

At the Crossroads: Mining Policy in Greenland

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ABSTRACT. Despite formidable physical barriers, mining has taken place in Greenland for more than 100 years. Initially it was by royal concession but without a formal regulatory framework; later there were a few guiding principles laid down by law and elaborated administratively to suit the occasion. One previous attempt had been made to devise a policy that would attract investment, but the resulting mining legislation did not seem to have served this purpose.

A policy review initiated in 1989 as a result of a growing need for alternatives to the ailing Greenlandic fishing industry recently resulted in the enactment of new mining and tax legislation. The new Mining Act is the first step on the road towards development of Greenland's resources. The real test, however, will come when one or more projects enter the development phase. Then the management of the impact of these projects and the revenues they generate will be central to a successful mining policy.

Key words: Greenland, mining policy, economic development, resource extraction

RÉSUMÉ. Malgré d'énormes obstacles physiques, les ressources minérales du Groenland ont été exploitées depuis plus de 100 ans. L'exploitation s'est faite tout d'abord par concession royale, mais en l'absence d'un cadre législatif et réglementaire; il y a eu ensuite quelques principes directeurs établis par la loi et précisés par l'administration en fonction des cas. Il y avait eu précédemment une tentative pour créer une politique qui attirerait les investisseurs, mais la législation minière qui en résulta ne semblait pas servir cette fin.

Une révision des politiques lancée en 1989 et résultant du besoin croissant de trouver une alternative à l'industrie de la pêche groenlandaise qui est mal en point, aboutit à la promulgation de nouvelles lois sur les mines et de nouvelles lois fiscales. La nouvelle loi sur les mines représente le premier pas vers la mise en valeur des ressources du Groenland. Le vrai test viendra cependant lorsqu'un ou plusieurs projets entreront dans la phase de développement. La gestion de l'impact de ces projets et des revenus qu'ils généreront sera alors essentielle au succès de la politique minière.

Mots clés: Groenland, politique d'exploitation minière, développement, exploitation des ressources

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INTRODUCTION

July 1990 marked the end of mining at the Black Angel lead-zinc mine at Maarmorilik, West Greenland, ending a long record of mining going back to the 1860s. At the same time, an overhaul of mining policy got under way, concentrating on issues relating to security of tenure of mineral properties and taxation of mineral companies operating in Greenland. A new Mining Act for Greenland was enacted by the Danish Folketing (parliament) on 21 May 1991, while at about the same time the Greenland Landsting (local assembly) adopted new tax rules for mining companies.

The history of mining in Greenland and past mining policy is characterized by a strong awareness of the need for a government share in profits from mining, which has not always been accompanied by a clear understanding of what these profits actually are, the nature of how the mineral industry functions or how mining companies are managed. Investors in mining have always looked at the previous system with some scepticism, mainly because of the problems surrounding tenure and the tax treatment of mining projects. The new Mining Act changes the security of tenure to mineral properties, taxation rules are moved to the regular Greenlandic tax code and the administrative framework is made more comprehensive.

The objectives of this paper are, first, to briefly review the history of mining in Greenland and the policy framework in which it has taken place, and, second, to summarize the goals of the strategy report and to review the new Mining Act in relation to the recommendations of the strategy report.

MINING IN GREENLAND

Since the Danish colonization of Greenland in the early 18th century, mining activities have been few, far apart and

commonly unprofitable (mostly small, local coal and peat mining). The two notable exceptions are the Ivittuut cryolite mine and the Black Angel lead-zinc mine at Maarmorilik. Zinc and lead have also been mined on a smaller scale at Mestersvig, in central East Greenland (Fig. 1). These activities have now ceased and this leaves Greenland without mining for the first time since the beginning of cryolite mining in the 1860s.

Despite the limited number of operations, mining has made considerable contributions to the economic development of Greenland. Initially in the 19th and 20th centuries the cryolite mine at Ivittuut financed all state activities in Greenland (Lyck, 1988), but after World War Two, and especially after 1953, when Greenland constitutionally became part of Denmark, public expenditure and investments have far exceeded the state share of cryolite revenues. From 1973 onwards, royalties and taxes from the Black Angel have made a small contribution toward the finance of these expenditures, as shown in Table 1. The large amount of revenue in 1985 derives from the sale of a 50% share in Kryolitselskabet Øresund A/S, which operated the Ivittuut cryolite mine. The company had diversified into a range of non-mining activities not related to Greenland or mining (the sale was part of a government privatization program). The significant negative revenue in 1986 relating to the Black Angel was the result of repayment to the operating company of taxes and royalties in connection with a restructuring of the operating company (Greenex) and change of ownership (from Cominco Inc. to Boliden AB). However, mining at Maarmorilik has also contributed significantly to the economic development of Greenland through higher incomes, increased employment and a positive contribution to the balance of trade (Lyck, 1988).

Until 1988 all revenues from mining in Greenland accrued to Denmark, but according to an agreement between the

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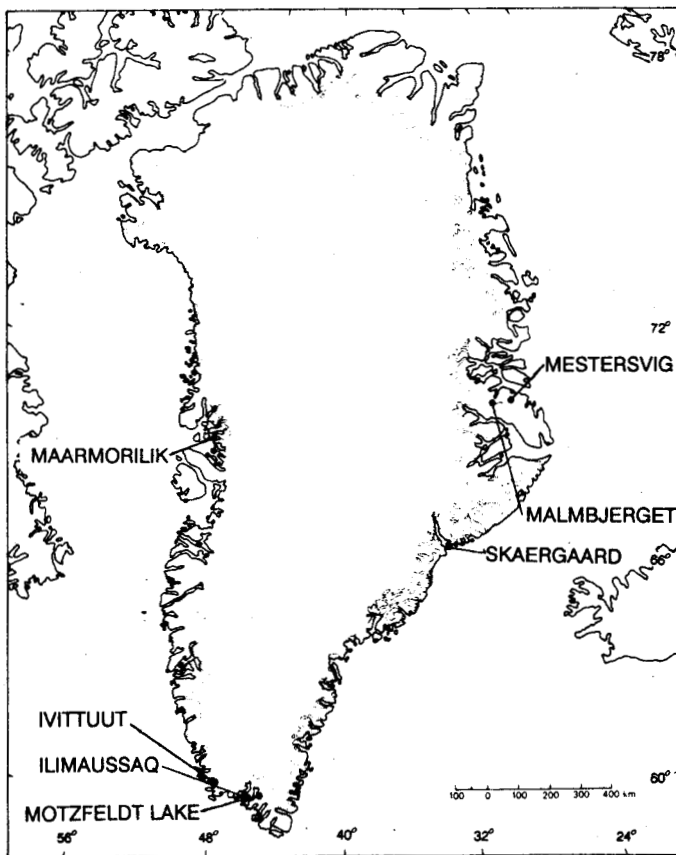


FIG. 1. Map of Greenland showing the most important mineral locations mentioned in the text.

Greenland Home Rule Government and the Danish minister for energy, future revenue (up to DKK 500 million annually) is to be shared equally between Greenland and Denmark (Mineral Resources Administration, 1989). This means that Greenland's share will not be subtracted from the transfer payments from Denmark, which finance a considerable part of the Home Rule budget. Distribution of revenues in excess of DKK 500 million is to depend on negotiations between Greenland and Denmark.

The 1965 and 1978 Mining Acts

The first comprehensive mining policy for Greenland was introduced in 1963, when a special commission made recommendations for a new mining act (Minelovskommissionen, 1963). Before that time, only a brief royal decree in 1935 and, before that, 18th-century mining tradition from Norway were used to regulate mining activities in Greenland (Harhoff, 1985). The 1935 royal decree is most notable for its definition of all subsurface mineral resources as state property. The mining commission proposals for a new mining act were enacted in 1965, although some of the details recommended were left out or modified. Two main issues were considered in the report: organization of mineral activities and economic conditions for mining. Both were discussed extensively, but the proposals in the report and, somewhat less, the final text of the act helped little to promote a mining industry in Greenland.

When negotiations on Home Rule for Greenland were taking place in 1977-78, control of mineral policy became a central issue (Foigel, 1980). Some Greenlandic negotiators wanted

TABLE 1. Mineral revenues from Greenland

Year	Black Angel (10 ⁶ DKK)	Cryolite dividend (10 ⁶ DKK)	Net gov't spending (10 ⁶ DKK)	Revenue as % of spending
1972	0.25	7.10	809.00	0.91
1973	0.40	7.10	779.00	0.96
1974	0.47	8.60	963.00	0.94
1975	6.11	7.10	1131.00	1.17
1976	10.56	7.60	1198.00	1.52
1977	10.61	7.60	1237.00	1.47
1978	2.05	7.60	1324.00	0.73
1979	10.71	11.40	1676.00	1.32
1980	32.36	10.70	1956.00	2.20
1981	62.88	11.40	2058.00	3.61
1982	37.25	12.80	2388.00	2.14
1983	56.08	15.50	2488.00	2.88
1984	32.84	14.80	2639.00	1.81
1985	2.82	714.50	2759.00	26.00
1986	-32.43	-	2727.00	-1.19
1987	0.00	-	2642.00	0.00
1988	0.57	-	2774.00	0.02

Sources: Ministeriet for Grønland, Yearbooks 1973-88; Mineral Resources Administration, 1989.

full control, while the Danish government considered revenues from resource extraction a national and not a local matter — and by implication one of the few possibilities for recovering part of the vast sums spent in Greenland over previous decades. As a compromise, the Home Rule Act only refers to non-renewable resources in vague terms when it states that the resident population has "fundamental rights" to these resources. When the Home Rule Act was enacted in 1978, important amendments to the 1965 mining act were also introduced. The central points in this modified mining act are summarized below.

The main addition concerned the sharing of influence over resource decisions between the Danish government and the Greenland Home Rule through the concept of "joint decision-making power," which includes a reciprocal right of veto. Other additions concerned the establishment of a joint Danish-Greenlandic parliamentary committee to monitor mineral activities and policy and the creation of a Mineral Resources Administration for Greenland. The parliamentary committee is an advisory body, and formal decisions are made by the Danish and the Greenland Home Rule governments. The Mineral Resources Administration represents the governments in all contacts and negotiations with mining and exploration companies (a major advantage) and relies on the organizations attached to it (the Geological Survey of Greenland and the Greenland Environmental Research Agency) for technical advice. The Mineral Resources Administration also has access to the facilities in the Home Rule system.

Taxation of profits from mining activities was dealt with only briefly. Mining concessions generally had to contain provision for a government share in profits "when capital investment and a suitable return on the investment has been recovered" (Minelovskommissionen, 1963:25). However, exceptions from this main rule were possible and the government could claim a royalty even if the investment and return on investment were not yet recovered. Finally, it was possible to exempt mining companies from all other tax regulations.

As its predecessor from 1965, the 1978 Mining Act used a three-tier system for regulating exploration and mining activities. Prospecting required a permit valid for up to five years. A

permit did not require the holder to perform any particular kind or amount of work and might cover areas of widely different size. A report on investigations carried out under the permit had to be submitted no later than six months following its expiry. Discoveries of mineral occurrences always had to be reported and the prospector might be required to submit all the data generated.

An exploration concession could be granted if the applicant was considered to possess the required skill and financial ability. This was an exclusive right to conduct exploration. However, it incorporated no security of tenure to any discoveries made. The maximum term of the concession was eight years in West Greenland and twelve years in the more inaccessible East Greenland. In contrast to prospecting permits, exploration concessions contained work obligations that were to be specified separately in each case. The concession was forfeited if no work was carried out for a period of three years, if the concessionaire was declared bankrupt or if conditions set out in the Mining Act or the concession were not met by the concessionaire.

A mining concession gave the holder an exclusive right to mine for a period of up to fifty years. Such a concession might be given as a direct continuation of an exploration concession, in which case the company holding the latter had preferential status if it fulfilled the requirements for a mining concession. These include that the holder must be a company registered in Denmark and must possess the necessary technical and financial resources. In special circumstances, the government might consider it reasonable to give the mining concession to another applicant, in which case the company holding the exploration concession was to be compensated for its exploration expenditures. Additional sections concerned use of local labour, submission of plans, mine safety and forfeiture of the concession. These were not meant as specific guidelines but gave the Mineral Resources Administration power to determine concessionary terms in these areas.

The text of the Mining Act was a policy framework designed to be filled in by the text of individual concessions. As a result, a number of administrative practices have evolved since the act was passed by the Danish Folketing in 1978. These were approved by the Joint Committee on Mineral Resources in Greenland and in a number of cases they constituted significant policy changes. The most important of these was the practice of including options for state participation in exploration concessions for minerals in Greenland through an option for the state petroleum and minerals company Nunaoil A/S to acquire a maximum of 50% of a project, half on a paid but low-risk basis (i.e., paying for a share *after* the results of the private investor's exploration were known) and the other half carried by the private investor. Options of this type were first used in an oil concession in East Greenland but were subsequently adopted for all exploration concessions.

Concessions also contained a number of blanket authorizations that enabled the Mineral Resources Administration to change or modify the terms of the concession. Any method of exploration or type of machinery could be banned and the Mineral Resources Administration could issue general regulations for the purpose of assuring workplace safety, and for environmental, preservation, resource, health and general considerations. Other administrative practices included a provision enabling the Mineral Resources Administration to force different companies to cooperate on adjoining projects within a restricted area. A final but very important administrative

practice was not to give information on future economic conditions for mining operations (apart from the option clause) before a deposit had been discovered and preferably also completely delineated (Mineral Resources Administration, 1988).

In the environmental field, administrative practice had always been based on an ad-hoc approach. Despite calls for standardized environmental regulation, it had always been maintained that each case will be one of unique interaction between geochemistry and the living environment on the location. Usually, a list of possible environmental investigations could be supplied by the Mineral Resources Administration, although the number and extent of these cannot be defined easily (Hansen, 1990).

It would be an overstatement to say that an established taxation policy existed for mining in Greenland. As mentioned above, the Mineral Resources Administration generally took the view that such matters should be negotiated separately in each case (Mineral Resources Administration, 1988). Thus, an exploration company contemplating investment in Greenland could only be guided by the two old concessions given to Greenex A/S and ARCO Inc. (for oil in East Greenland) and the stated policies for government participation through options.

The Greenex concession was comparatively simple on the question of taxation: Greenex paid an "area fee" of DKK 1.1 million annually in the final years of operation, a 5% tax on dividends paid to shareholders and a profit tax or royalty of 45% of the annual concession profits. The profit tax was only imposed when the capital investment in the mine had been fully recovered. However, according to the Mineral Resources Administration 1987-88 annual report, the dividend tax concerning foreign shareholders could be deducted from the profit tax and could be considered an advance payment of this. In addition, Greenex was exempt from all other tax and customs regulations. The usefulness of these facts is limited by the absence of depreciation schedules and knowledge of concession accounting practices.

The East Greenland concession pertained to a petroleum project and contained highly detailed specifications for the course of the exploration project and the possible later production phase. During the exploration phase, Nunaoil A/S had a 25% share on a carried basis. If exploration yielded favourable results and a discovery was developed, provisions for progressive royalty payments, standard corporate taxation and additional state participation would come into force.

Proposals for Change — the 1990 Strategy Report

In May 1990, the Mineral Resources Administration for Greenland published a report from a working group on mineral resource development strategy in Greenland (Mineral Resources Administration, 1990). Dealing with overall strategy and goals for minerals, petroleum and administrative organization, the report considers the most obvious problems inherent in the present system. These include government participation, taxation, security of title and information and marketing strategy. The report indicates that some significant changes in overall policy and administrative practice are on their way in Greenland.

The approach to mineral resource development adopted so far is characterized as "hesitant." A legal framework and an administrative system have been established but little has been done to promote or market Greenland as a target for mineral investment (see also Wood, 1989). As Greenland was now

without any mining activity, it was recognized that changes in policy were required.

The report recognizes that the basic conditions for attracting mineral investment are stability and security of investment, competitive terms, including simple administration, and easy access to information. Considering the need for more economic activity in Greenland, the overall goal for a revised mineral policy is proposed as the creation of an industry (exploration and production) that can contribute significantly to the economy of Greenland. The attainment of this goal requires, first, a very large increase in mineral exploration (and subsequent production) and, second, that such activity actually benefit Greenland in terms of commercial development, employment, tax revenue, education, infrastructure, technology transfer and internationalization. At the same time, the costs (environmental, social, cultural, etc.) arising from mineral development must be limited as much as possible.

With respect to minerals, the long-term goal is to have two to four medium-sized operations at any given time, as well as a number of smaller ones. The short-term goal is to attract a "sufficient" number of international mining companies in order to define enough geophysical anomalies to reach the long-term goal (using 2000 geochemical/geophysical anomalies per discovery).

Finally, the goal section discusses possible Greenlandic participation in mineral activities, including employment in exploration and production, supply of goods and services, downstream processing and local investment participation. Whether or not these goals can be reached depends on the size and stability of the future market, the level of exploration activity and the number of mines.

Four elements that determine if the international mining industry will be attracted are identified: concession terms offered, legal and administrative framework, amount and quality of information available and marketing effort towards the mining industry. The most pressing problems concern the conditions offered in prospecting permits, exploration concessions and mining concessions. The resulting changes are extensive and are discussed below. Hard-rock mine taxation is almost completely removed from the mining act, but the additions to the Greenland corporate taxation regulations are described.

The New Mining Act of 1991

The new Mining Act for Greenland (Lov nr. 335, 6 June 1991) is in many ways significantly different from its predecessor, but the concept of legislation as an overall framework for specific concessions or permits is retained and, in some ways, strengthened. Within this framework, major changes have been made concerning tenure, taxation, closure and abandonment of sites, and government-investor relations.

The three-tier permit system is modified, with the initial five-year prospecting permit retained in unchanged form but with two additions that allow the minister for energy to claim a tax as well as a fee on permits. These charges are additional to any expenditure arising from the processing of applications, which may also be charged to the applicant. Combined exploration and mining permits are exclusive to the holder but can be separate for each phase, in which case the exploration permittee has a right to obtain a mining permit. Exploration permits can provide for a gradual reduction of the permit area and for specific work requirements. Mining permits can usually be granted only to companies registered in Greenland whose only

business is activities covered by the permit and who possess the necessary skill and financial resources. As for the exploration permit, the minister may collect a fee for the mining permit. The term of an exploration permit is ten years, renewable for a maximum of three two-year periods. For a mining permit the standard term is thirty years, while the term for combined exploration and mining permits usually cannot exceed fifty years.

Permits can also specify to what extent Greenlandic labour is to be employed or Greenlandic suppliers, contractors and services are to be engaged. Alternative labour or suppliers, etc., may be used if special skills required are not available in Greenland or if Greenlandic suppliers are not competitive.

A general plan of operations and installations must be approved before mining commences. This also applies to exploration permits, any installations in and outside the permit area (e.g., infrastructure) and mine closure plans. The permit holder must supply all necessary information to the authorities for the processing of the application and must also regularly report on activities and results. Conditions for reporting and confidentiality of information are to be specified in the permit.

Closure (temporary or permanent) of a mine or the end of exploration require that the permittee remove installation and clear affected areas. The exact terms are to be specified in permits, possibly including the posting of a bond as collateral for reclamation. As part of the application for a mining permit, the applicant must submit a plan indicating how affected areas are to be left and prove that this is provided for financially. Temporary discontinuation of operations is generally allowed but requires the approval of the minister and it must be shown that closure plans can be carried out in case of permanent closure. The minister can activate the closure plan if a mine has been out of operation for six years.

The permittee is liable for damages caused by the activity and must pay compensation according to legislation and normal Danish liability law. Permits can also specify that the permittee is liable for damages caused by the permitted activity, even though the damage was accidental. On the other hand, this liability may be reduced if the party involved (i.e., the victim) was grossly negligent.

The summary above contains numerous references to what the minister can do and what a permit can specify. This "open" framework is not intended to be filled from scratch for each new application, but rather "standard" permit terms are formulated so that only smaller details have to be changed according to local conditions, etc. This gives the authorities a sufficiently flexible tool with which to manage mineral activity in a social and political environment currently undergoing rapid change (these arguments are mentioned in the remarks presented to the Danish Folketing when the Mining Bill was tabled on 2 May 1991).

A significant part of the mining policy reform is the adjustments made to the Greenland income tax act with respect to mineral resource companies (i.e., oil and mining). The changes include a tax reduction for downstream processing of mineral concentrates (10% of investment in secondary processing facilities annually), deduction before tax of funds set aside for site rehabilitation if terms for collateral for this have been met, unlimited carry forward of losses and a rule that assures that mining companies are taxed directly by the Home Rule Tax Directorate rather than the municipality in which the mine is located. The last rule means that mines will be taxed at the lowest percentage (at present anyway) in Greenland, 35%

of taxable income. In addition to these changes, the provisions may be replaced by alternative tax provisions if the mining permit so specifies.

Mineral-Led Development in Greenland

Visions of mineral discoveries and huge benefits for Greenland have appeared regularly and with varying degrees of intensity in the past. Examples include the Malmbjerget Molybdenum Porphyry in the 1960s, uranium in the rocks of Ilímaussaq in Southwest Greenland in the 1970s and the Motzfeldt Lake Niobium, Tantalum and Rare Earth Elements project in the 1980s. With the new mining policy as expressed in legislation and in the strategy report described above, a major step towards realizing these visions has been taken. However, both the goals set out in the report and the means with which they are expected to be reached deserve some attention.

Before embarking on an effort to promote mining in Greenland, the basic desirability of such an undertaking ought to be considered in detail. In general, benefits from mining are considered to include higher labour and capital income (for domestic capital), both directly from a project and from suppliers and subcontractors involved, technology transfer, regional development, foundations for resource-based industrialization, higher net foreign exchange earnings and higher government revenues (both from mining taxes and taxation of incomes related to mining). Costs, on the other hand, are likely to include increased dependence on the outside world, environmental degradation and the effects of inframarginal projects on non-mineral exports and export substituting industry (Gillis, 1978).

In the case of Greenland, the strategy report emphasizes that benefits in terms of regional development, primary and secondary employment, technology transfer and improved labour skills are expected to contribute significantly to the overall benefit for Greenland. Experience from many developing countries shows that the latter benefits most often do not materialize as expected (see Gillis, 1978:10-11). An isolated mine may during its development and production life provide significant employment, higher incomes and training, but only as long as the mine operates. There is no reason to believe that isolated mining operations will create much regional development of a permanent nature. When the mine closes the local economy is deeply affected, as experienced recently by the municipality of Ummanak after the closure of the Black Angel mine in 1990.

The extreme isolation of most promising mineral occurrences in Greenland indicates that the traditional regional development argument must not be overemphasized in Greenland. The remaining possible benefits (except government revenue) depend very much on whether Greenland is in a position to gain them. This requires a skilled workforce and able subcontractors, both of whom must be competitive. A way of establishing these is to require the first concession holders to undertake training of non-skilled local labour.

Government revenues from the mining sector are likely to come from three sources: taxation of the mining companies, suppliers and subcontractors, as well as personal income taxes from individuals employed by these. Only the mining company itself requires special tax treatment.

The special feature of mining companies is that they have the opportunity to earn "economic rent," i.e., a surplus above what is required to find and extract a mineral deposit. For each

deposit, the size of this rent depends on the quality of the ore body and the efficiency with which it is extracted from the ground. By its definition, rent from mines does not include returns to capital exceeding what would otherwise be available. This means that the natural desire of governments is to collect as much as possible of the economic rent (Garnaut and Ross, 1977). For several reasons this is not possible in practice. First of all, 100% rent collection requires that there is no uncertainty about the outcome of the mining project. Second, capture of all of the rent would, if possible, remove any incentive for an efficient operation. The result would be dissipation of any potential rents from a given mine.

In Greenland, taxation of suppliers, subcontractors and employees is covered by existing tax regulation. The changes in the Greenland Tax Act mean that it is now also applied to mining companies, with appropriate provision for foreign companies to get a home-country tax credit and to be taxed at a current rate of 35%. Additional proposals in the strategy report included tax-system incentives, such as tax holidays, processing credits (to encourage processing in Greenland) and additional tax credits, as well as use of special incentives to encourage Greenlandic and possibly also Danish investment in resource projects. However, only the processing credit survived to become law.

Six main factors affecting the main goal of maximizing rent collected by government from mining have been identified by Garnaut and Ross (1983). These are neutrality of the tax system, its stability (probability of changes to the system as perceived by investors), intrinsic investor risk (tendency of the system to reduce risk), maximum tax rate possible (without affecting the incentive for efficient operation), adaptability of the system to realized profit, government risk (i.e., reduction of variability of revenue) and revenue delay. Each of these factors should be considered when a general taxation policy for mining in Greenland is designed. In the present situation, with the wish to attract exploration investment to Greenland, one of the most effective incentives would be a tax system seen to be neutral, stable and risk minimizing.

Tax holidays, depletion allowances, additional tax credits and processing credits, as well as use of tax system incentives to attract investment from Danish and Greenlandic taxpayers in need of a tax break, were mentioned as possible instruments, but nowhere were the economic implications of using such instruments discussed. Most of these instruments have commonly been used to mitigate the effects of a non-neutral tax system or to achieve other policy goals than rent capture.

The remaining incentive is an allowance of 10% annually of investment in secondary processing facilities located in Greenland. Processing allowances are widely used in mineral-producing countries as an incentive to locate downstream processing facilities there. The problem with such an allowance is that it acts as a subsidy for downstream processing by substituting cheap feedstock for labour and ultimately acts to dissipate rent (Gaffney, 1977).

Whether the incentive will have any impact is an open question, but downstream processing facilities will probably be located elsewhere as a result of poor infrastructure, low availability of skilled labour and the generally fixed structure of most mineral industries. If the incentive does work it may dissipate a modest proportion of mineral rents.

It is important to note that any mining tax system must address the concerns of both the state and investors. Maximizing rent capture and generating a stable source of income

must be balanced against the needs of investors in an industry characterized by natural uncertainty and market cyclicality. Mineral economists have long agreed that ordinary tax schemes cannot be applied to mining without great difficulty. A simplistic solution known as the "resource rent tax" was proposed by Garnaut and Ross (1975, 1983). This has evolved into a more realistic regime in terms of stable government revenue, which includes three elements. The first is a small *ad valorem* tax on the value of mineral production. Second is a corporate tax that includes deductions for exploration and research costs, as well as allowing carry-forward of losses. The third element is an additional profit tax that is applied when a threshold rate of return has been achieved, thereby partly eliminating unacceptable windfall profits to investors (Kumar, 1991).

The strategy report and the new Mining Act show a clear trend towards more general regulation of mineral activities and away from the previous, mostly ad-hoc approaches. This represents a shift in policy away from what resembles a "bargaining model" in which concession terms are settled by marketplace bargaining (Smith and Wells, 1975; Gillis, 1978). In this model, excessive profits to the investor will result in pressures for renegotiation (which in the end may give the government a greater share of profits). The alternative to the bargaining model is the resource rent approach advocated by Garnaut and Ross (1983), which emphasizes fixed taxation rules for the collection of mineral rents. The applicability of the latter model depends, however, on the presence of competition in the supply of investment.

If this condition is not fulfilled, a case of bilateral monopoly will exist. Such a situation may be caused either by the investor having exclusive access to markets or technology or by unique managerial ability, or by the investor having been given exclusive tenure to a mineral property. The first cause of bilateral monopoly may exist in certain industries over considerable periods and in specific regions. The second problem of bilateral monopoly can, it is believed, be circumvented by agreeing on fiscal terms (in general or for a project) before the start of exploration (Garnaut and Ross, 1983). In the case of Greenland, situations of bilateral monopoly may easily occur, especially if only a few companies want to invest there. At a time when Greenland is almost desperate for any new economic activity, the bargaining power of an investor becomes increasingly important and collection of a reasonable part of mineral rents correspondingly difficult.

Greenland's economy is relatively small (see, e.g., Lyck, 1988) and labour supply is constrained by a small population. At the same time, one of the goals of the strategy report is to expand employment in the mining sector. However, many resource-exporting countries have experienced considerable difficulties of a type often called "Dutch Disease" with rapid development of a natural resource industry. The problem is, very simply, that this rapid development will tend to bid factors of production (e.g., labour) away from their current employment, forcing up wages and, because exporters cannot pass higher costs on into higher prices for their products, thus causing existing export industries to contract (production for domestic use can pass on higher costs to the consumers) (Caves and Jones, 1985). For mining in Greenland, the problem is likely to be the greatest in terms of labour availability, whereas capital will probably be foreign anyway.

CONCLUSIONS

With few exceptions, Greenland appears in the past to have been unable to attract mineral exploration investment. Physical

barriers and unfavourable geology are two possible but unconvincing explanations. Instead, inappropriate mining policy, combined with a generally hesitant attitude towards mining ventures in Greenland, is probably the dominant reason.

The strategy report acknowledges both of these problems but at the same time it heralds a concerted attempt to attract the investment required for Greenland to benefit from the natural resource endowment of the country. However, too much optimism is premature, for, despite numerous reports of interesting mineralizations in the publications of the Geological Survey of Greenland, there is little firm evidence of the existence of ore bodies suitable for mining. Only continued exploration can change this.

Assuming for the moment that deposits do exist, the next question is whether these resources can provide Greenland with the additional economic activity the country needs. It probably can, but success depends very much on how such development is managed. Rent capture is perhaps the most visible issue, and here the new policy may be adequate but not ideal, the main problem being one of credibility: will the tax rate remain constant or can it be expected to rise if profits are high?

The other changes introduced with the new Greenland Mining Act are all significant improvements, even if one might query the many provisions for taxes and charges on the various types of permit. The improved security of tenure and the "standard" permits implied in the Mining Act, combined with the central authority of the Mineral Resources Administration (i.e., no other bureaucratic interface between applicant and government), create a competitive framework when compared to other jurisdictions.

The achievement of other goals than government revenue still requires careful handling, particularly with respect to technology transfer, permanent employment (i.e., beyond the end of a mine), dependency on mineral exports and investment of mineral revenues. The management of the economy while development and mining proceed will determine whether long-term benefits can be realized or whether government revenues and higher incomes are consumed when available.

Development of minerals may also strain the economy regardless of taxation, as an expanding mining sector draws factors away from other export industries. This phenomenon may be particularly dangerous in Greenland, where the total size of the economy is so small and highly dependent on exports that just one or two projects might produce symptoms of "Dutch Disease."

Mineral development may result in significant government revenues, but at the same time these are notoriously volatile. Regardless of what policy is adopted with regard to the use of these revenues, a way to stabilize the flow of income is required.

At a time when excitement in Greenland is running high as a result of encouraging exploration reports from the Skaer-gaard gold camp in East Greenland (see Sinding and Poole, 1991), Greenland has taken a great step towards realizing its geological potential. However, a good mining act and an adequate tax policy are just the beginning. The real test will come if and when Greenland has to manage its new-found wealth.

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