

GREENLAND MINEX News

GREENLAND MINERAL EXPLORATION NEWSLETTER

STOP PRESS
New discovery, page 9

Greenland MINEX News No. 3

July 1993

Why Greenland ? - II

an administrative view

The last issue of MINEX posed this question from a geological point of view. This time we deal with some other factors conducive to investment.

- **First of all**, Greenland with its long relationship with Denmark, provides a stable political, administrative and business environment. Political extremes and coupled risks, part of everyday life in some countries, are virtually non-existent. Stability is the key word.

- **Secondly**, investments by mining and oil companies are very welcome and there are no restrictions on foreign ownership. This openness is based on a strong determination by the political authorities in Greenland and Denmark.

- **Thirdly**, modern mining legislation is in place represented by the Mineral Resources Act from 1991. This provides favourable, competitive and clear mineral licence terms. The administrative procedures are fairly simple and flexible. They are based on a one-door approach; all communications relating to the licences are directed to one office – The Mineral Resources Administration for Greenland (MRA). Taxwise, terms are favourable. The corporate tax rate is 35 % and depreciation on investments may be carried out as quickly as the licensee wishes. There are no royalties on production.

- Why Greenland ? - II Page 1

**Geological & exploration
briefs** Page 2

- Gold, geochemistry, aeromagnetism
- Kimberlite – diamond research
- Regional geochemical mapping
- Commercial exploration 1993
- Drilling programmes in 1993
- GGU's Report of Activities

**Regulatory & licensing
information** Page 7

- Exploration licences

- **Fourthly**, there is no private ownership of land in Greenland. Thus, "land claim" issues by minority groups are unknown. Greenlanders are the indigenous people and the Home Rule System as such, including the Mineral Resources System, reflects Greenland's rights within the Kingdom of Denmark.

- **Fifthly**, much of Greenland's ice-free land has close access to the sea; a major benefit for mining operations.

- **Finally**, large tracts of land remain open to mineral entry. Only about 3 % of the 385 000 km² ice-free land available for exploration is covered by exclusive licences.

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Geological & exploration briefs

Gold, geochemistry, aeromagnetics

key words in four released reports

GGU has released four reports in 1993 in the Open File Series that deal with gold exploration, geochemical mapping and aeromagnetic surveying.

- **Open File Series 93/1** concerns the geochemical mapping of about 19 800 km² in the western part of the Proterozoic Nagssugtoqidian mobile belt in West Greenland. The mapping is based on stream sediment and water collected at a density of 1 sample per c. 20 km². The distribution of high values of Au, As, Cu, Pb, Zn and Ni seems indicative of mineralisation within supracrustal sequences affected by Proterozoic shear zones. Geochemical provinces recognised in many of the element distribution maps may be related to lithotectonic units with intrusions of shonkinitic, lamprophyric or kimberlitic dykes.

Reconnaissance geochemical mapping of map sheets 67 V.1 and 68 V.1 (66° to 68°N, 51°40' to 54°W), West Greenland by A. Steenfelt, E. Dam & J.P. Nielsen, 1993. 66 pp., incl. 47 figs, 5 tables. **Price: DKK 75.00**

- **Open File Series 93/2** presents a high resolution aeromagnetic survey flown south of Disko Bugt within the Proterozoic Nagssugtoqidian mobile belt of central West Greenland. The survey comprises 10 062 line kilometres covering approximately 8 425 km². A qualitative discussion relates the data to the Nagssugtoqidian geology of the area. It is also demonstrated that other geological events can be seen in the data, e.g., possible deep-seated intrusions and reversely magnetized dykes and sills.

Project AEROMAG-92: a new high resolution aeromagnetic survey of the Lersletten area, central West Greenland (68°15' to 68°55'N, 50°25' to 53°35'W) by L. Thorning, 1993. 34 pp., incl. 9 figs. **Price: DKK 86.00**

- **Open File Series 93/3** summarizes all released commercial information concerning gold exploration on the 'Nanortalik peninsula' of South Greenland. It reports the role of geochemical sampling (stream sediment, soil and talus) in the recent discovery of gold-bearing quartz veins. One vein, 800 m long locally contains up to 235.3 ppm gold over a width of 1 m and an average grade of 51.45 ppm over 46 cm. There seems to be a positive correlation between scheelite and gold, a feature which should facilitate further exploration for gold in the area.

Gold exploration on the 'Nanortalik peninsula', South Greenland by P.W.U. Appel, M. Lind & J.P. Nielsen, 1993. 66 pp., incl. 25 figs, 10 tables. **Price: DKK 70.00**

- **Open File Series 93/4** presents analyses of 1400 stream sediment samples from an area in North-East Greenland showing an elevated background and anomalies of the gold pathfinder elements As and Sb as well as a number of Au and W anomalies. The distribution of the anomalous samples suggests the occurrence of a Sb-W-Au mineralisation associated with a major late- to post-Caledonian fault zone in northern Hudson Land, and placer type auriferous mineralisation in the Devonian Basin in western Hudson Land.

Stream sediment geochemical evidence for gold mineralisation in Hudson Land (73°10' to 74°25'N, 21°30' to 24°45'W), North-East Greenland by A. Steenfelt, 1993. 25 pp., incl. 12 figs, 3 tables + 4 maps.

Price: DKK 165.00

Kimberlite - diamond research

new exploration and laboratory results

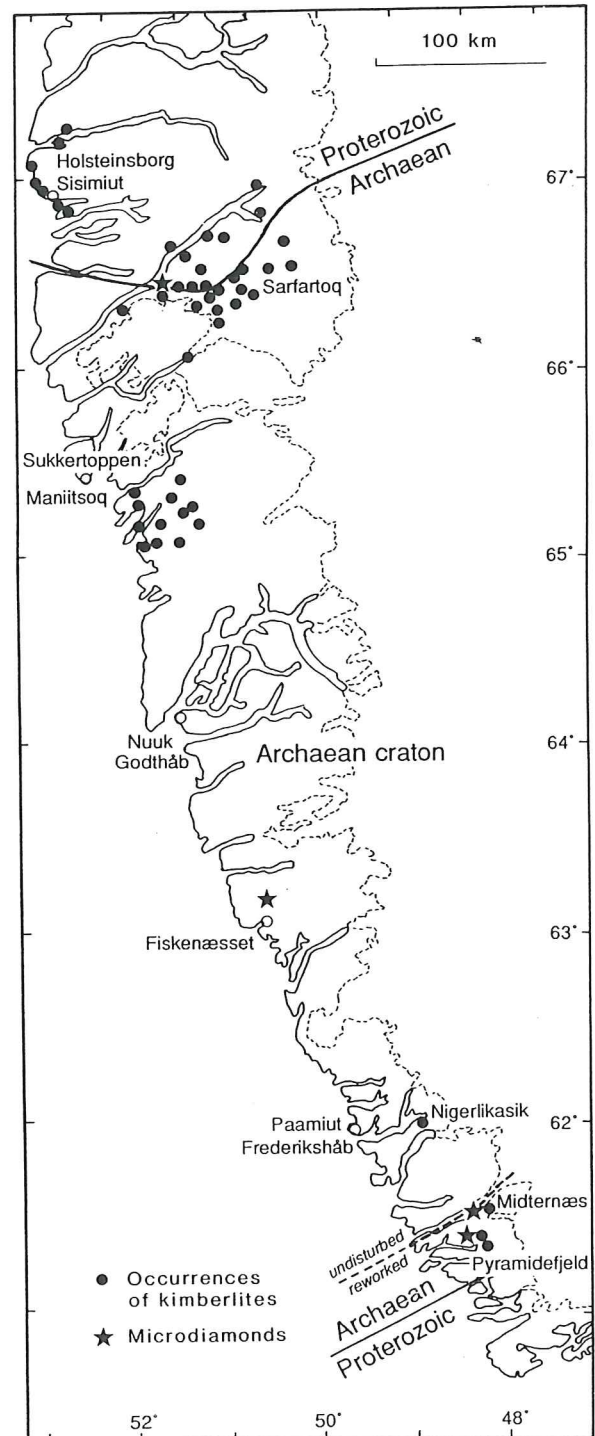
A direct result of the diamond exploration boom in North America is the continuing interest shown in the kimberlite province of West Greenland. Stretching for 1300 km north-south between latitudes 60°N and 72°N, the province is characterised by dykes, sheets and local diatremes of kimberlite, lamproite and ultramafic lamprophyres. The majority of the 500 or so documented occurrences are concentrated in the southern half of the belt within the Archaean block (see map).

Brief mention is made here to one field programme for 1993 and to new experimental work on P-T conditions of Greenland kimberlites that are of direct relevance to their diamond potential.

New kimberlite project

A helicopter-supported, pilot project on kimberlite exploration will be carried out by GGU in July and August in the region between Søndre Strømfjord and Nuuk. The main aim of the work is to investigate the dispersion patterns of kimberlite indicator minerals as shown in streams draining known kimberlite occurrences. The work will be centered on the two main concentrations of kimberlites in the northern part of the Archaean block, viz., around Sarfartoq and east of Maniitsoq.

Most of the kimberlites in the project area occur as dykes that can be traced for several kilometres. Local diatremes up to 40 m in diameter are reported. Pyrope garnet, chrome diopside and picroilmenite are the main indicator minerals presently known from heavy mineral concentrates of bulk stream sediment samples. The ultimate economic



prize – the gemstone, diamond – is as yet elusive, but encouragement in the project area comes from the discovery of microdiamonds from stream-sediment samples west of Sarfartoq.

Diamond stability field

Conditions of origin of kimberlites and associated rocks are of utmost importance for assessment of diamond potential. Recent thermometry and barometry work carried out in Copenhagen shows that the West Greenland kimberlites originated within the diamond stability field.

Garnet macrocrysts in a kimberlite from the Maniitsoq area and minerals in a garnet

lherzolite nodule from Sarfartoq have been analysed by electron microprobe. The temperature calculated for the macrocrysts is 1310°C; those for the nodule lie in the range 1110–1140°C with pressures estimated at greater than 50 kbar. Recalculated temperatures from existing data from kimberlites farther south at Nigerlikasik and also within the Proterozoic terrain to the north in the Sisimiut area, fall in the range 1030–1080°C (40–50 kbar). These temperature variations may reflect the different settings in Archaean and Proterozoic terrains.

Further reading

Conditions of origin of kimberlites in West Greenland: new evidence from Sarfartoq and Sukkertoppen regions by L.M. Larsen & J. Rønsbo, 1993. *Rapp. Grønlands geol. Unders.* 159, 115-120.

Regional geochemical mapping

completion of West Greenland coverage

The reconnaissance geochemical mapping programme (RGMP), started by GGU in the late 70's, is aimed at providing systematic regional coverage of the ice-free areas of Greenland. It is based on stream sediment and water sampled at a density of one sample per 20–30 km². The results are published as element distribution maps (dot plots) at 1 : 1 000 000 in Open File reports (For latest maps, see abstract of report 93/1 on page 2 above). At present, the programme has covered about half of the ice-free land of Greenland.

The 1993 field work will be devoted to the completion of the coverage of the large Precambrian shield region between Kap Farvel (60°N) and Ummannaq (70°30'N) in West Greenland, with sampling in three main areas. The completed data set will then form the basis for the compilation of maps that will be released in the GGU Thematic Map Series.



Commercial exploration 1993

spanning 13 degrees of latitude

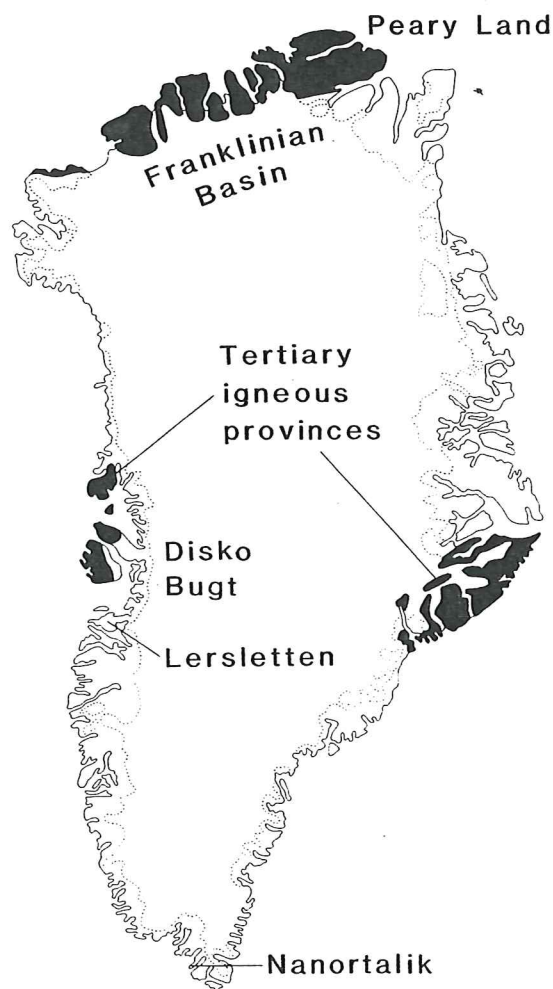
Commercial mineral exploration this year stretches through all latitudes of Greenland from the island's southern tip around Nanortalik (60°N) to the farthest north in Peary Land (north of 83°N). As usual field investigations will be concentrated in the months June to September but this year, two Greenland-based companies, Platinova and Nunaoil, in an attempt to prolong the season, started activities in early May using snow scooters. Platinova is operating in Peary Land; Nunaoil in Lersletten, south of Disko Bugt in West Greenland.

Drilling activities will reach a peak this year (see next article); in addition geological reconnaissance and mapping, geochemical sampling and geophysical work will be carried out by a handful of companies. Much of the exploration will concern the Precambrian Shield of West Greenland, but the basic magmatism of the Tertiary provinces on both west and east sides of Greenland, as well as the Palaeozoic rocks of the Franklinian Basin in North Greenland, continue to be in focus.

In the south, Nunaoil's Nalunaq gold discovery last year near Nanortalik, and new geochemical anomalies published by GGU, have caused a flourish of activity in the region. Main targets are in the Proterozoic supracrustal sequences. Apart from the drilling programme by Cyprus Greenland Corporation (see later), Nunaoil with its other partner in the region, Atlas Corporation, will expand gold exploration to other areas on the south-west coast. On the other side of Greenland on the south-east coast, Quadrant Resources Pty. Ltd. will explore similar supracrustal rocks for gold and base metals, as well as for gold and platinum in a Tertiary gabbro complex.

At the northern end of Greenland Platinova is once again exploring the region where the folded and mineralised Palaeozoic

metasediments mapped during GGU's campaign 1978-80, lure attention, but still await systematic investigation from an economic point of view. The field work is focused on zinc, copper and lead, and is a follow-up to last season's effort farther west in the 600 km long North Greenland fold belt.



Further reading

Reconnaissance geochemical mapping of eastern South Greenland (60°30' to 62°30'N) by A. Steenfelt, E. Dam & P. Erfurt, 1992. *Open File Ser. Grønlands geol. Unders. 92/10*, 15 pp., 49 figs. Available from GGU. Price DKK 68.00.

Drilling programmes in 1993

a burst of activity

1993 marks a notable burst of activity in hard rock drilling for minerals. For the first time in many years, drilling rigs will be operating during three major programmes. Not since the 70's has such widespread drilling activity been seen in Greenland. The total goal is 8 to 10 km of core from three regions of the west coast. From south to north these regions are Nalunaq, Sermiligaarsuk and Disko.

At **Nalunaq**, near Nanortalik, Cyprus Greenland Corporation will operate a 2-rig drilling programme amounting to 15 holes with at least 4 km, possibly 6 km, of core. The target is gold-bearing quartz veins hosted in Proterozoic mafic supracrustal rocks.

At **Sermiligaarsuk**, Nunaoil A/S plans to obtain 1.5 - 2 km of core from 10 holes at two localities in the Archaean metavolcanics of the Tartoq Group. The target is gold and base metals.

On the island of **Disko**, based on three geophysical anomalies, Falconbridge Greenland A/S will be operating a drill programme at three localities aimed at 2 km of core from 10 holes. The target is shallow Tertiary intrusives that may host mineralisations of Norilsk type: Ni, Cu and PGM.

The drilling in all three regions will be carried out by Canadian firms.



GGU's Report of Activities

available June 1993

Each year, a summary in English of the main geological work carried out by GGU is provided by "Report of Activities". This covers field work in Greenland, compilation and assessment of data in Copenhagen, as well as reporting on other work areas, scientific, practical and administrative, such as for example, the data and advisory services to the mining and petroleum industries.

"Report of Activities, 1992", (75 pages) available now in June, contains 16 articles that touch on a wide range of topics, including geological mapping, mineral exploration potential, basin analysis, hydropower potential, ocean drilling programme, petroleum-geological activities and glacier research. It appears in GGU Report 159 together with 7 short scientific papers.

Regulatory & licensing information

Exploration licences

status June 1993

As of late June, 12 626 km² are covered by 24 exclusive mineral exploration licences; see list below and map on next page. This contrasts with 10 029 km² under 22 exclusive licences in 1992.

In terms of companies involved, all but two (Pasmauco Australia Ltd., and Coffs Harbour Rutile N.L.) that explored last year have retained exploration licences. Taking up exclusive licences in Greenland for the first time are the U.S. based companies, Cyprus Greenland Corporation and Atlas Corporation, the Australian company Quadrant Resources Pty. Ltd. and Cominco Resources International Ltd. of Canada. (Another newcomer is BHP Minerals International Exploration Inc., but with non-exclusive prospecting licences in East and West Greenland).

Eight of the exploration licences that are in force (or are in the process of being granted), involve joint ventures; only the operator is named in the attached list.

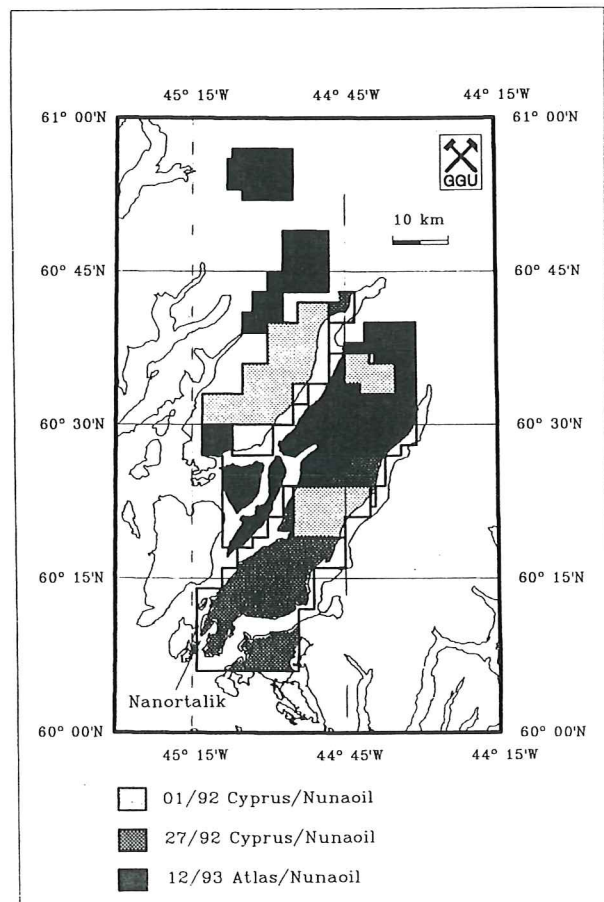
Three of the new licences, 07/93, 11/93 and 16/93 are special 3-year exploration licences for large areas in North and East Greenland with reduced exploration commitments per km². This type of licence was introduced in 1992.

**exploration licences
in south-west Greenland**

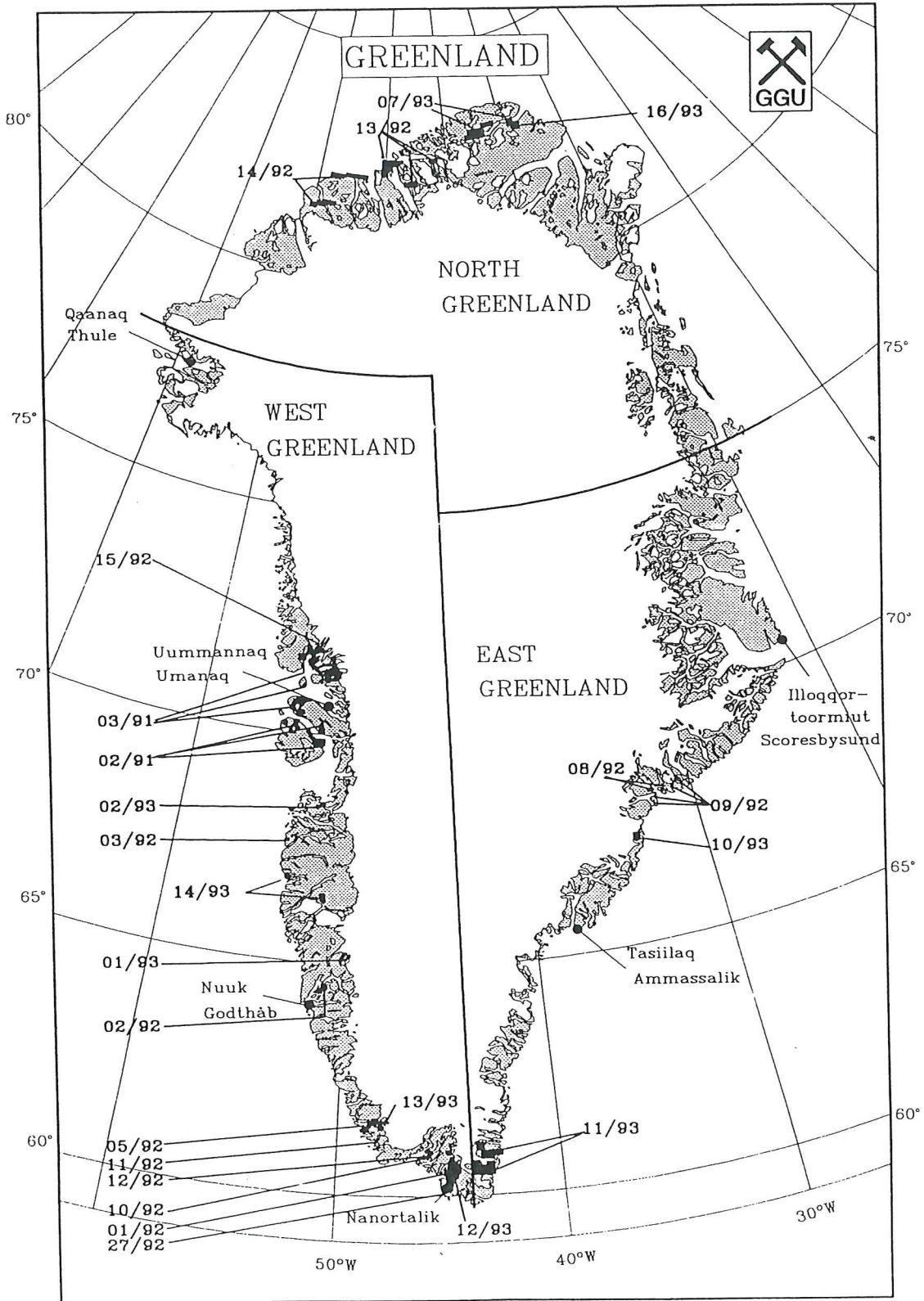
Licences

Area

02/91: Falconbridge Greenland A/S	1075 km ²
03/91: Falconbridge Greenland A/S	1153 km ²
01/92: Cyprus Greenland Corporation	376 km ²
02/92: Nunaoil A/S	181 km ²
03/92: Nunaoil A/S	21 km ²
05/92: Nunaoil A/S	324 km ²
08/92: Platinova A/S	44 km ²
09/92: Platinova A/S	85 km ²
10/92: Highwood Resources Ltd.	45 km ²
11/92: Municipality of Ivittuut	5 km ²
12/92: Mineral Development International A/S	58 km ²
13/92: Platinova A/S	616 km ²
14/92: Platinova A/S	905 km ²
15/92: RTZ Mining and Exploration Ltd.	1489 km ²
27/92: Cyprus Greenland Corporation	368 km ²
01/93: Nunaoil A/S	178 km ²
02/93: Nunaoil A/S	123 km ²
07/93: Nunaoil A/S	1340 km ²
10/93: Quadrant Resources Pty. Ltd.	216 km ²
11/93: Quadrant Resources Pty. Ltd.	1884 km ²
12/93: Atlas Corporation	703 km ²
13/93: Laurel Point Pty. Ltd.	168 km ²
14/93: Laurel Point Pty. Ltd.	197 km ²
16/93: Cominco Resources International Ltd.	1072 km ²



Valid exploration licences, June 1993



Major discovery of massive sulphides

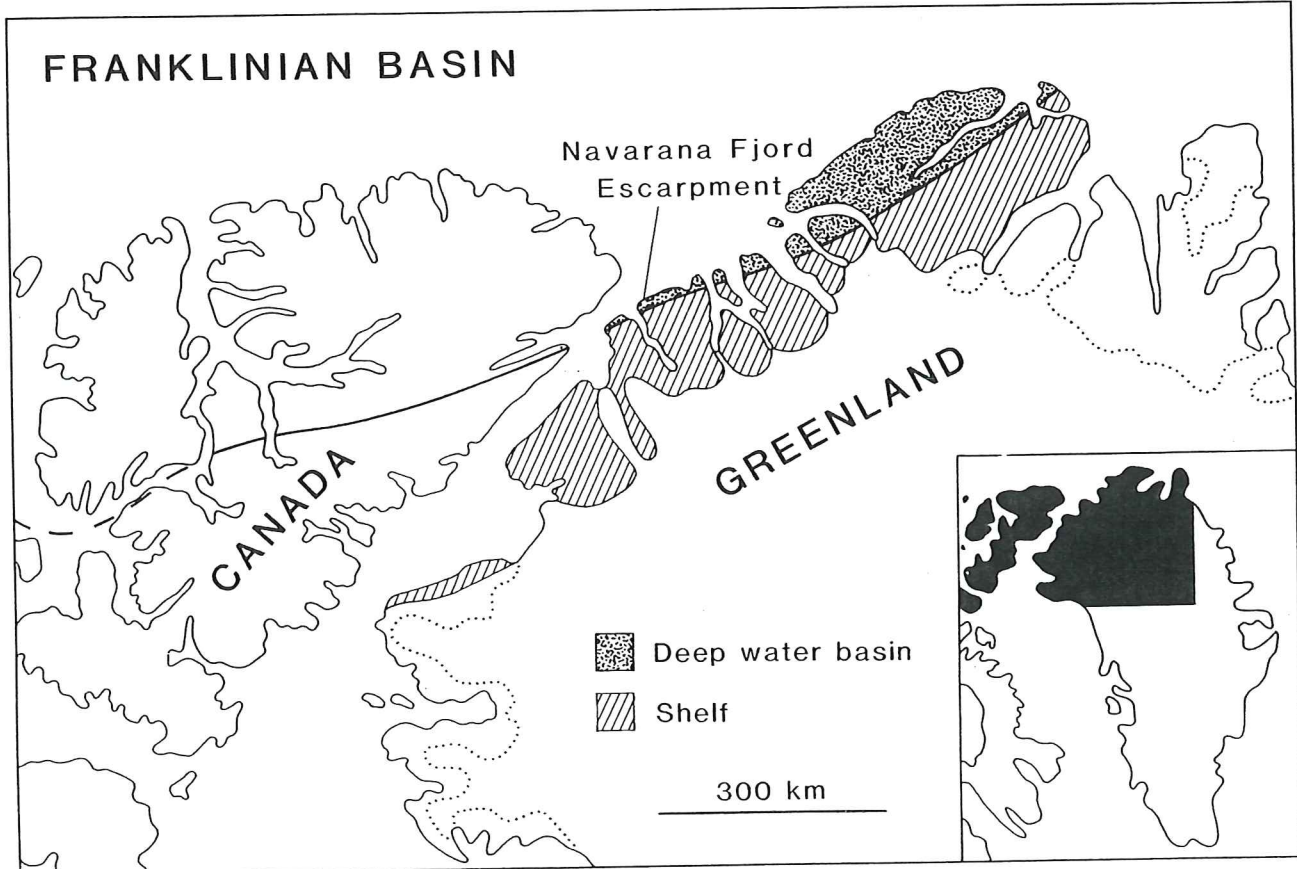
Platinova rewarded for perseverance

The commercial exploration taking place last summer north of latitude 83°N, just 800 km from the North Pole, was highlighted in the first issue of this newsletter (MINEX, June 1992) as marking a "determination to extend the search for minerals to the world's northern limits".

The target: the extensive Lower Palaeozoic Franklinian Basin of northern Greenland with "potential for both Mississippi Valley type lead-zinc in the platform and shelf carbonates, and Sedex type mineralisation in the platform margin and trough facies".

The companies: Platinova A/S and Nanisivik Mines Ltd.

Just over a year later as we go to press with this issue, we can report that this determination has borne fruit in the form of a discovery by Platinova of a major zone of zinc mineralised massive sulphides. Platinova's planned field work in the north – a reconnaissance survey by skidoo using the frozen fjords for main access – is mentioned on page 5 above. "This operation, completed May to mid-June, can be said to have been a great success both geologically and logistically" reports senior geologist Frank W. van der Stijl from Platinova's office in Nuuk. As a result the company is busily engaged in launching a follow-up operation for an immediate return to



the far north. For this phase full air support replaces the skidoos. This programme is scheduled to start in July and continue through August and will involve detailed geological mapping, geophysics and diamond drilling.

Sedex-type deposit

The mineralisation has a surface exposure 1.2 km by 200 m with exposed widths of 10 m to 40 m. The main body is flat-lying and open ended. The zinc mineralisation has the characteristics and geological setting of a sedimentary-exhalative (Sedex) deposit. Assay results of the surface sampling, will be available by the end of the month; meanwhile preparations for the next programme go ahead with the knowledge that "eye-ball grades" are very exciting. The July-August programme is aimed at establishing the continuity of the main mineralisation under the covered areas, as well as to sample and measure grades and widths during drilling.

Navarana Fjord Escarpment

One of the principal tectonostratigraphic features of the Franklinian Basin is the so-called Navarana Fjord Escarpment. This is traceable for 600 km across northern Greenland as the regional facies boundary separating the carbonate shelf from the deep-water trough to the north. The detailed nature of this facies boundary, its varying structure and position during the evolution of the basin, were determined during the systematic mapping campaign carried out by GGU in the period 1978-1985. Since then it has been known that zinc mineralisation and stream-sediment zinc anomalies are associated with this major east-west regional feature.

Focusing in on target

Guided by this regional geology, known mineral showings and a geochemical survey, Platinova, in the person of Frank W. van der Stijl, former chief geologist at the Black Angel lead-zinc mine at Maarmorilik, spent several weeks in Copenhagen last winter focusing in on prospective targets by using GGU's data base and archives, and talking to geologists with first-hand experience of the region. The Greenland Mineralisation Data Bank (GREENMIN), samples, chemical analyses, as well as unpublished geological maps, photographs, reports and diaries, formed the basic material of this preparatory work. Van der Stijl is also quick to recall that his belief in the practicality of operating by skidoo crystallised and gained the necessary strength to influence others, as he consulted details of a similar May to June skidoo traverse in a GGU diary from the late 60's.

The massive sulphide discovery is within an exploration concession owned 100% by Platinova.

Final comment

Final comment is reserved for Bob Gannicott, President of Platinova, who from the Toronto office of the company remarks, "It is the geological database compiled over many years by the Geological Survey of Greenland combined with the generally underexplored nature of Greenland that makes discoveries of this type still possible here. This represents an exploration opportunity unique in the developed world".