

GREENLAND **MINEX News**

GREENLAND MINERAL EXPLORATION NEWSLETTER

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January 1997

1996: a record year for exploration

high hopes for Greenland diamonds

In the last issue of MINEX (July 1996), we reported on the revived interest in the mineral potential of western Greenland, pointing out that the commercial interest in this part of Greenland – the coastal stretch closest to Labrador – had never been greater. We likened the activity to ‘a nickel-diamond ping-pong game across the Labrador Sea’: exploration for diamonds in Canada and the discovery of the Voisey’s Bay deposit, leading to spin-off nickel exploration elsewhere, with the discovery in Greenland of diamond-indicator minerals. While the final outcome of this play is still unknown, new developments point to diamonds rather than nickel-copper, as a potential first-round winner in Greenland. These developments include the discovery of a microdiamond-bearing kimberlite block at a geophysically pre-defined site.

The results of the summer-autumn activities in western Greenland have assured that the commercial exploration momentum has been maintained, making 1996 a record year. Thus, in terms of number of valid exploration licences and in terms of ground claimed, or even in terms of millions of kroner spent by commercial companies acting on their exploration rights, 1996 has been an exciting

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year. It was exceptional in that it brought to Greenland a wave of exploration interest following on from the main revitalisation in 1995 caused by the hectic competition to stake ground in Labrador and in similar geological provinces in Greenland. The resurgence of

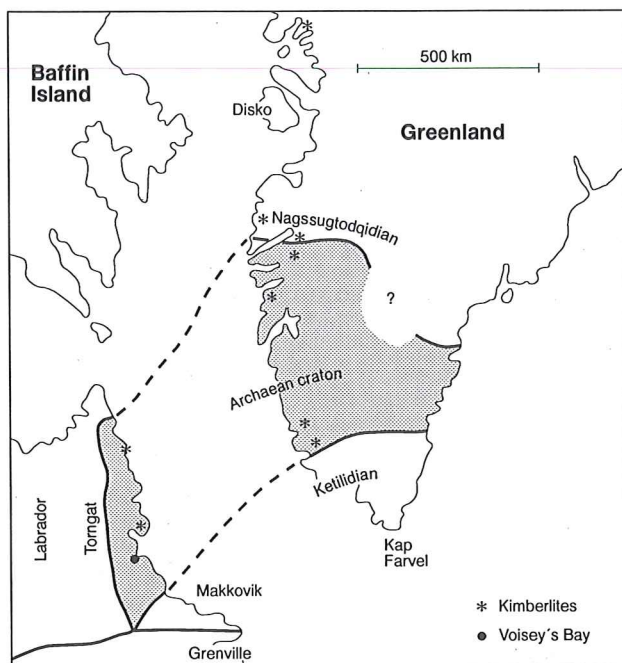
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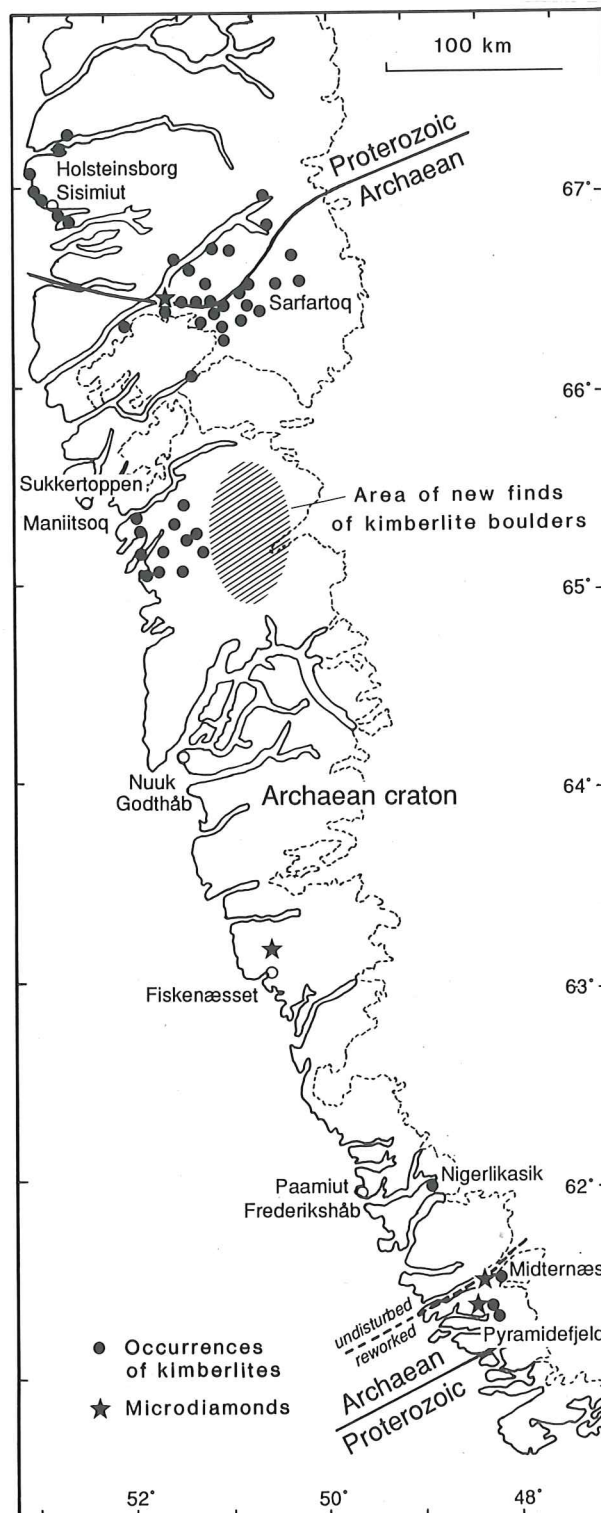
Greenland and Labrador in pre-drift reconstruction showing Archaean craton flanked by Proterozoic mobile belts.

interest continued in the second half of 1996 as new aspects of the diamond potential of Greenland were publicised. And, judging by the nature of the applications for exploration rights at the end of the year, this interest shows no sign of slackening.

What then are the main developments since the last MINEX issue?

Foremost here must be the discovery by Platinova A/S in the Archaean of western Greenland of kimberlite boulders on the shoreline of a lake that had been identified by geophysical survey as a possible kimberlite-pipe target. This particular discovery in the glaciated terrain of the Maniitsoq region, to the east of the known *in situ* kimberlite rocks (tabular bodies rather than pipes; see figure), is a tantalising find. The similarity in setting to the diamond-bearing kimberlite pipes of the Lac de Gras region of the Canadian Northwest Territories could hardly be more striking. When news broke in the autumn that a rock sample from the lake-side not only showed

that the kimberlite had originated within the diamond stability field, but also yielded a clear white microdiamond, the geological analogy took on extra relevance.



This discovery is from a region in which a number of other companies are working including Quadrant Resources Ltd., Cominco Ltd. and Monopros Ltd. (a subsidiary of De Beers) with farther east near the Inland Ice, Nunaoil A/S and RTZ Mining and Exploration Ltd. Platinova A/S has optioned some blocks to three other companies: Aber Resources Ltd., Fjordland Minerals Ltd. and Lexan Explorations Inc., a trio that has an exploration expenditure commitment of six and a half million dollars on the property by the end of 1997. Five hundred kilometres to the south, another group comprising Quadrant Resources Pty Ltd., Monopros Ltd. and Major Resources Ltd. are involved in an extensive mineral analysis programme based on sediment sampling of streams and lake shores. Following the initial discovery in 1995 during nickel exploration of diamond indicator minerals in the reworked Archaean and Proterozoic terrain, and in one area not previously known for kimberlites, this group has increased its interest in ground in western Greenland.

These developments have had a marked effect on the commercial interest both in the Archaean block and the bordering Proterozoic

terrains to the north and south (see figure page 2). An up-to-date status of exploration licences, including comparative representation of the 1996 level of exploration, is given in MRA's section 'Regulatory and licensing information'.

Perhaps not surprisingly, the final comment here on diamond exploration once more refers back to the nickel-diamond connection. The geophysical identification in Greenland of kimberlite targets specifically below lakes – a central element in the Lac de Gras kimberlite-pipe model – was made during a geophysical survey in 1995 involving Cominco Ltd. that had a main exploration aim of nickel-bearing massive sulphides. The 1995 survey covered the Maniitsoq-Nuuk region or the northern part of the Archaean craton that is known for important noritic complexes and nickel-copper sulphide mineralisation. As reported on earlier in MINEX (No. 8, June 1995), Cominco's participation in the Greenland geophysical programme was a direct consequence of the Voisey's Bay discovery. Through this, the company is reserved a diamond production royalty in some exploration blocks in which *in situ* kimberlite bodies are known.

New Catalogue of Greenland Publications and Data

information of reorganisation of Greenland publications

Following the fusion between the Geological Survey of Greenland (GGU) and the Geological Survey of Denmark (DGU) to form a new national geological survey - the Geological Survey of Denmark and Greenland - with the call-sign GEUS, the range of publications (print) to be issued by the new survey has now been finalised. One of the early consequences reported on in the last issue of MINEX (No. 10, July 1996) was the incorporation of the *Open File Series* of the former GGU into a new report series - *Danmarks og Grønlands*

Geologiske Undersøgelse Rapport. The first three reports in this series of relevance to the mining industry are referenced elsewhere in this newsletter (see page 7).

The reorganisation of Greenland publications (in English) is outlined in a new 'Catalogue of Greenland publications and data' that was released at the end of 1996 in the new *Rapport* series (*Rapport* 1996/114, 50 pp). This catalogue is available free of charge and can be ordered from GEUS.

Geological & exploration briefs

Activities in the Far North: The Peary Land Zinc Project

Platinova completes 4th year of drilling

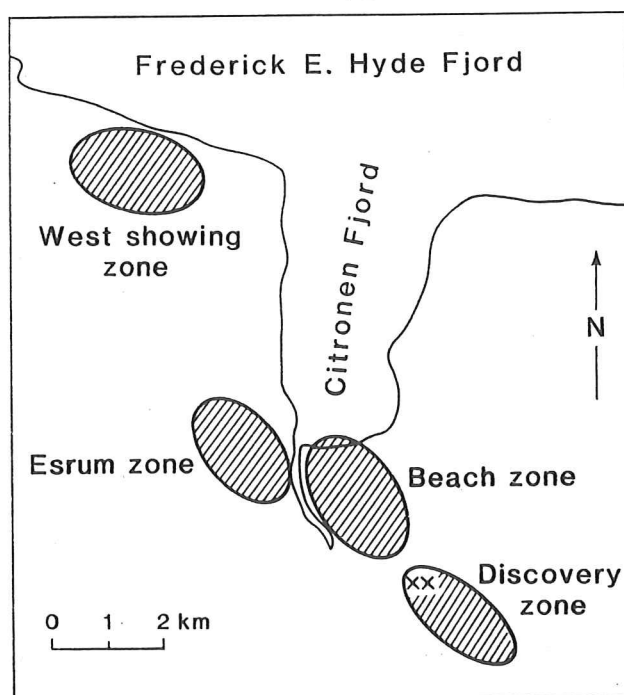
The discovery by Platinova in the northernmost land in the world of a shale-hosted zinc-lead-iron sulphide deposit was met by some with the sceptic view that the location was too far north to be viable. It was discovered in the spring of 1993 by a skidoo-exploring party using the fjord ice for transport. The deposit is located south and west of Citronen Fjord, on the south side of Frederick E. Hyde Fjord at 83° N, where the coast is ice-bound for the main part of the year. For the location of Citronen Fjord, see map on page 5.

For Platinova however, a company now in its second decade of unbroken involvement in Greenland mineral exploration, the discovery in 1993 naturally warranted follow-up work. This was mobilised the same year with diamond drilling, and electromagnetic and gravity surveys. The early indications of a sizeable SEDEX-type deposit in Lower Palaeozoic rocks of the Franklinian Basin proved to be so promising that in 1996 the company could report the successful completion of its 4th season of drilling. The deposit is formed of at least 5 major massive sulphide mounds situated on a 10 km long NW-SE trend.

The 1996 programme was completed in late September. It consisted of 6.4 km of drill core from 42 holes in the so-called Beach Zone and in a newly-discovered sub-area in the northwestern part of the Discovery Zone (XX on figure). Drill hole spacing is about 100 m. Using a cut-off grade-width of 6% zinc over 2 metres, the 1996 drilling has confirmed a resource in the Beach Zone and XX area of

5.7 million metric tons with 9% zinc and 1% lead. The central part of the Beach Zone hosts a thicker and higher grade section comprising 2 million metric tons at a grade of 11.5% zinc and 1.6% lead, using a cut-off of 10% zinc over 3.5 metres.

The Peary Land Zinc Project has now involved total drilling of over 30 km in 131 holes, outlining the higher-grade part of 10% zinc-lead mentioned above within an overall resource of over 25 million metric tons at 8% zinc-lead. The company, in the process of reviewing metallurgical aspects and economics of the project, reports that equipment is already on site for further drilling in 1997.



Nunaoil drilling for gold

projects continue in West and South Greenland

In addition to the drilling for massive sulphides in Peary Land featured above, the search for other commodities in 1996 saw the continuation of drilling for gold in West Greenland. The Storø gold prospect in Archaean supracrustal rocks on the island of Storø, some 50 km north-east of Nuuk, was discovered by Nunaoil in 1994 during regional exploration particularly of greenstone successions. Chip samples returned gold values of up to 91 g/t over 4 m. The gold occurs in a 3 km long zone in a mixed succession composed mainly of amphibolites, metasediments and banded iron formation. The gold seems to have a number of settings but is typically associated with arsenopyrite and pyrrhotite in the marginal zones of quartz veinlets in amphibolites. Drilling on the prospect started in 1995. In 1996 Nunaoil completed another 2 km of drilling in 9 holes making a total of 4.6 km of retrieved core from 21 holes. The best intersection is 32.7 g/t gold over 1.5 m. Average contents of 1-2 g/t gold occur in zones of 10-20 thickness and 100-200 m long.

In addition, the company continued investigations at the drill-tested gold prospect of Kirkespirdalen, 30 km north-east of Nanortalik, South Greenland with a view to start drilling for resource delineation and test-mining. A reserve of 200 000 tons of ore at

20-30 g/t gold is suggested and a small-scale production with the employment of 20-30 persons might be viable.

New zones of gold mineralization are reported by Nunaoil in the Nuuk area as well as at Bjørnesund 150 km south of the capital. On the south coast of Nuussuaq, north of Disko Bugt chip samples returned up to 15 g/t gold over a 1 m thick layer in metacherts and up to 40 g/t in sulphide-rich veinlets.



Exploration in East Greenland

a new Voisey's Bay target

Commercial activities in 1996 in East Greenland include Platinova's ground geophysical survey to test a Voisey's Bay target in Tertiary basic rocks. A dyke of a large feeder system related to flood basalts on the north-east side of Skaergaard intrusion hosts along its margins, zones with up to 2.5%

copper, with anomalous silver, nickel and cobalt. The geophysical data are now being evaluated with a view to a drilling programme, in which Falconbridge can earn a 51% interest in the project by completing 5 km of core drilling.

Airborne geophysical mapping: AEM and AEROMAG

*1996, south-western Greenland: results soon available
1997, East and West Greenland: programme defined*

If the 1990's come to figure prominently in future reviews of Greenland's mineral exploration history, one fact that will at least be recorded is that state-financed geophysical mapping – both magnetic and electromagnetic – was used for the first time in the 90's regional assessments of mineral potential. The airborne geophysical surveys initiated and financed by the Government of Greenland with the specific aim of stimulating interest in mineral exploration, continued in 1996 with two projects (AEM Greenland and AEROMAG) in areas over south-western Greenland. In 1997 the two projects are planned to continue in areas in West and East Greenland (see figure).

Previous years have seen such geophysical surveys in the Lersletten region of central West Greenland (1992), Inglefield Land, North-West Greenland (1994) and in the Maniitsoq-Nuuk region, southern West Greenland and across the southern tip of Greenland into South-east Greenland (1995). All these surveys were flown over regions of Archaean or Early Proterozoic crystalline rocks.

The details of the 1996 surveys are given below.

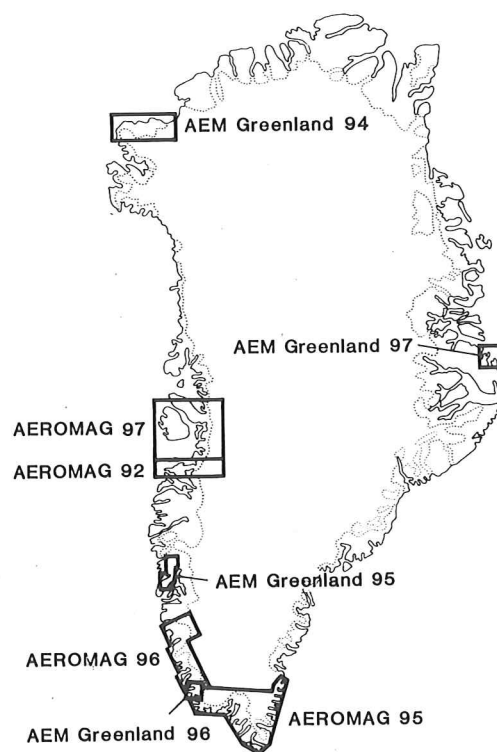
AEM Greenland 1996

- Helicopter electromagnetic, magnetic, radiometric and VLF-EM survey.
- Five areas in South-West Greenland over Archaean and early Proterozoic supracrustal rocks, including the gold anomalous Tartog Group.
- 8756 line km with a 200 x 2000 m grid and 60 m terrain clearance.
- Flown by Aerodat Inc., Canada

AEROMAG 1996

- Fixed-wing magnetic survey.
- South-West and southern West Greenland over the southern part of the Archaean craton and its junction with Proterozoic crust.
- 67 277 line km with a 500 x 5000 m grid and 300 m drape terrain clearance.
- Flown by Geotrex Ltd., Canada

Data availability. Release of the data is planned for 1st March 1997 at which time both digital data and maps will be available for viewing and/or purchase. Maps derived from the AEM survey will be at 1:20 000 and 1:100 000; those from AEROMAG will be at 1:50 000 and 1:250 000.



AEM Greenland 1997

In 1997, for the first time since initiation of the AEM Greenland 1994-1998 programme, the airborne survey will be in East Greenland, and over rock provinces other than Precambrian. The region to be investigated is within the East Greenland Caledonian fold belt. The electromagnetic and magnetic survey will be carried out by fixed-wing aircraft based on landing facilities at Constable Pynt and Mestersvig. Areas with particularly interesting mineral potential have been selected with a view to testing different geological targets and structures.

AEROMAG 1997

This programme will be an aeromagnetic survey over the Disko Bugt area of central West Greenland that will link up with the

Lersletten survey carried out in 1992 (see figure; also further reading). Flown over both Precambrian shield areas as well as the Cretaceous-Tertiary cover, the survey is motivated by the need for a better understanding of the geology and structure in a region that has both mineral and hydrocarbon potential.

Tenders. The two 1997 projects are managed and carried out by GEUS and a call for tenders from geophysical contractors for this airborne work was put out in December 1996.

Further reading:

Project AEROMAG-92: a high resolution aeromagnetic survey of the Lersletten area, central West Greenland (68°15'N, 53°35'W) by L. Thorning, 1993. *Open File Series Grønlands Geologiske Unders.* 93/2, 34 pp., appendix.

Three 'open-file' reports in new *Rapport* series

The airborne geophysical work carried out under the so-called AEM and AEROMAG projects is reported on above. The three reports referenced here are all related to that activity. *Rapport* 1996/11 and *Rapport* 1996/84 report on results from the AEM 1995 survey over the Archaean block of West Greenland in the Maniitsoq-Nuuk region that have relevance to nickel and diamond exploration. The first report summarises the main results of the survey and identifies specific anomalies relating to massive sulphide mineralization, while the latter focuses on an evaluation of the airborne data in the direct search for kimberlite pipes.

Rapport 1996/12, reporting on geochemical mapping of Inglefield Land, North-West Greenland by means of analysis of stream sediment, stream water and soil, was part of the follow-up programme to AEM 1994. The results indicate a potential for structurally

controlled gold and base metal mineralisation within Early Proterozoic supracrustal rocks.

Airborne electromagnetic and magnetic survey of the Maniitsoq-Nuuk area, southern West Greenland. Results from project AEM Greenland 1995 by R.W. Stemp, 1996. *Danmarks og Grønlands Geologiske Undersøgelse Rapport* 1996/11, 34 pp. **Price:** 135 DK kr

Reconnaissance geochemical mapping of Inglefield Land, North-West Greenland by A. Steenfelt & E. Dam, 1996. *Danmarks og Grønlands Geologiske Undersøgelse Rapport* 1996/12, 27 pp, with maps. **Price:** 130 Dk kr.

Airborne geophysical surveys applied to diamond exploration in Greenland. Some results from Project AEM Greenland 1995 by R.W. Stemp, 1996. *Danmarks og Grønlands Geologiske Undersøgelse Rapport* 1996/84, 21 pp. **Price:** 65 DK kr.

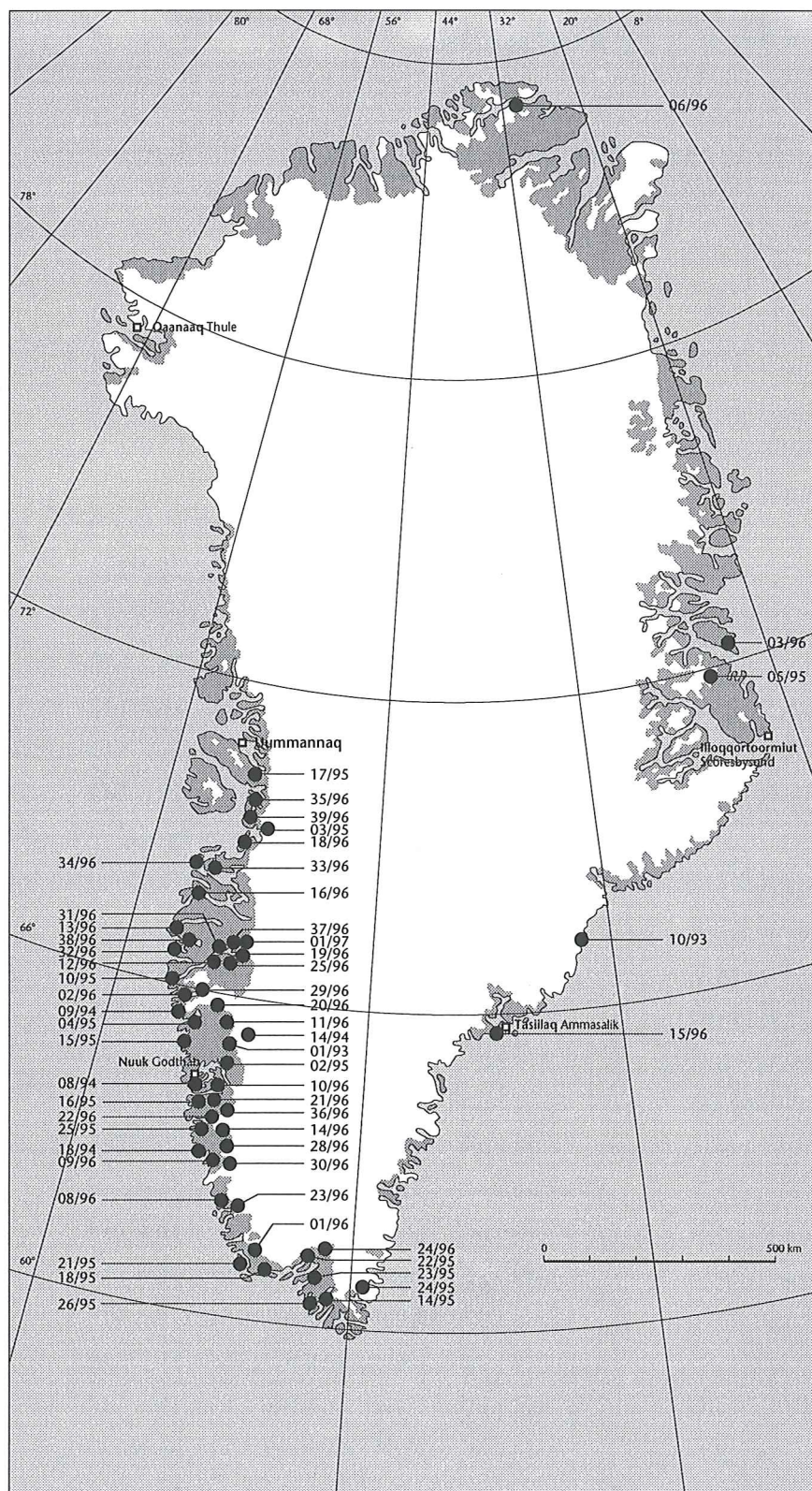
Regulatory & licensing information

Exclusive licences status

Status per January 1, 1997 for exclusive licences
is displayed on the location map on page 9.

01/93: Nunaoil A/S	178 km ²	10/96: Quadrant Res. Pty. Ltd.	202 km ²
10/93: Quadrant Res. Pty. Ltd.	26 km ²	11/96: Quadrant Res. Pty. Ltd.	521 km ²
08/94: Nunaoil A/S	316 km ²	12/96: Quadrant Res. Pty. Ltd.	381 km ²
09/94: Nunaoil A/S	181 km ²	13/96: Quadrant Res. Pty. Ltd.	289 km ²
14/94: RTZ Mining and Exploration Ltd.	71 km ²	14/96: Nunaoil A/S	760 km ²
18/94: Valhalla Mining Ltd.	168 km ²	15/96: Nunaoil A/S	1,470 km ²
02/95: Nunaoil A/S	326 km ²	16/96: Inco Ltd.	1,711 km ²
03/95: Nunaoil A/S	635 km ²	18/96: Quadrant Res. Pty. Ltd.	465 km ²
04/95: Cominco Res. Int. Ltd.	4,332 km ²	19/96: Quadrant Res. Pty. Ltd.	219 km ²
05/95: Platinova A/S	6 km ²	20/96: Quadrant Res. Pty. Ltd.	399 km ²
10/95: Ujarak Minerals Aps.	5 km ²	21/96: Quadrant Res. Pty. Ltd.	170 km ²
14/95: Platinova A/S	402 km ²	22/96: Quadrant Res. Pty. Ltd.	244 km ²
15/95: Platinova A/S	3,390 km ²	23/96: Quadrant Res. Pty. Ltd.	151 km ²
16/95: Platinova A/S	510 km ²	24/96: Texas Energy Corporation N.L.	271 km ²
17/95: Diamond Fields Res. Inc.	296 km ²	25/96: Texas Energy Corporation N.L.	104 km ²
18/95: Diamond Fields Res. Inc.	2,245 km ²	28/96: Platinova A/S	13,178 km ²
21/95: Quadrant Res. Pty. Ltd.	1,723 km ²	29/96: Platinova A/S	11,900 km ²
22/95: Quadrant Res. Pty. Ltd.	745 km ²	30/96: Quadrant Res. Pty. Ltd.	103 km ²
23/95: Softrock Petroleums Ltd.	349 km ²	31/96: Quadrant Res. Pty. Ltd.	196 km ²
24/95: Softrock Petroleums Ltd.	1,102 km ²	32/96: Quadrant Res. Pty. Ltd.	204 km ²
25/95: Satellite Holdings Ltd.	193 km ²	33/96: Quadrant Res. Pty. Ltd.	236 km ²
26/95: Platinova A/S	291 km ²	34/96: Quadrant Res. Pty. Ltd.	141 km ²
01/96: Diamond Fields Res. Inc.	777 km ²	35/96: Quadrant Res. Pty. Ltd.	194 km ²
02/96: Ujarak Minerals ApS	77 km ²	36/96: Quadrant Res. Pty. Ltd.	169 km ²
03/96: Tertiary Gold Ltd.	1,288 km ²	37/96: Quadrant Res. Pty. Ltd.	170 km ²
06/96: Platinova A/S	5,010 km ²	38/96: Quadrant Res. Pty. Ltd.	241 km ²
08/96: Quadrant Res. Pty. Ltd.	426 km ²	39/96: Quadrant Res. Pty. Ltd.	259 km ²
09/96: Quadrant Res. Pty. Ltd.	153 km ²	01/97: Softrock Petroleums Ltd.	140 km ²

Location map of exclusive licences in Greenland - as of January 1



Further licences information

New licences

One licence was granted, namely to Softrock Petroleum Ltd. (01/97). The area is located close to Kangerlussuaq airport. Two prospecting licences were granted to Major General.

Amendments of existing exploration licences

During the last half of 1996, various amendments to existing licences came into effect. Licences were amended as follows:

- The area of exploration licence no. 06/96 at Fredrick E. Hyde Fjord was increased from 1,929 km² to 5,010 km².
- The area of exploration licence no. 21/95 at Kobberminebugt was increased from 1,052 km² to 1,723 km².

- The area of exploration licence no. 03/95 at Disko Bugt in West Greenland was reduced from 1,332 km² to 635 km².
- The areas of licences nos. 02/91, 03/91, 01/92, 12/92, 27/92 were all reduced by relinquishment, and since they expired on December 31, 1996, they are in the process of being renewed for another 5-year period.

Terminated licences

The following licences were terminated: 05/92, 01/95, 08/95, 13/95 and 07/96.

Renewals

In addition to the above mentioned renewals, the following licences are under the process of being renewed: 02/92, 08/92, and 10/92.

Greenex A/S

On October 31, 1995, Greenex A/S that operated the lead and zinc mine in Maarmorilik during the period 1972-90 was liquidated.

The mine was closed down in 1990. Abandonment operations were completed in 1990-91 with, however, the possibility for the authorities to demand further abandonment activities to be carried out during the period up to June 30, 1996.

Since 1990 the environment at Maarmorilik

and the nearby fjords have been monitored annually by the National Environmental Research Institute (NERI). These studies demonstrate a significant decline of the pollution level compared to earlier.

On this basis the authorities have decided that no further abandonment measures are to be carried out by Greenex A/S.

The monitoring of the environment in the area will continue until year 2005.

Mineral exploration activities, 1992-1996

The figures below give an impression of the mineral exploration activities in Greenland in the period 1992-1996. They clearly show that the level of activity has risen steadily throughout this period, and particularly from 1995 to 1996. In 1996, the licences for minerals reached an all time high of 68 exclusive licences covering more than 60,000 km². Compared to the previous year, where there were 35 licences covering 23,127 km², Greenland has experienced a surge of interest in 1996. The pronounced increase is attributed primarily to a new diamond scenario and also the Voisey's Bays find of 1995.

Most of the 60,000 km² is held by Quadrant Resources Pty. Ltd., Platinova A/S and Nunaoil A/S.

It is also worth noting that at the end of 1996 a very substantial part (approx. 85%) of South and Central West Greenland is occupied by exclusive licences. On average, the exclusive coverage is 15% of all ice-free areas of Greenland.

Similarly, the actual amount spent on exploration activities shows a clear indication of increased activity in the area, as demonstrated in figure 3 (* = estimate).

The number of drilling meters is another indicator of the level of exploration activity, and as figure 4 shows, the trend in Greenland has generally been increasing.

Exploration Licences

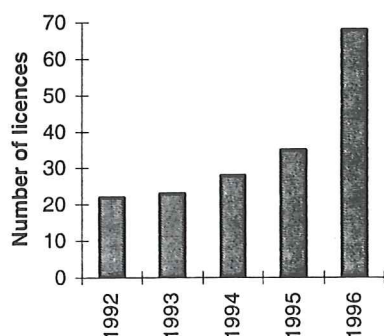


Figure 1

Licence Area

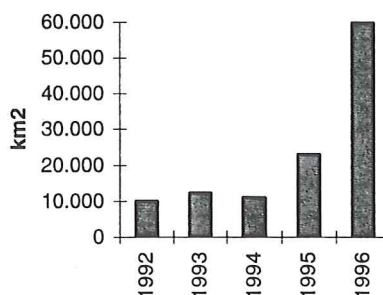


Figure 3

Exploration Expenditures

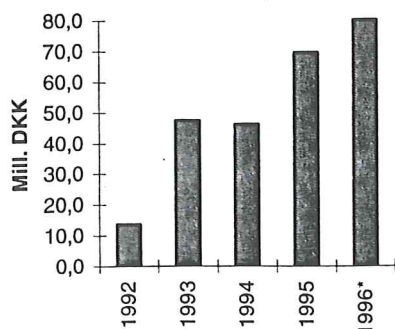


Figure 2

Drilling Meters

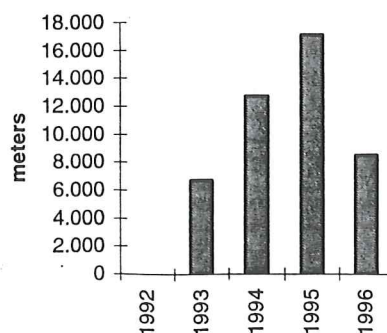


Figure 4