

## GREENLAND

*By Bureau of Minerals and Petroleum (BMP) & Geological Survey of Denmark and Greenland (GEUS)*

In the past few years, mineral activity in Greenland has stabilised and at the end of 2003, there were 19 exploration licences. The total area covered by exclusive licences was 5,714 km<sup>2</sup>, and the total amount committed for exploration was DKK31.8 million. Between 2001 and 2002 exploration spending decreased by DKK91 million. This was due to the fact that the Nalunaq gold mine project moved from the exploration stage to the development phase. An exploitation licence was granted in 2003.

The mine, at Kirkespirdalen in south Greenland, will be Greenland's first gold mine, and on December 28, 2003, Nalunaq Gold Mine A/S began loading high-grade stockpiled ore on to the bulk carrier MV Lake Erie at the Nalunaq port site. Approximately 31,000 t were shipped to Rio Narcea Gold Mines in northern Spain for processing and gold recovery. It is expected that mining and shipment of ore will start in the second quarter of 2004. The total annual volume to be shipped is estimated at 150,000-160,000 t, with an expected annual gold production of approximately 130,000 oz. Since 1998, work at Nalunaq has included 15,000 m diamond drilling and 3,750 m of underground development, of which 2,750 m are in the mineralised structure. There are four adits to date at levels 300, 350, 400 and 450 m above sea level. In 2002, an independent resource calculation by SRK Consulting gave a measured and indicated gold resource of 483,900 t averaging 25.5 g/t Au, representing 396,600 oz of gold. In addition, there is an inferred resource of 281,300 tonnes averaging 20.3 g/t. Nalunaq is a joint venture between the Greenland company, NunaMinerals A/S (18%) and the Canadian company, Crew Development Corp (82%).

Diamond exploration was resumed in 2001 in several areas in west Greenland where known kimberlite occurrences were reinvestigated. The growing interest in diamond exploration resulted in new applications being sought for exploration licences. Navigator Exploration Corp and Hudson Resources Inc conducted investigations in 2003 in the West Greenland kimberlite province, and Hudson Resources recovered 20 micro diamonds from three samples during its field programme. Results from a calculation of the geothermal gradient showed that the geothermal setting within the region at Kangerlussuaq is equivalent to that of the prolific Lac de Gras area in Canada's north, host to the Ekati and Diavik mines. During the 2003 field season, Navigator's geologists confirmed the presence of additional occurrences of ultramafic breccia, including a boulder showing encircling a second small lake. The ultramafic breccias are being investigated for potential kimberlitic affinities. Final results of this work are not anticipated until early 2004, but initial chemistry from indicator minerals recovered to date is consistent with derivation from a potentially diamondiferous source body.

BMP, in collaboration with GEUS, carried out bulk-sampling tests at three kimberlitic dyke localities within the area. The test resulted in 128 micro diamonds as reported in March 2004.

NunaMinerals A/S has continued a data evaluation from its licence area in Southwest Greenland near the capital, Nuuk, and has signed a Letter of Intent with Greenland Resources A/S to form a Joint Venture to explore the Storø Gold project covering 222 km<sup>2</sup>, 40 km east of Nuuk. Greenland Resources intends to spend up to DKK12 million (US\$2 million) on future exploration. The Storø Gold project has been shown to be part of a gold province with gold occurrences located along a 150 km trend. Detailed channel sampling returned somewhat low-grade gold mineralisation with values up to 2.4 g/t Au over 1 m. However, grab and local float samples returned up to 17 g/t Au, indicating that higher-grade gold mineralisation might be present. Field activities including geophysics and diamond drilling are planned for 2004.

Continued exploration for Ni-Cu-PGM was carried out in the Palaeogene terrains in west Greenland around Disko Island, and in east Greenland around the Skaergaard intrusion. At the latter locality the operating company, Skaergaard Minerals Corp, after a review of previous data, estimates that the resource could amount to 1,800 Mt, with recoverable values of gold, palladium, platinum, titanium and vanadium. The company conducted surface sampling, including three bulk samples for metallurgical test work, and completed a shallow drill hole. A preliminary metallurgical flow sheet for the recovery of metals in saleable concentrates has been developed. A 6,000 m infill drilling programme is planned for the 2004 field season in order to provide data for renewed resource calculations.

In the Disko area, Vismand Exploration Inc completed three geophysical ('Titan 24') transects on its exploration licence during the summer of 2003. The exploration target is a Noril'sk style Ni-Cu-PGM deposit that could be associated with sills and feeder dykes to overlying picritic and tholeiitic flows of the West Greenland Flood Basalt province. Initial results show an extensive geophysical anomaly at a depth of 1-1.5 km.

In East Greenland, Gem Fields International has an exploration licence covering 549 km<sup>2</sup> on Ammassalik Island. The licence is centred on a Ni-Cu-PGM-Au showing hosted by serpentinised ultramafics of potentially komatiitic affinity. The mineralisation was located by tracing nickel-bearing massive sulphide boulders in scree for over 9 km along strike. Similarly mineralised boulders have been found, extending for 4 km across strike, indicative of a second mineralised horizon. Systematic channel sampling of 52 m yielded an average of 1% Ni, 0.3% Cu, 0.012 g/t Pt, 0.239 g/t Pd and 0.15 g/t Au.

Diamond Fields International has an agreement to acquire an 80% interest in the nickel project on Ammassalik Island.

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A known resource of olivine in the Seqi dunite deposit near Nuuk was reinvestigated and drilled in 2003. Crew Development Corp, together with LKAB of Sweden, extracted a 50-t bulk sample for detailed pelletising test work. Crew is compiling a feasibility study, which is expected to be submitted in the first half of 2004. The deposit could supply about 1.0 Mt/y from an open-pit operation.

The airborne hyperspectral survey carried out in 2002 in central west Greenland by GEUS under a contract with BMP has now been reported and the data released. The survey operations were primarily directed towards the kimberlite province in the area close to the international airport at Kangerlussuaq.

### Mineral exploration in Greenland

	1999	2000	2001	2002	2003
Prospecting licences	14	15	6	6	11
Exploration licences	26	24	19	17	19
Exploitation licences	-	-	-	-	1
Area under exploration licences (km <sup>2</sup> )	11.46	11.29	10.26	5.96	5.71
Exploration commitments (DKK million)	31.4	27.6	40.5	25.8	31.8
Exploration expenses (DKK)	46.9	103.4	111.8	20.8	-