (of December 7, 2009) on mineral resources and activities on 1 January, 2010. This Act on Mineral Resources helped establish the foundation and framework for future control of mineral resources.

The establishing of the Act on Mineral Resources was the result of a shared belief amongst political groups that Greenland needed to move

towards the development of its mineral resources sector in order to create an industry that would contribute massively to the economic growth of the country and create employment opportunities for its people.

The outlook for Greenland's mineral resources sector today is certainly much brighter than that which the country's Bureau of Minerals and Petroleum (BMP) faced in 1998 when it took over the responsibilities then held by the Danish authorities. It was at that time that the industry was suffering from a decline in the number of licences, and more importantly in general interest from companies in exploring Greenland. This trend would continue before reaching an all-time low in 2002.

It was at this point that the BMP designed a marketing strategy to promote Greenland's vast mineral potential on a systematic, continuous basis. The focus was to be targeted particularly, but not exclusively, towards Australia and Canada, the two largest mining countries in the world. The results of this strategy began to bear



Tikiusaaq Carbonatite Complex, West Greenland (REE) – Drilling at the prospect in 2011, glacial tongue of the inland icecap in the background

MINING IN GREENLAND

PHOTO: NUNA MINERALS



We used to be Greenland mining services, now we are LNS Greenland A/S.
The logo has been changed but the Company remains the same



LNS
Greenland

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LNS GREENLAND

LNS Greenland A/S (LNSG) was established in 1990 under the name R.C. Entreprenorservice A/S. Based in Qaqortoq, South Greenland, it was one of the first Greenlandic companies to provide services to the oil, gas and minerals industry in Greenland. Today LNSG is a part of the Norwegian LNS Group that consists of 15 subsidiaries, of which many possess heavy arctic experience gained from activities in Spitsbergen, Greenland and Antarctica. LNSG has offices in Qaqortoq and Nuuk, the capital of Greenland, and provide professional services within marine operations, diving, transportation, contracting, construction, tunnelling, camp solutions, catering, logistics and various other tasks tailored to specific Greenlandic industry practices.

www.lns.no

“BMP DESIGNED A MARKETING STRATEGY TO PROMOTE GREENLAND’S VAST MINERAL POTENTIAL”

fruit in rapid order with a growing number of mineral companies showing interest in exploring Greenland from deposits taking the number of granted mineral licences from 17 in 2002 to 94, including applications, in April 2011. In the same period the number of non-exclusive prospecting licences went from six in 2002 to 20 in April 2011.

With the near collapse of the mineral resources

sector in 2002, the following year saw Greenland’s total approved licence area fall to an all-time low with only 5,714 square kilometres handed out to exploration companies. It was the promotion of Greenland’s potential at a number of major mineral conventions in Canada, combined with annual visits that BMP representatives made to Australia that triggered an



An Air Greenland chartered helicopter making a drop-off



increase in applications from these countries.

By 2005 the licence area in Greenland had more than doubled to 12,986 square kilometres, a figure that continued to grow as more applications were submitted. In the recent years Greenland has experienced a higher

growth in area applied for, than the area being reduced or relinquished as a result of exploration maturity. The result is a still growing area for exclusive exploration licences. In April 2011 the licence area passed 40,000 square kilometres, including pending applications.

With this increase in licences being granted and licence area so to came a rapid increase in exploration expenditure in Greenland. This growth resulted in record years in 2005, 2007, 2008 and 2010, when more than 70 million euros was approved as exploration expenditure

“GREENLAND HAS ACTUALLY EXPERIENCED A HIGHER GROWTH RATE THAN THAT OF THE MINERAL RESOURCE GIANTS OF AUSTRALIA AND CANADA”

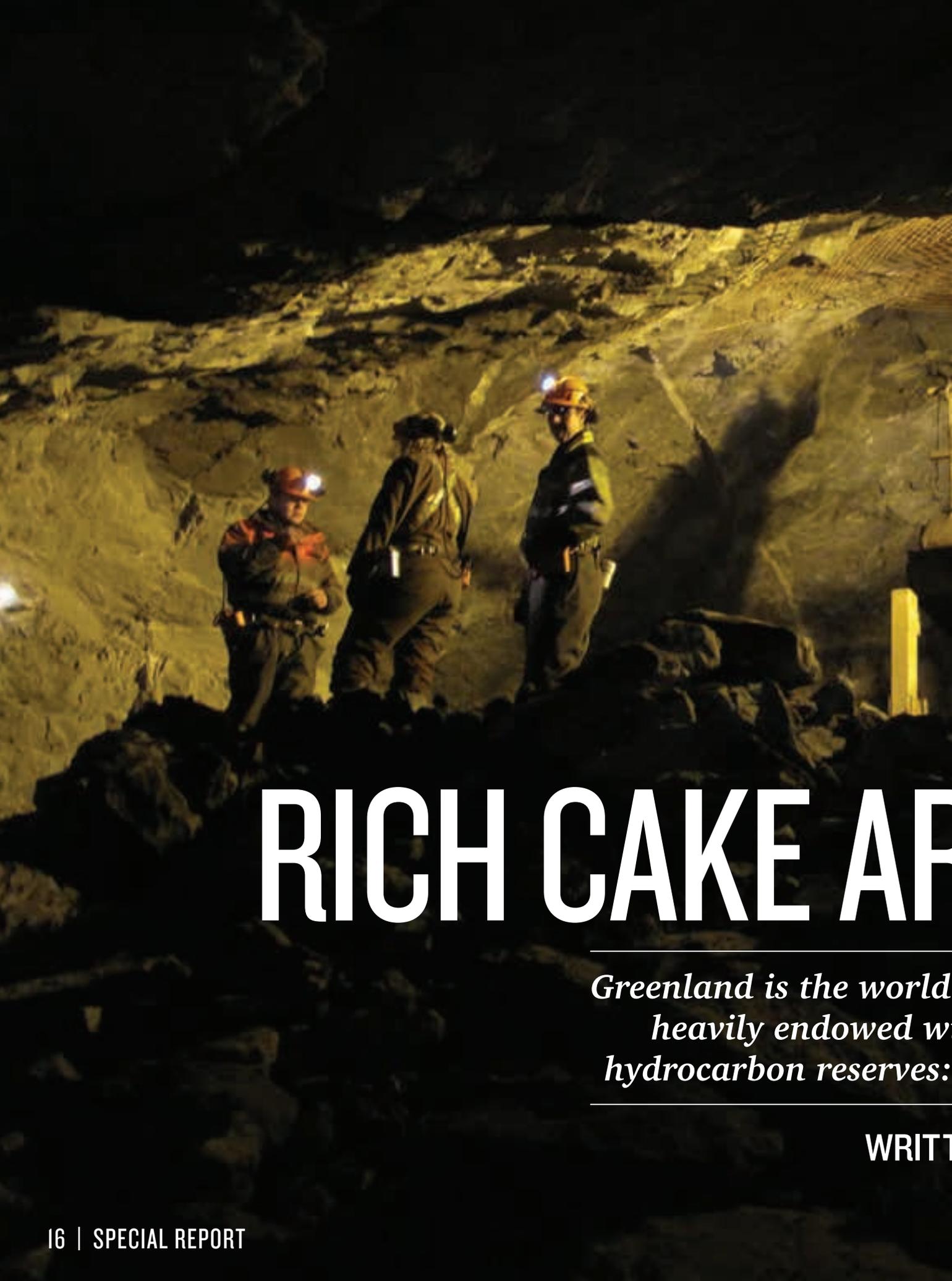


Morning fog lifting during field work in the Akuliaruseq region, West Greenland

for exploring the country's mineral potential. Similarly the country has witnessed a dramatic increase in the amount companies have spent towards mine construction and in preparing to begin exploitation operations. Taken into context these figures and statistics highlight an incredible fact, and that is that in real terms during the last decade Greenland has actually experienced a higher growth rate than that of the aforementioned mineral resource giants of Australia and Canada.

It is clear for all to see that the general tendency since 2002 has been growth in all areas of the mineral industry in Greenland. In the time from 2002 up until April 2011 the number of mineral licences increased more than fivefold, and the licence area increased more than six fold. These factors shine the spotlight not only on the growth in the licence area and numbers but also in the maturity of the different exploration projects, as exploration expenses tend to rise as a project matures over time.

For the time being no decline has been seen in the number of exploration licences as a consequence of the economic recession, and applications are still coming in for new licences. The growing interest from new parts of the world indicates that Greenland is becoming present and visible as a viable mineral resource country. With the current tendencies Greenland expects to see continuous growth in the mineral industry in the country for many years to come. **BE**



RICH CAKE AP

*Greenland is the world
heavily endowed w
hydrocarbon reserves:*

WRITT



ROUND THE ICING

's largest island, nearly a third the size of Australia and with minerals as well as commanding important offshore it is going to be a busy place over the next decade or so

WRITTEN BY: JOHN O'HANLON | RESEARCH BY: RICHARD HALFHIDE

Drilling activity at the Isua banded iron formation





The Bureau of Minerals and Petroleum is a Greenlandic government agency, working under the Ministry for Industry and Minerals and responsible for overseeing the growth of the nation's resources. This is a burning issue in this volatile nation, which has just appointed its first female Prime Minister who is clearly keen to encourage the country's emergent mining industry and has taken the initiative to lift the existing ban on the extraction of uranium. The island has the potential for very large deposits of uranium (and almost everything else it would appear) but as an independent state within the Kingdom of Denmark it has previously stuck to that country's interdict on dealing in any way with radioactive materials.

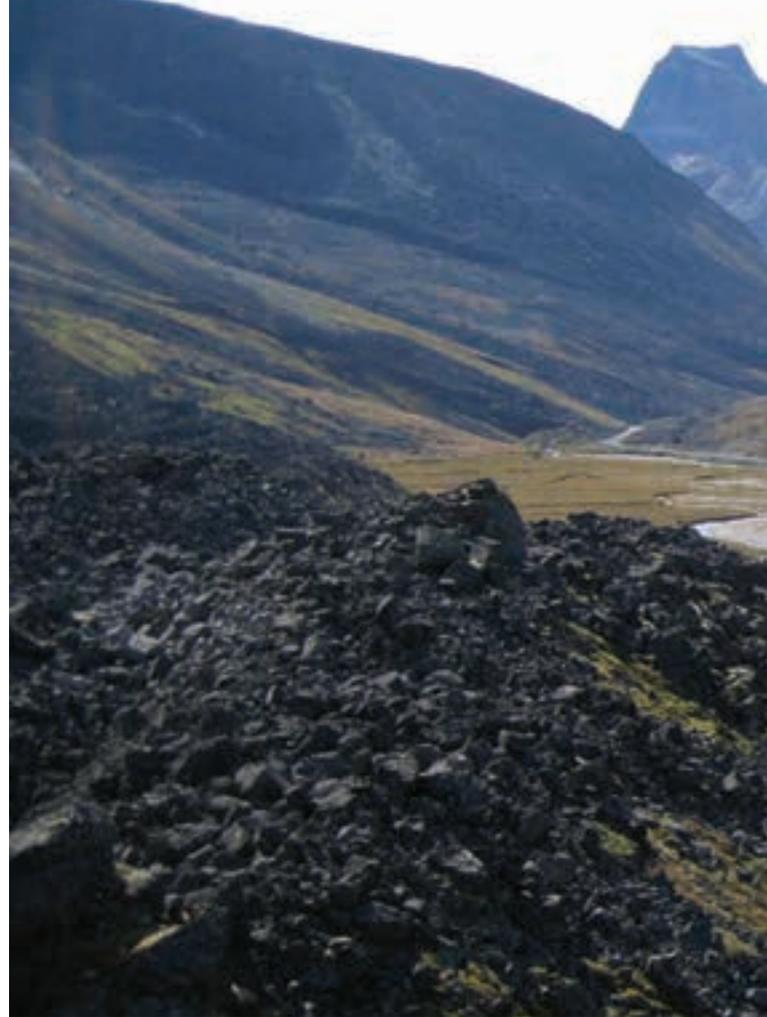
The next ten years will be interesting, and have the potential to change completely the political and social dynamics of Greenland. However the impression that Greenland's appearance on the world minerals stage is an unexpected phenomenon needs to be dispelled says Jørn Skov Nielsen, Deputy Minister at the Ministry of Industry and Mineral Resources: "There has been a gradual build-up in the mineral sector over the last ten years. Over that time the number of licences has increased and a number of small companies are taking them up."

In 1998 when the BMP took over from the Danish authorities, he explains, the minerals industry in Greenland saw a decline in the numbers of licences, and also a decline in general interest in exploring Greenland and its mineral potential. It hit an all-time low in 2002. As a response, the BMP designed a

marketing strategy to promote Greenland's mineral potential based on the experience of the two biggest mining countries in the world: Australia and Canada. In a few years the downward trend was reversed. From 17 exclusive licences in 2002 the number grew to more than 94 in 2011.

Nevertheless, it has proved difficult to secure the necessary investment and commitment to turn prospective areas into producing mines. One of the only mines currently producing in Greenland is gold from the Nalunaq mine owned by the UK based Angel Mining (Gold), and that is reaching the end of its viable life.

The largest, most imminent and most viable project in the country, and one having the scale to make a real difference to the economy, is London Mining's iron ore project at Isua, 150 kilometres to the north of the capital Nuuk. "This is a very big project in Greenland terms, with a capex of around \$2.3 billion," says Nielsen. "If it goes ahead it will have the potential to create 800 jobs, and bring in considerable revenues for the government in terms of taxes, royalties and economic stimulation." Environmental and social impact assessments have been completed as well as a bankable feasibility study for an operation of 15 million tonnes per annum. BMP is currently considering



an impact benefit agreement (IBA) that will outline the impacts of the project and how the community can participate, preparatory to issuing a mining licence.

Though it only has a population of 57,000, Greenland suffers from unemployment like everywhere else. For millennia its chief industry has been fishing, which accounts for 90 percent of its exports. Whatever government is running the country,

“MINING DEVELOPMENT WILL HAVE TO BE SUSTAINABLE AND IN HARMONY WITH FISHING, TOURISM AND OUR NATURAL ENVIRONMENT AND ECOLOGY”



Nalunaq goldmine camp in South Greenland

diversifying the economy has to be a priority, though at the same time it will be essential to protect and preserve the fishing industry and the communities that depend on it. The current administration has no interest in facilitating a runaway bonanza on the back of rising commodity prices. Minerals, and possibly hydrocarbons will play their part in the diversification process but it can only be allowed to happen in a controlled way, says the deputy minister.

Mining development and the inward investment it brings should be encouraged, agrees Dr Henrik Stendal, Head of the Geology Department in the Ministry of Industry and

94

.....

**Exclusive licences
granted in 2011**

Mineral Resources. “It will have to be sustainable and in harmony with fishing, tourism and our natural environment and ecology. That way society will be able to move forward in pace with development.” So the current state is that a number of

projects are on the starting blocks but the gun has not yet been fired – when it is, the race will be a marathon rather than a sprint.

The same thing applies to offshore hydrocarbons. There are currently 20 exclusive and 25 non-exclusive exploration licences, says Stendal, involving major players like Statoil, Exxon, Dong Energy, ConocoPhillips, Shell, Cairn Energy and Maersk Oil as well as the

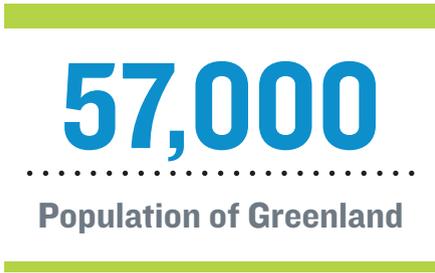
national oil and gas company Nunaoil. “There is also a licensing round off East Greenland - but it is all exploration at this stage. It will take a number of years at best before any production can start. It has been demonstrated that there is a viable hydrocarbon system in Greenlandic waters but we have not found commercial quantities yet,” he adds.

Exploration drilling in 2010 and 2011 was followed by the acquisition of useful quantities of seismic data. The best estimate of the available resources comes from geophysical data provided by the United States Geological Survey (USGS) the ‘mean’ estimate for the area to the

northwest of Greenland was 31 billion barrels and for the northeast 17 billion barrels. Both estimates are for oil and gas combined, measuring the latter in oil-equivalent units.

Onshore, apart from the iron ore project already mentioned, there are two potentially significant mining projects that could be advanced in the near future. One is the rare earth elements (REE) discovery of Kringlerne owned by the Australian Tanbreez

in south Greenland, which also contains significant amounts of zirconium. “They are experimenting with how best to process the ore, but this is one of the largest reserves of heavy



Activities at the former Seqi olivine mine, in operation from 2004 to 2009



Processing of ore at the Seqi olivin mine

“WE ARE A FISHING NATION AND WANT TO KEEP THAT INDUSTRY PROTECTED”

rare earths in the world, another world class resource.” With more than four billion tonnes of this ore in south Greenland, and China’s ability to supply it declining, Greenland’s potential to satisfy at least a quarter of global demand in the future means a lot to European and American industry.

An application for a small gemstone project in the southwest Greenland is going through currently, Stendal adds, but attracting even more interest is an application expected later this year to develop a zinc deposit in the

north. “The company has completed a pre-feasibility study on the deposit, and believes it can be mined commercially,” says Stendal. “It is in a really remote area, but this is a world class deposit. One of the biggest challenges up there is to get the ore out, because of the ice.” This is a difficult but not impossible task, he explains: there is a two month window in the summer when ships can get in to take off the concentrate, though icebreakers will probably have to be used.

The further north you go the more

Drilling at the Maarmorilik
lead – zinc deposit



“WE ARE DETERMINED THAT MINERAL EXPLOITATION WILL HAPPEN IN A CONTROLLED AND RESPONSIBLE WAY”

ice there is, but it's common knowledge that the ice cap on Greenland is receding. That's alarming news for the world, but it is making exploration and mining easier. Henrik Stendal points to the Black Angel mine which yielded very high quality zinc ore till it was mothballed in 1990 because of low world prices and the fact that the ore was nearly exhausted. However, receding ice has revealed a larger surface deposit, so the mine might open again within a few years.

There's considerable upside in these projects, but don't look for a bonanza, says the prudent Jørn Skov Nielsen. Mining companies will usually have to build their own roads and harbours and generate their own power to operate in these remote places. Greenland is as big as Western Australia but it is not as easy to get about. Infrastructure will increase their costs. Then they have to consider environmental protection and rehabilitation costs, he points out. “We are a fishing nation and want to keep that industry protected – our environment has been a priority whatever the colour of the government.” before mining starts enough money must be deposited to cover the cost of returning the site to its original state, he says, including the removal of roads and harbours.

One thing that Greenlanders have been worried about is that a quantity of foreign workers, particularly Chinese, would come in and take all the new jobs. “We do have a challenge to educate our people.” admits Nielsen. But the government has done its bit by setting up the Greenland Mining School in Sisimiut, and the mining companies will be expected to participate in competence building, he stresses. Making sure the population has a strong voice in the future development of the resource sector is assured by following the successful Canadian model where impact and benefit agreements are the norm, he says.

Greenland is a huge land mass, undoubtedly rich in minerals and probably rich in offshore oil and gas. However for the time being it is neither a mining nor an oil economy. “We are getting close to mineral exploitation but oil production will not begin within the first decade, and we are determined that this will happen in a controlled and responsible way,” concludes Jørn Skov Nielsen. “The last thing we want is a free-for all!” **BE**

For more information about
BMP Greenland visit:
www.bmp.gl



BREAKING NEW GROUND

The incredible progress CGRG has made when it comes to identifying regions rich in strategic and precious metals in what is one of the today's most exciting parts of the world for mining

WRITTEN BY: WILL DAYNES
RESEARCH BY: RICHARD HALFHIDE



Based purely on its geological structure alone, Greenland has what the vast majority of industry experts consider to be highly favourable conditions for the development of its own mining sector. Indeed its geographical location between Europe and the United States, combined with the high prices attainable for most of the raw

materials that are present there, partially offset its absence of infrastructure and of sources of energy, and the harsh climatic conditions of the country.

Established by a team of Czech geologists and businessmen in 2011, the Czech Geological Research Group (CGRG) was created specifically to obtain exploration licences in Greenland as a junior exploration



Trail Ø - Central part of Kap Simpson intrusive complex

company, using funding obtained from private sources.

“The founding of the company,” states Managing Director, Petr Dvorský, “was preceded by approximately two years of careful exploration of the potential of this business to succeed. Upon establishing ourselves in 2011 we applied for our first licences in Greenland, which were

subsequently granted, before commencing with our first field studies that same year.”

Today CGRG is tirelessly moving forward with its analysis of Greenland’s geological environment, with its team of geologists working intensively through a number of strategic tasks. These tasks include the re-processing of legacy Aeromag data from the west and south of Greenland that



Milne Land - shallow auger drilling in the area of Mudderbugt

2011

.....
The year that CGRG was established

the company purchased using the latest processing techniques, as well as working alongside the Geological Survey of Denmark and Greenland (GEUS) in preparation for the 2014 season.

“In addition to our existing Kap Perry, Traill and Milne Land licences,” explains Jan Štembera, Vice President of Exploration, “we also applied for two additional licences, Ameralik on the west coast and Igaliku in the south of the country, in early January. Moving forward we aim to begin conducting basic geological surveys on these two new licences during 2014.”

In addition to the work it plans to carry out on Ameralik and Igaliku, the company has also submitted a request to extend its existing Milne Land licence. It is here that CGRG has already uncovered a series of promising geological anomalies that suggest a massive amount of future potential for new rare earth discoveries.

“I think we managed to choose the locations of our licences very successfully,” Dvorský continues, “particularly in terms of their high potential for bearing the commodities that are in our viewfinder and that coincide in many respects with the strategic needs of the majority of European consumers. In this respect we find ourselves



Milne Land - erosional remnants of Jurassic sediments in the area of Charcotgletscher

continuing with the gradual sophisticated expansion of our purposefully established licences, which we see huge potential in.”

Despite the obvious advances the company has made in a relatively short space of time, CGRG has not been immune from the many challenges and risks that Greenland possesses. One of the biggest risks faced by any company looking to operate in

what is essentially uncharted land is the underestimating of the need to have all the necessary logistical provisions in place. Whereas in populated countries a missing part or spare can typically be obtained in a matter of hours or day, in Greenland this becomes weeks. It is for this reason that CGRG works closely with partners like Polog, the Danish logistics company which

“THE CZECH GEOLOGICAL RESEARCH GROUP (CGRG) WAS CREATED SPECIFICALLY TO OBTAIN EXPLORATION LICENCES IN GREENLAND AS A JUNIOR EXPLORATION COMPANY”

**“OUR GREATEST ASSET IS UNDOUBTEDLY
THE QUALITY OF OUR STAFF, WHO, AS LEADING
EXPERTS IN THEIR FIELDS, ESTABLISH THE
BASIS FOR OUR SUCCESS”**



Milne Land - radiometric survey of fossil beach sediments (fossil placers)

is a recognised specialist when it comes to logistics in the high Arctic.

Of course then there are the unique climate conditions that Greenland is known for. “In many of the areas in which we are working, particularly north-west Greenland,” Dvorský says, “it is of huge importance that we ensure the accurate timing of work, whilst at the same time remaining very flexible, because at the end of the day, no matter how perfect the plan, the weather can completely disrupt it. In order to try and combat this we rely on cooperation with Polog and local people, and it is this cooperation that we find the most valuable asset in the fight against inclement

climate. We are presenting an elaborate concept and people knowledgeable about the local conditions are very effectively helping us to realise this concept.”

In CGRG’s home country of the Czech Republic there is a well held understanding that all geological activities should be carried out in the most environmentally conscious fashion. CGRG has transported this philosophy over to Greenland where its geologists are adhering to all the environmental standards and regulations related to geological exploration in Greenland.



Milne Land - waterfall in the area of Vinkeldal

In Dvorský’s eyes this is yet another example of the invaluable efforts made by CGRG’s employees throughout the business. “Our greatest asset is undoubtedly the quality of our staff, who, as leading experts in their fields, establish the basis for our success. It is our steadfast belief that in this line of work nothing can be left to chance or circumvented. We are pleased with the fact that Czech geologists like ours have a worldwide reputation as being the best and we can rely on them completely.”

With the additions of the Ameralik and Igaliku CGRG will hold a total of five

Trail Ø - alteration
zone in the area of
Dreibuchten



properties, a large number for any junior mining company. However, as Štembera goes on to highlight, the potential that these assets possess far outweigh the challenges that arise from having so many assets at one time. “If you look at the map you will see that around Ameralik there is literally nothing for hundreds of kilometres along the coast. That is green pasture, an unexplored area and we have high hopes for that area, as we do for Igaliku. At both we need to do the basic geological sampling, conduct basic field work and analyse samples and that is the plan for next year.”

CGRG believes that it has a valid concept and sufficiently high-quality sources of information to be able to gradually build up a network of exploitable deposits of its raw materials of interest. “We are putting a lot of effort into the success of our programme, starting with the continuous work of our geologists and the obtaining of new data, and concluding by providing support for the development of new technologies applicable to geological surveying,” Dvorský concludes. “We believe that Greenland has the potential to provide our European industry with a certain degree of independence from the often very distant and uncertain suppliers and we are glad that we, as a Czech company, represent a part of this positive process.” **BE**

For more information about
CGRG Ltd visit:
www.cgrg.cz

EXPLORING THE POTENTIAL OF GR

NunaMinerals A/S is the only truly Greenlandic company among the many that have been attracted by the vast potential of one of the world's last remaining frontiers

WRITTEN BY: **JOHN O'HANLON**
RESEARCH BY: **RICHARD HALFHIDE**

MINERAL GREENLAND

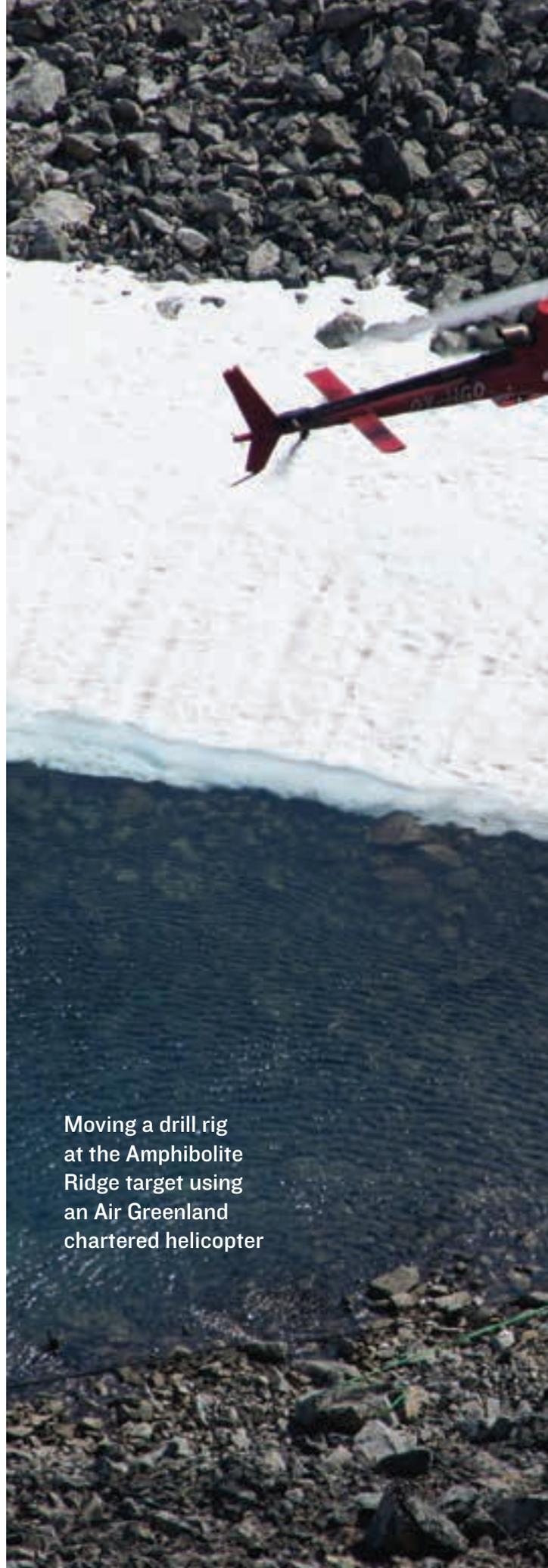
ny
mineral



NunaMinerals is at the forefront of gold exploration in Greenland – and it is a company with a proven record of success. Its CEO, Greenlandic geologist Ole Christiansen was responsible for the discovery and initial development of what remains today the country’s only producing mine, the Nalunaq Goldmine in South Greenland, as well as the Seqi olivine mine near Maniitsoq in West Greenland, currently on ‘care and maintenance’. NunaMinerals is currently working hard to develop the next generation of gold mining prospects. “Our primary focus and internal expertise has always been and will continue to be gold,” says NunaMinerals’ Chief Geologist, Joshua Hughes.

In fact almost all his and the company’s efforts are currently going into fast tracking the company’s Vagar gold discovery, which he says, represents the most significant discovery ever made by NunaMinerals since its inception in 1998. Vagar is located only 25 kilometres from existing mining infrastructure at Nalunaq, and only eight kilometres from an ice-free deep water fjord allowing year round access.

Vagar is an early stage project, which was tested by a limited drilling program at the Amphibolite Ridge target, for the first time in the summer of 2012. Despite the limited campaign, the results were enough to convince Hughes and Christiansen that the project has significant commercial potential (for example 57.4 metres with 1.33 grams per tonne (g/t) gold in the ‘discovery hole’). So this summer will see further drilling as NunaMinerals moves towards its next major



Moving a drill rig at the Amphibolite Ridge target using an Air Greenland chartered helicopter

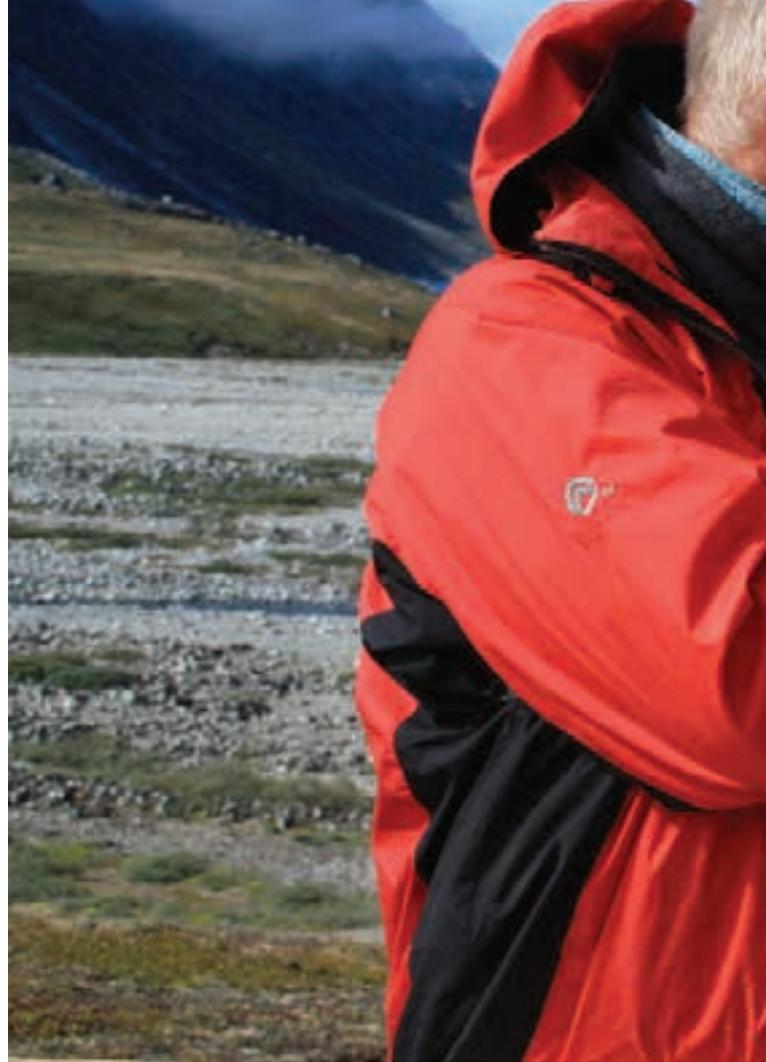
NUNAMINERALS



goal, a listing on the Toronto Stock Exchange (TSX), using Vagar as its ‘qualifying project’.

The company is currently listed on the NASDAQ OMX Copenhagen Stock Exchange, with the Greenland Home Rule Government representing the single largest shareholder, controlling just over 33 percent of the shares. A listing in both Denmark and Canada would give the company exposure to a whole new source of capital. “We are pursuing a listing on the TSX to expose us to a wider base of investors who are more experienced with the mineral exploration industry, as we begin to progress Vagar through to resource definition over the next few years,” says Hughes.

As a company focused on gold NunaMinerals believes it is sitting on a previously unsuspected asset where Vagar is concerned. The gold mineralisation at Vagar displays numerable geological similarities with the highly productive gold deposits of the Tintina Gold Province of Alaska and the Yukon. The company firmly believes Vagar has the potential to host bulk mineable gold deposits of significant proportions. “It is not a single deposit but a whole belt of gold mineralisation stretching over 150 kilometres – the Nanortalik Goldbelt,” explains Hughes. “What is significant is that earlier explorers in South



Greenland had never realised the potential for intrusive igneous rocks to contain gold – their focus has always been limited, targeting gold bearing quartz veins hosted within non-granitic, prominently mafic, packages. The fact we are now finding gold conforming to Intrusion Related Gold Systems (IRGS), a deposit type that has never been previously tested in the region,

“OUR PRIMARY FOCUS AND INTERNAL EXPERTISE HAS ALWAYS BEEN AND WILL CONTINUE TO BE GOLD”



Inspecting drill core from the ‘discovery hole’ at Amphibolite Ridge

opens up huge areas of southern Greenland for gold exploration. In addition to the high-grade quartz veins (up to 1,013 g/t gold at the ‘Amphibolite Ridge’ target), the granitic host rocks themselves are also gold mineralised, offering significant tonnage potential. This marks a paradigm shift in Greenlandic gold exploration and our new approach is already yielding results. As a company we have a first mover advantage, with some of the best licences for gold, covering nearly all of the known gold occurrences in southern Greenland.”

So while Vagar is expected to be

7,500 KM²

**Total licence area held
by the company**

NunaMinerals’ project of potentially ‘company making’ proportions, it has a further very promising gold property at their Storø project within the Archaean Nuuk Fjord Greenstone Belt, conveniently located only 40 kilometres

from the capital. Over 15,000 metres of drilling has already been completed at Storø to date. Of the approximately 7,500 square kilometres of exclusive exploration licences NunaMinerals holds at present, nearly 6,500 are primarily prospective for gold.

NunaMinerals’ strategy is to concentrate on its core gold activities while still participating in other mineral projects by

means of joint ventures. “Previously we have had partnerships with majors including Rio Tinto and Implats. We recently signed a Memorandum of Understanding with Korea Resources Corporation (KORES), a state owned exploration company, and are currently in active discussions with a number of other international parties, which we are confident will lead to the creation of joint venture partnerships on several of our projects within a one to two year window,” states Hughes.

In addition to its gold assets NunaMinerals possesses a varied exploration portfolio incorporating base and specialist metals, as well as diamonds. One such project is

a high-grade rare earth elements (REE) deposit, with associated tantalum and niobium credits, at the Qeqertaasaq carbonatite complex of West Greenland. The simple carbonate mineralogy of the ore from Qeqertaasaq makes it amenable to low cost acid leaching, requiring no pre-concentration or grinding, entirely eliminating a substantial proportion of the projected processing costs. NunaMinerals is actively working alongside the US based company, ‘IntelliMet’ to develop a metallurgical flow sheet for the ore using their revolutionary selective solid phase extraction technology.

The second is at Ymer Ø in East Greenland which hosts high concentrations of antimony,

Ymer Ø, East Greenland



“WE ARE PURSUING A LISTING ON THE TSX TO EXPOSE US TO A WIDER BASE OF INVESTORS”

tungsten and gold. “Ymer Ø has been subject to limited drilling historically, which was successful in revealing exceptionally high-grade tungsten (for example 14.07 percent over seven metres) and antimony (up to 20.89 percent over two metres) mineralisation. We now have several robust, drill-ready targets identified from a recent airborne

geophysical survey, which are supported by geochemistry,” says Hughes.

Then at Inglefield Land, a vast terrain in the high arctic of northwest Greenland, NunaMinerals holds an extensive licence covering more than 5,000 square kilometres. Recently GEUS, the Geological Survey of Denmark and Greenland, has proclaimed





View of the top of the Stendalen layered gabbro intrusion, within NunaMinerals Hugin Licence, South East Greenland

NUNAMINERALS

Inglefield Land as one of the most promising areas in the whole of Greenland for finding new zinc deposits, based upon stream sediment anomalies. Significantly NunaMinerals' licence contains a cluster of the highest stream sediment zinc anomalies in the whole of northern Greenland, which is already known to host major zinc deposits such as Ironbark Zinc's advanced project at Citronen Fjord. "We are conducting grass roots exploration across Inglefield Land, targeting a number of commodities, including copper-gold, nickel-cobalt-gold, and zinc," explains Hughes. "Despite the very early stage that the project is at, the area has already yielded ore-grade samples of both copper-gold and nickel-cobalt-gold mineralisation."

As an indigenous company, NunaMinerals is deeply rooted and well respected within the national and local community. The company is also keen to promote Greenlandic technical staff. "I am very proud of our team. The majority are Greenlandic and are experts in Arctic logistics, which is essential when exploring in the most northerly country in the world. Mineral exploration is a continuous balance between risk and geological prospectivity – we are able to significantly reduce those risks through truly understanding the environments in which we operate and the logistical challenges we need to overcome to reach our goals," concludes Hughes. **BE**

For more information about
NunaMinerals A/S visit:
www.nunaminerals.com

EXPLORING A

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A NEW FRONTIER

Chief Executive Officer, Nicholas Rose, explains how Avannaar Resources' role as a prospect generator is helping to lay the foundations for the future of Greenland's mining sector

WRITTEN BY: **WILL DAYNES**
RESEARCH BY: **RICHARD HALFHIDE**



Winter camp on Disko
Island, West Greenland:
Working in winter on frozen
ground makes many types
of geophysical survey easier





There are a number of motivations for our company to be here in Greenland,” explains Nicholas Rose, Chief Executive Officer of Avanna Resources, “the primary one being the geological map of the country that shows a large variety of geotectonic environments that have high potential for hosting giant ore deposits.”

Hailed as one of the next great frontiers for exploration Greenland possesses a massive geological endowment, with virtually every part of it showing signs of being prospective for some form of mineral or metal. Boasting a stable democracy and well-defined legal and administrative systems, Greenland is also an attractive destination as it currently lacks the level of exploration that other parts of the world with similar geological potential experience at present.

Founded by a group of British and Danish geologists in 2006, Avanna Resources is focused exclusively on Greenland. Based in Copenhagen, Denmark, the company’s strategy is to act as a prospect generator, locating potential targets before conducting preliminary work to make the project attractive for potential joint venture partners.

Avanna’s exploration strategy is based on applying quite stringent minimum criteria to any projects that are being considered at the generative stage. Prospects under consideration must have the potential to develop into very large mining projects based on major industrial commodities that can survive dips in price-cycles. These criteria point to the major infrastructure metals such as copper, nickel and zinc, and eliminate



6000 KM²

The area covered by the Washington
Land zinc licence

minor and specialty metals.

“There are definitely common threads that link our projects,” Rose continues, “the strongest being that we strive to identify targets that can yield big ore deposits with very robust economics.” Beginning its work with a strong geological model in place the company goes into the area in question with the aim of building up good targets that can subsequently be tested by drilling.

On initiating a new project Avannaa spends one to three years of preliminary investigation where the objective is to pinpoint drill targets, well constrained by geophysical surveys, remote sensing and surface geology including geochemical sampling and geological mapping.

“What also links the projects that we choose and generate,” Rose says, “is the way we approach each with a view to making them as interesting as possible to potential partners. What we do is examine the sort of targets these large companies want to explore and ask ourselves what sort of preliminary work do we need to do in order to make the project attractive and encourage partners to get down to the real business at hand, which is actually drilling targets.”

Avannaa currently has four priority projects



Basic prospecting and mapping is an essential activity during the earlier phases of project development

with active work programmes where it is single-mindedly preparing to drill with the next couple of years. At present the company has option and joint venture agreements on two of its projects with Anglo American and Boliden.

Avannaa’s partnership with Anglo American covers its Jameson Land assets, which have potential for sedimentary hosted

copper. The area contains many known copper and other base metal mineralisations found mainly in Permo-Triassic rocks. For its part Anglo American has the option to earn 55 percent interest in Avannaa’s existing exploration licence, as well as any additional properties that the parties choose to jointly explore within an Area of Interest comprising southern and central Jameson Land, and

“HAILED AS ONE OF THE NEXT GREAT FRONTIERS FOR EXPLORATION, GREENLAND POSSESSES A MASSIVE GEOLOGICAL ENDOWMENT”

“AVANNAA CURRENTLY HAS FOUR PRIORITY PROJECTS WITH ACTIVE WORK PROGRAMMES WHERE IT IS SINGLE-MINDEDLY PREPARING TO DRILL WITHIN THE NEXT COUPLE OF YEARS”



Drilling charge holes for a seismic survey in West Greenland where Avannaa is using seismic work in combination with other geophysical methods to constrain buried copper-nickel-PGE targets

wholly outside of the National Park area, by expenditure of \$15 million over a five year period. To date the East Greenland rocks, comprising approximately 2,500 square kilometres within the Area of Interest, remain under-explored.

Boliden on the other hand hold an option to earn 51 percent of the company's Washington Land zinc licence. Prospective for carbonate-hosted zinc deposits, the licence contains a number of potential targets in carbonate platform sediments of the Franklinian Basin that covers much of northern Greenland and Canada, and hosts the historical Polaris mine. The licence area covers more than 6,000 square kilometres and contains several known mineralised zones that form parts of a regional fault system that remains under-explored.

In addition to the aforementioned assets, the company also owns two other projects where it is actively looking for partners and which illustrate its multi-pronged approach to drill targeting by applying several independent techniques. Both projects have an excellent geological basis and are situated close to tidal-water making them highly accessible in the happy outcome of developing to a large mining project.

The first of these is the Disko-Nuussuaq nickel-copper-PGE project. This project



Field camps in the majestic but desolate landscapes of North Greenland

possesses all the elements necessary to provide a giant nickel-copper-PGE province of the Noril'sk type and its geological credentials have been well established by several decades of exploration that has included historical programs by Cominco and Falconbridge.

The second is the company's Kangerluarsuk zinc project, located in a classic geological setting for giant SEDEX type deposits close to a margin between a shallow carbonate dominated platform and a deeper oceanic basin; other examples include the Selwyn Basin in the Yukon and the famous Rammelsberg mine in Northern Germany.

"The projects that we are engaged in," Rose enthuses, "have the potential to help transform the economy of Greenland in ten to 15 years' time. The role of mining companies



The distances and nature of t

“THERE ARE A NUMBER OF ADVANCED PROJECTS AT THE FEASIBILITY STAGE AND PRACTICALLY ALL OF THEM HAVE BEEN KNOWN ABOUT FOR DECADES”

in society is a much discussed point right now worldwide as well as in Greenland. There is a right time for everything and now it is the right time for us to focus on discovery and realise that distraction from that single aim is not beneficial for us or any of our stakeholders including the society within which we operate.”

It goes without saying that everyone within the exploration industry would like to see at least one project in Greenland becoming established as a successful on-going mining operation. While this is a development that is destined to happen sooner rather than later, the critical thing to achieve in the short term is to get as much exploration investment into



The terrain means that many projects are helicopter dependent, on the other hand rock exposure is often excellent

the country as possible, because, as Rose highlights, the real potential for Greenland is still in the ground waiting to be found.

“There are a number of advanced projects that are at the feasibility stage now and practically all of them involve deposits that have been known about for decades,” Rose says. “What is needed now is a second and third wave of really strong projects, which are still at the early post-discovery stage or are still waiting to be found. That is what I believe will really help put Greenland on the map.”

For Avannaq the immediate objective is for the company to consolidate the partnerships it already has in place, while at the same time work on securing an investor or partner for its

Disko-Nuussuaq and Kangerluarsuk projects. “Our aim is to get investment into these two strong projects within the next year so that we can drill them within the next two years,” Rose concludes. This model we have of prospect generation is quite sustainable in that we are always bringing new projects into the pipeline and we will continue to try to build our reputation and make ourselves attractive for future partnerships as Greenland itself develops in the years to come.” **BE**

For more information about
Avannaq Resources visit:
www.avannaq.com



THE PROSPECT OF PARTNERSHIP

21st North develops mineral projects in Greenland, a territory that is today long on interest but short on experience – experience is exactly what this company brings to the party, along with some very advanced technology

WRITTEN BY: **JOHN O'HANLON**
RESEARCH BY: **RICHARD HALFHIDE**



Channel sampling of
Ni-Cu mineralisation
on Ammassalik Island,
Southeast Greenland

It was in 2009 that two senior geologists with the Greenlandic exploration company NunaMinerals decided that there was no question that Greenland was on the verge of transforming from a fisheries-based economy to a major player in key minerals. An exploration company, they reasoned, that really understood the regional geology as well as the most advanced technologies available would be urgently needed.

So Claus Oestergaard and his partner Anders Lie, both based in the ‘mother country’ Denmark decided to set up 21st North to really optimise mineral exploration, whether on its own behalf or for clients. In between the two of them, Oestergaard and Lie had more than 30 years’ experience of working in all parts of Greenland, Oestergaard has also worked directly within GEUS, the Geological Survey of Denmark and Greenland, which has amassed almost all the available historical data on which more specific modern work has to rely.

Lie and Oestergaard were among the first in the exploration business to realise and apply the potential of digital satellite imagery in Greenland, as well as remote sensing capabilities, hand held XRFs and hyperspectral technologies which use different wavelengths to identify alteration features and rock types even before you go into the field. “Remote sensing is helpful because it is something you can do at home from your desk!” says Oestergaard. Applying 21st century techniques to develop resources gave the company its name, and today it has a well-established partnership with the British remote sensing, image processing, GIS



and digital mapping services company HME Partnership.

Getting established was not that easy though, says Oestergaard: “We knew it was a tough place to start, which is why we included several extra legs to stand on, so we offer contract exploration services and consultancy to firms wanting to get involved in Greenland as well as developing our own licences.” However these properties, most of them owned through a subsidiary company Greenland Gold Resources, take up 75 percent of 21st North’s energies. “Our core business is the exploration and development of projects,” he explains.

However it is quite a unique potential partner for anyone wanting to develop

new grassroots exploration projects in under-explored regions of Greenland and Scandinavia. The way forward for this company will be via joint ventures says Oestergaard. “Whether our key projects will be listed at some point or remain private is an open question – but at some point we would welcome partnerships that allow us to conduct exploration projects on a more regional scale, supported by investors, with a focus, probably, on east or south Greenland. There are some really interesting regions in Greenland which require grass roots exploration but further development requires financing.”

21st North’s most advanced project so far is its Akuliaruseq graphite deposit, between



Nickel prospecting in the Ammassalik region. Southeast Greenland

“WE WOULD WELCOME PARTNERSHIPS THAT ALLOW US TO CONDUCT EXPLORATION PROJECTS ON A MORE REGIONAL SCALE, SUPPORTED BY INVESTORS”

the towns of Sisimiut and Aasiaat on the west coast of Greenland and close to the airport at Kangerlussaq. Greenland has a long history of small scale graphite mining, he explains. Knowledge of the Akuliaruseq deposit goes back as far as 1912-1916 where sporadic mining took place. No further work was done until the 1980s, but by 1986 geological and geophysical exploration work

had outlined and test drilled four favourable blocks defining an open-ended indicated resource of 5.34Mt grading 9.5 percent C. Bulk sampling indicated that a significant volume of the deposit consists of large and giant size graphite flakes without impurities, the most important criteria for flake graphite deposits.

The company has recently applied for extension of the property and will conduct a surface exploration programme this year to outline additional resources. In addition, a €1.85 million, 5,000 metre drilling campaign is proposed to establish the depth and extent of the Akuliaruseq deposit as well as further testing the flake size, leading to test mining in order to be certain that this is not just a large scale resource but also one that can be successfully exploited. “Though we are an exploration company and generally not interested in mine building or beneficiation as such, we always have an eye to these matters early on,” he says. Once it has done the preliminary work and taken the project up to feasibility or pre-feasibility stage, the company wants to attract partners who will buy in to the project and take it forward to production. At his point 21st North’s interest will start to dilute or may be sold outright.

Less well known till 21st North came



“LOOKING AT REFLECTIONS FROM DIFFERENT WAVELENGTHS OVER A WIDE SPECTRUM GIVES YOU A GREAT DEAL OF GEOLOGICAL INFORMATION”



Lunch break . Sinarsuk Ti-V project, Southwest Greenland

on the scene was the Ikertoq Prospect, a 151 square kilometre nickel-copper licence in the same general area of Greenland, strategically located 60 kilometres from the international airport in Greenland and eight kilometres from a deep water fjord. In partnership with Northern Shield Resources, a Canadian junior, 21st North will drill up to 2,000 metres this summer at a cost of €1,000,000. It could be a very exciting project. Greenland and Canada were once joined together and for years mining companies

have been searching in Greenland for the continuation of Quebec's Raglan Nickel Belt and the structure that hosts the Voisey's Bay Nickel Deposit. The Ikertoq property could well be it.

Another nickel-copper deposit in the portfolio has already seen some test drilling, and more is to be carried out. Though its principal town Tasiilaq is easily accessible by sea and has daily flights to the west coast and Iceland, the island of Ammassalik off the south east coast of Greenland has seen limited exploration activities and early testing up to 2005 missed the best deposits. Now 21st North has exclusive mineral rights over an 84 square kilometre area that it considers has great potential for copper, nickel and platinum group elements (PGEs). There is



Fly camp set-up within the Ikertoq region prospecting for Ni-Cu

also gold bearing rock in this region.

Titanium and vanadium are among the many metals that are in increasing demand round the world. They are present in a highly accessible surface deposit at Sinarsuk near Fiskenæsset just 125 miles south of the capital Nuuk – there's virtually no overburden at all so once 21st North has completed its validation of the site it should be very attractive to an investor.

Though GEUS has done a huge amount of work, and a sporadic amount of development and exploration has taken place in recent years, there are still many parts of Greenland that have only seen limited exploration activity but where there are a lot of interesting finds to be made, says Oestergaard. "We rely very much on that historic information to decide



“WE KNOW HOW TO OPERATE IN ALL PARTS OF GREENLAND WITH A SURE HAND!”

that any particular area might be interesting to go into and work on, in fact we have done that with most of our projects.”

Remote sensing technologies give excellent results in Greenland.. “Looking at reflections from different wavelengths over a wide spectrum gives you a great deal of geological information. Another wonderful thing about Greenland is that there are no trees and excellent exposure due to the historic

glaciation. You can see a lot of information you can’t in other parts of the world.”

The centre of Greenland, 83 percent of its surface area, is inaccessible because of the ice cover, but its uncovered part is larger than France, he points out. He prefers to work in the southern and central part of the country. Though there are great deposits in the north, he feels that investors are less likely to be captivated by projects that are hard to access



Mobilising camp and fuel by barge in the fjords of West Greenland

from a logistical point of view, and more importantly whose production can only be shipped out for a few months of the year, Below the Arctic Circle, warmed by the Gulf Stream, pierced by numerous deep water fjords, the southern coasts are a miner's dream compared with many parts of the world.

And Greenland is one of the most secure and investment-friendly countries in the world, backed by Denmark though jealous of its independence and always vigilant on behalf of its population and its land and marine ecology. The biggest drawback is the lack of infrastructure, but this can be costed into any venture and may be offset by so many positive features that it becomes less

significant. It does require deposits with good grade and tonnage to be economic, though. "When new companies start to consider Greenland they get anxious, naturally enough. That is why most of them quickly realise they need a local partner," says Claus Oestergaard. "That is where we see ourselves. We give the companies the confidence that their investment is in safe hands. We know how to operate in all parts of Greenland with a sure hand!" **BE**

For more information about
21st North visit:
www.21stnorth.com

THE WORLD'S NEW P

Platina Resources aims to be the first group metals mine in Greenland. C Mosig discusses the reasons why h

WRITTEN BY:
RESEARCH BY: RI

PLATINUM PRESERVE

*First company to establish a platinum
CEO and Managing Director, Robert
is confident this can be achieved*

**WILL DAYNES
RICHARD HALFHIDE**





For many years South Africa has been the repository of the world's platinum group metals (PGM's), with some 80 percent of the globe's total production of metals such as platinum, palladium, osmium, iridium, rhodium, and ruthenium originating from within the Bushveld intrusion, a large layered igneous intrusion within the Earth's crust.

While it remains a fundamentally

important site for mining Bushveld, like all good things, is not quite as exciting as it once was. This is a result of several factors, from the recent labour issues that have affected vast swaths of the South African mining sector to the simple fact that it has become necessary to mine deeper, and at greater expense, here than ever before. With the site slowly becoming less attractive to companies their attention has turned to identifying other



Rock formation showing mineralisation - Skaergaard Project, East Greenland

stable supplies of PGMs. It is here that the country of Greenland displays its significance.

“Greenland is unquestionably Europe’s last frontier for mining exploration,” states CEO and Managing Director, Robert Mosig. “Geologists are becoming increasingly excited by the signs of mineralisation that the country is starting to display. Indeed, Greenland represents a veritable sweet shop of all manner of minerals, from PGMs to

diamond, silver, zinc and uranium.”

Based in Queensland and listed on the Australia Stock Exchange since May 2006 (ASX:PGM), Platina Resources Limited is an international resource company focused on the exploration and development of a global portfolio of precious and specialty metal projects. Away from its home market, where its assets include the Owendale Platinum and Scandium Project and the Munni Munni

Platinum Group Metal (PGM) Project, the company also owns 100 percent of the Skaergaard Gold and Platinum Group Metal (PGM) Project as well as the Miki Fjord exploration licence in Greenland.

Located on the East Coast of the country and covering a total area of 141 square kilometres, the Skaergaard Gold & PGM

Project is Greenland's largest gold resource. "Here," Mosig continues, "we have an Inferred Resource of something in the order of 1.7 million ounces of gold and approximately half a million ounces of platinum and palladium."

Impressive as these figures are, Mosig is keen to highlight that this is just a snapshot of Skaergaard's potential. "When we initially

“THE VAST MAJORITY OF PLATINA’S WORK TODAY IS GEARED SPECIFICALLY TOWARDS BUILDING THE FIRST PGM MINE IN GREENLAND”



Drill Rig on site at Skaergaard Project, East Greenland



Drill Rig operating at Skaergaard Project, East Greenland

looked at the project it was estimated that the Skaergaard intrusion could hold as much as 30 million ounces of palladium in total.” There are a large number of drill holes that Platina has tested that are in fact excluded from the resource at this time. These holes have shown themselves to be in possession of significant quantities of platinum, palladium and gold. What the company is doing now is working diligently to carry out all the necessary QA/QC work to have these holes incorporated into the resource, giving it massively re-evaluated statistics.

**30
MILLION**

.....

**Ounces of palladium
estimated to be within
Skaergaard**

“Once this has been achieved,” Mosig explains, “we intend to work extremely rapidly to develop the Skaergaard project up, very much along the same lines as to how we have nurtured and developed our operations in Australia. We are very keen to be a component of exploration and development in Greenland, and the growth

of this particular project will be vital in achieving that goal.”

It is the company’s hope that this re-evaluation will go a long way to making what would probably be described by many as a modest resources a truly world-class



Drill core from
Skaergaard Project,
East Greenland

“GREENLAND IS, AND WILL CONTINUE TO BE, THE FOCUS OF THE NEXT BOOM IN MINING AND AS SUCH OPERATIONS IT WILL BE A MAJOR FOCAL POINT FOR THE INDUSTRY GOING FORWARD”

asset. What makes Skaergaard “even more deliciously exciting”, as Mosig puts it, is the fact that the project lies just 400 kilometres away from the geo-thermal power rich nation of Iceland. “We believe it is this association between an untapped set of resources and a repository of cheap power that make our Greenland projects so formidable.”

Adjacent to Skaergaard one will find the Miki Fjord licence. Covering a 1,255 square kilometre area of the East Greenland Igneous province, the area is broken up into two significant regions, the Kangerlussuaq Complex and the Miki Fjord Dyke.

The Kangerlussuaq Complex is a 1,000 square kilometre circular target, prospective for precious, base and rare earth metals. The Miki Fjord Dyke meanwhile is a steeply dipping linear dyke that begins only two kilometres from Skaergaard and extends for more than 55 kilometres varying in width from 20 to 600 metres, and is believed to be highly prospective for gold and base metals.

The vast majority of Platina’s work today is geared specifically towards building the first PGM mine in Greenland. In working to reach this goal the company has been extremely grateful for the support it has received from the Bureau of Minerals of Petroleum (BMP). “From our perspective,” Mosig says, “it has

been very refreshing to experience BMP’s appropriate and tolerant view of supporting exploration, whilst at the same time maintain the pristine nature of Greenland’s environment. This is certainly an approach that we believe should be adopted in other parts of the world.”

Mosig readily admits that in many ways he and his company have been blessed by being present in the midst of Australia’s mining boom. Indeed it is the experiences he has had during this time that makes him even more excited about Greenland’s immediate and long-term future.

“Greenland is, and will continue to be, the focus of the next boom in mining,” Mosig concludes, “and as such operations it will be a major focal point for the industry going forward. Unquestionably there are going to be dramatic new discoveries here and that many exciting things are poised to happen in the coming months. We at Platina are delighted to be playing its part in this next era of mining and we are very keen to continue our work here for many years to come.” **BE**

For more information about
Platina Resources visit:
www.platinaresources.com.au



THE MINER WITH THE MOSTEST

The Tanbreez project in Greenland has the potential to disrupt the world market in a group of minerals that's making a political as well as a financial impact

WRITTEN BY: **JOHN O'HANLON**
RESEARCH BY: **RICHARD HALFHIDE**



Aerial view of plant site



TANBREEZ

Tanbreez, though this does need explaining to the uninitiated, does just what it says on the tin. The name is a contraction of two close associates on the periodic table Tantalum (TA) and Niobium (Nb), their cousins the rare earth elements (REE), while the final Z stands for their elusive though incorruptible uncle Zirconium. All of these are sought after as new uses are found for them in, among other things, electronics, alloys, mobile devices, car exhausts and green power generation applications.

Currently China holds a near-monopoly over world REE supplies and controls around 95 percent of mined production and refining. But these elements are vital in both civilian and military technologies. By restricting exports and driving up prices China can effectively force companies to manufacture devices that need to incorporate rare earths in its own factories. But Greenland has 58 percent of the world's REE outside of China and 65 percent of the 'heavy' rare earths, which are in shorter supply.

Tanbreez, a private company in the blessed position of being able to fund its project without recourse to stock markets, is sitting on what is probably the world's largest resource of these minerals outside of China itself. It is a very exciting project, explains the company's founder and CEO Greg Barnes. He is a geologist who has studied Greenland's minerals for many years and has been involved with both London Mining, which is planning to exploit large iron ore deposits in southern Greenland, and Greenland Minerals which



holds a licence to the north of the Tanbreez property containing a variety of minerals but principally uranium.

Greg's enthusiasm for Greenland is very infectious, if understandably partisan. He believes the country's resources have been woefully and inexplicably overlooked over the years and he has little sympathy for the few Canadian exploration companies that

have started projects in the past and then let them fizzle out. It has taken the Australians to galvanise the scene, he says, including his own Perth based company Rimbali, which since 2001 has pioneered exploration on the current Kringlerne deposit. Three Australian companies, Tanbreez, Greenland Minerals and Ironbark, which has zinc interests in northern and eastern Greenland, own

**“TANBREEZ IS MUCH MORE ACCESSIBLE
THAN A LOT OF THE COMPARABLE
PROJECTS IN CANADA”**



The camp in June 2010 and an Air Greenland chartered helicopter

the projects most likely to come into early production, he points out.

Rimbal's processing tests resulted in high values of zirconium, niobium, lithium, yttrium, rubidium, beryllium, strontium and a variety of rare earth metals distributed over several locations in the decade from 2001, he says. Up to 2012, Tanbreez spent more than \$40 million on developing the asset and then submitted a definitive feasibility study to the Greenlandic government, which must have been impressed to receive the 19-volume submission weighing in at 33 kilogrammes.

The study carried out by Danish engineers

58%

.....
Greenland's share of REE resources outside China

MT Højgaard (MTH) is based on the annual treatment of 500,000 tonnes of ore to produce 100,000 tonnes of eudialyte concentrate and 200,000 tonnes of feldspar. MTH's plant design allows for future treatment rates of up to 1.5 million tonnes

per annum. The open pit mining project will include roads, a processing plant, accommodation for the workforce, a tailings deposit and a port facility, which will include a helipad. Though he can get to the project from his base in Perth Western Australia within a day, the last part of the journey has to be accomplished by helicopter.

Now Barnes and his team, which includes his right-hand man Hank Schönwandt a former Deputy Minister in the Greenlandic Ministry for Industry and Minerals, are ready to start construction of a mine on its licence lining the southern half of the Ilimaussaq peninsula in south-west Greenland. There are, at a conservative estimate, 4.3 billion tonnes of ore contained within the licence area, so the mine life can be calculated in

generations rather than the more usual decades. Little wonder then that last year he hosted a visit to the site by no fewer than three prime ministers. Work can begin as soon as the Bureau of Minerals and Petroleum (BMP) approves the application for an exploitation licence.

The minerals of interest are principally contained in a red coloured ore called eudialyte, associated with white feldspar

“GREENLAND AND WESTERN AUSTRALIA
ARE APPROXIMATELY THE SAME SIZE AND
WITH VERY SIMILAR GEOLOGY”



Prime Ministers visit the Tanbreez site 2012



Greg Barnes briefing the Prime Ministers on the site 2012

and black arfvedsonite, a mineral found in few other places on earth. Feldspar and arfvedsonite are commercial but low cost minerals, Eudialyte is another matter. The Greek prefix eu- always signals something nice – in this case the name means easy to dissolve. That’s a key attribute of the ore he is planning to mine, says Barnes: “If you have to use powerful acids to extract the chemicals you want, your capex goes through the roof. But we will need only weak acids which means we can process the ore very cheaply.” In fact, he says, the process is almost chemical-free, consisting of a crushing plant followed by a magnetic separator that works because the minerals have different levels of magnetic attraction. Thus the proposed

processing plant will produce concentrates of feldspar and eudialyte for shipment to destinations around the world.

As is the case throughout Greenland, there is not much in the way of infrastructure at Ilimaussaq, though Tanbreez will not have to invest too much in the way of providing what it needs. “In fact it is much more accessible than a lot of the comparable projects in Canada,” he claims. “A hydro-electric line runs close to the ore body so we will be able to get all the power we need. All the labour we are likely to want is available locally and there is no lack of water.” Access by sea will be straightforward, as the fjord that runs beside the outcrop is steeply shelved and deep, and though the lack of roads may be a problem

Main ore body
looking from the west





TANBREEZ

the project is after all only 25 kilometres from Greenland's major southern international airport at Narsarsuaq and about the same distance from the town of Qaqortoq.

In general, mining companies are obliged to factor in the cost of roads, harbours and services to their projects in Greenland, so in many ways the south is the place to be. "We are on what they call the banana coast," jokes Greg Barnes, "the warmest part of the country right in the south. We are on a natural harbour, and it is ice-free all the year round." This, he says, is thanks to the effect of the Gulf Stream. Another big bonus, certainly over any Canadian operations – and Canada is only 150 miles from north western Greenland at its closest point – is the lack of mosquitoes in this part of the country.

The exploitation licence should come through in the next few months. Once that happens, Tanbreez can move ahead to construction, which could be completed in 2014, with first production the following year. "Greenland and Western Australia are approximately the same size and with very similar geology," Greg Barnes points out, "yet Western Australia's mining industry earns in excess of \$100 billion and Greenland's mining industry earns virtually nothing at present." Where Australia is placed to supply China, it could be argued Greenland is just as well placed to supply Europe and America, so watch this rather large space. **BE**

For more information about
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SPECIAL REPORT



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