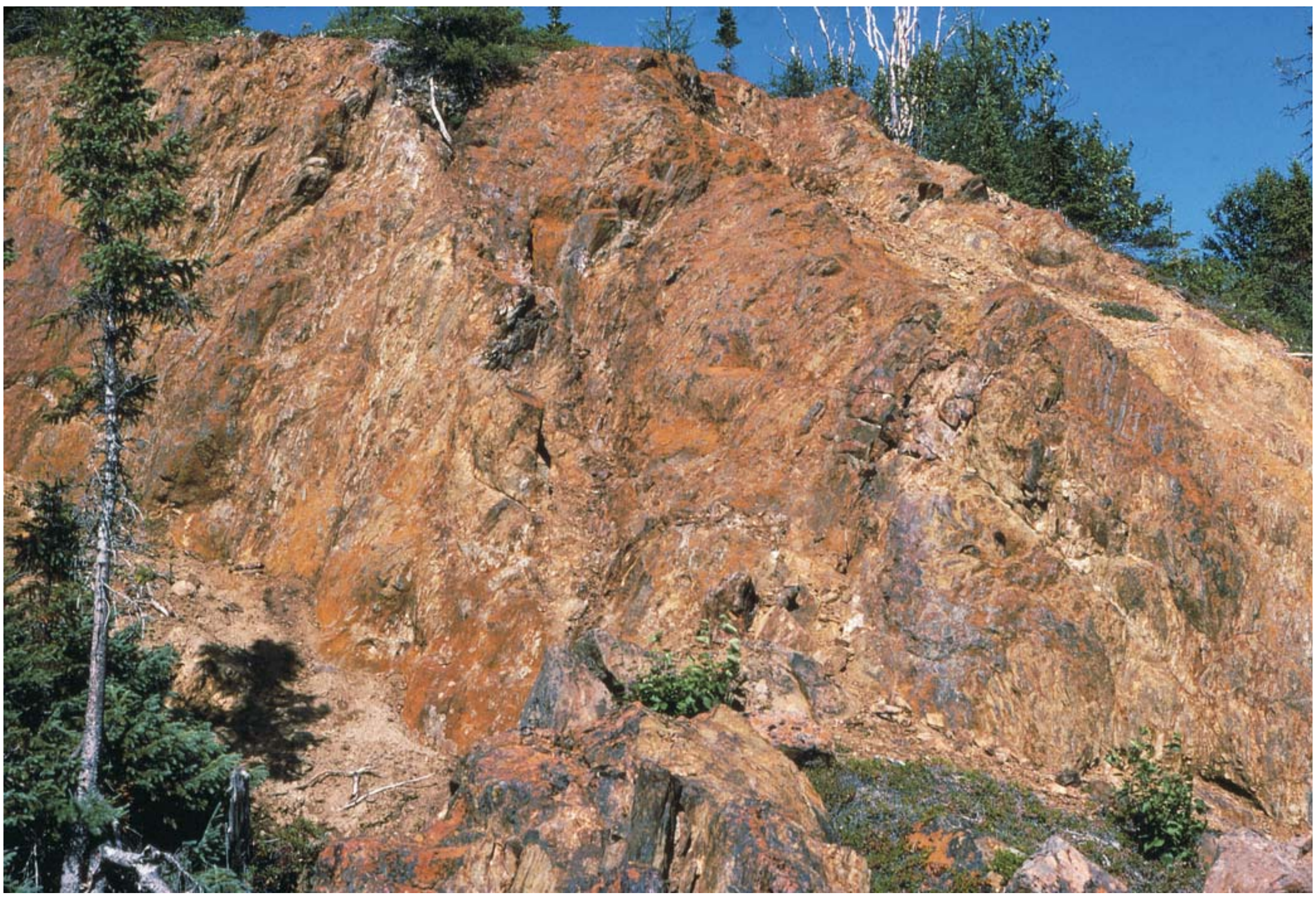
Newfoundland Labrador

Natural Resources

Mines

MINERAL OCCURRENCES AND METALLOGENESIS IN EASTERN LABRADOR



C.F. Gower

Open File LAB/1571

St. John's, Newfoundland
November, 2010

NOTE

DISCLAIMER

Recommended citation:
Gower, C.F.
2010: Mineral occurrences and metallogenesis in eastern Labrador. Government of Newfoundland and Labrador, Department of Natural Resources, Geological Survey, Open File LAB/1571, 141 pages.

Cover: Pyritic gossan in Paradise metasedimentary gneiss belt, Hawke Bay (mineral occurrence 013H/01/Pyr004).

Newfoundland Labrador

Natural Resources

Mines

MINERAL OCCURRENCES AND METALLOGENESIS IN EASTERN LABRADOR

C.F. Gower

Open File LAB/1571

St. John's, Newfoundland
November, 2010

CONTENTS

Page

Page

Page

Page

Page

FIGURES

PLATES

Page

TABLES

Page

MAP

ABSTRACT

Geological mapping and mineral exploration have resulted in the reporting of 545 mineral occurrences in the eastern Makkovik Province and the Grenville Province in eastern Labrador. This report mentions all occurrences, in the context of grouping them according their geological setting, particularly addressing the age and nature of the host rock, and identifying commodities that show repeated mutual association. The objective of this approach is to attempt to recognize generalized metallogenic settings in the hope that this concept-based approach will assist future mineral exploration in the region.

The eastern Makkovik Province (Cape Harrison domain) is characterized by U–Mo–F–pyrite mineralization, associated with mid-Paleoproterozoic felsic volcanic rocks (correlated with the ca. *1860 Ma Aillik Group), mid- to late-Paleoproterozoic granitoid rocks (1840–1650 Ma), and pegmatite–quartz veins–minor shear zones. All mineralization is attributed to late-stage felsic magmatic activity during various events, including the introduction of hydrothermal and/or meteoric fluids.*

In the Grenville Province, the earliest recognized mineralization is a Cu–(Au–Zn–Mo–U)–pyrite association found in dominantly pelitic metasedimentary gneisses, probably deposited between 1810 and 1770 Ma. In eastern Labrador, mineralization is mostly pyrite and Cu, but, in probably correlative rocks in the Ketilidian mobile belt in southern Greenland, economic Au is known and deposits are also enriched Zn. Both mildly anomalous Au and Zn have been found in places in the metasedimentary gneisses in eastern Labrador. A volcanic-exhalative, Besshi-type model is favoured for this type of mineralization.

In Labradorian (1710–1600 Ma) rocks, mineralization is classified as follows: i) Cu–(Ni–Au–Pd–Pt)–pyrite and hints of Cr–V concentrations in ultramafic and mafic rocks – an association that has features in common with that known in subduction-related intrusive complexes elsewhere, including those referred to as 'Alaskan-type'; ii) Fe–Ti oxide mineralization in anorthositic and leucogabbronoritic rocks that may include minor Cu and Ni, and which is generally linked with late-stage residual liquids from anorthosite-norite magmas; and iii) Cu (Au–REE–F–U–Th–Zr) mineralization in intrusive and extrusive felsic volcanic rocks, for which an Olympic Dam or IOCG (Iron Ore–Copper–Gold) deposit model has appeal. This tripartite grouping is in keeping with the trimodal mafic–anorthositic–monzogranitic Labradorian magmatic association previously recognized in the eastern Grenville Province.

Indications of mineralization in post-Labradorian – pre-Grenvillian rocks in eastern Labrador are sparse, but some potential may exist for Cu–Fe oxide–pyrite mineralization in layered mafic intrusions located at the interface between Labradorian and Pinwarian (1520–1460 Ma) crustal regions, as well as for Mo mineralization in ca. *1300 Ma felsic intrusions.*

The best candidates for Grenvillian-related (1090–985 Ma) mineralization are, i) nepheline in mid-Grenvillian alkali-feldspar syenite, and ii) U–Mo–F–REE–pyrite mineralization in pegmatite (although not all pegmatite is necessarily of Grenvillian age). The pegmatites carry potentially economic amazonite and muscovite in places. Modelling Grenvillian metallogenesis requires an appreciation that Grenvillian orogenesis was characterized by collisional tectonism involving older rocks and concomitant modification of earlier metallogenic environments.

Post-Grenvillian mineralization can be related to rifting (615–550 Ma) that preceded the creation of Iapetus Ocean, during which time the Long Range dykes (hosting minor Cu–pyrite mineralization), and huge quartz veins were emplaced in eastern Labrador. Apart from their potential as a silica resource, the quartz veins (and associated brittle fault brecciation) carry minor sulphide in places.

INTRODUCTION

This document is a review of mineral exploration, mineral occurrences, and metallogenic settings in eastern Labrador, embracing the eastern part of the Makkovik Province and the eastern third of the Grenville Province in Labrador. Rather than being merely underexplored, much of this region is unexplored.

It needs to be emphasized, at the outset, that favourable areas, 'hot' commodities and choice exploration targets change with time. There are pitfalls in depending on any assessment (such as this one) of commodities of economic interest for political, social or economic purposes. Such assessments can, at best, only reflect knowledge, ideas and concepts at time of writing, and soon become out-of-date.

The objectives are two-fold. The first is to provide a detailed review of all mineral occurrences in eastern Labrador, grouping them in such a manner so that features in common can be identified. The second is to attempt to identify generalized metallogenic settings.

With respect to the first objective, much of the information contained in this report now resides in the mineral occurrence database system (MODS) of the Geological Survey of Newfoundland and Labrador (to which a high proportion of the information regarding eastern Labrador has been supplied by the author from his own field data). Every non-confidential mineral occurrence in the region is mentioned and can be related to the MODS database, where more information can be found. For each occurrence, the author has returned to the original source so as to ensure accuracy of the information (commenting, in places, as to the veracity of the information within the source). Where inconsistencies between MODS records and original reports were discovered, they have now been reconciled. Inconsistencies detected within reports have been noted. Information contained in this document regarding some new occurrences and new information on earlier-known occurrences has been incorporated into the MODS database. The descriptions given for each occurrence are intended to be thorough. Granted, systematic mention of every site makes for tedious reading, but, at the same time, the report goes well beyond mere description. By grouping similar occurrences, a regional geological context can be developed and its interpretation provided. By this means, it is hoped that future mineral exploration is assisted, stimulated, its efficiency enhanced, and wasteful expenditures mitigated.

The second objective, an attempt to identify generalized metallogenic settings, is intended to provide an improved basis by which systematic grassroots mineral exploration could be conducted in the future. The hope is that this approach will be employed in preference to ad hoc assessment of previously reported mineralization – the method that has tended to dominate exploration efforts in the region during the past two decades. In an attempt to foster the former methodology, this report is organized geologically (first by tectonic province, then rock group) rather than by commodity. It is hoped that this approach will engender better appreciation of the relationship between commodities and their host rocks. It also forces the user (and the writer, it should be added) to be more aware of the geological background to the occurrences, which, in the author's opinion, is an essential prerequisite to better understanding the origins of the mineralization and, indirectly, to more effective exploration.

INFRASTRUCTURE AND ALTERNATIVE LAND USE

This section draws attention to some of the non-geological and non-mineral-economic factors that have, or are likely to have, an important bearing on mineral exploration in southeast Labrador (Figure 1A, B).

HIGHWAYS

Trans-Labrador Highway

On December 16th, 2009, the government of Newfoundland and Labrador announced the opening of Phase III of the Trans-Labrador Highway. Phase III involved highway construction between Cartwright Junction and Happy Valley-Goose Bay. Further work was carried out during the summer, 2010 to officially complete the highway.

The Trans-Labrador Highway stretches approximately 1150 km from southeasternmost Labrador to southwest Labrador, passing through Happy Valley-Goose Bay, Churchill Falls and Labrador City–Wabush. The highway (Hwy 510) in southeast Labrador links various communities between Blanc Sablon and Red Bay, then, north of Red Bay, passes by Lodge Bay, Mary's Harbour and Port Hope Simpson. Branch roads have been constructed to link up St. Lewis (Hwy 513), Charlottetown and Pinsent Arm (Hwys 514 and 515), and Cartwright (Hwy 516). Distances are as follows: Blanc Sablon to Cartwright Junction – 306 km; Cartwright Junction to Happy Valley-Goose Bay Junction – 287 km; branch road to St. Lewis – 30 km; branch road to Charlottetown and Pinsent Arm – 29 + 24 km; Cartwright Junction to Cartwright – 91 km.

The author has examined all new road cuts and quarries created as a result of road construction (note that some small outcrops no longer exist due to subsequent landscaping), resulting in about 1000 data stations and 40 mineral occurrences being added to the database. From the mineral exploration

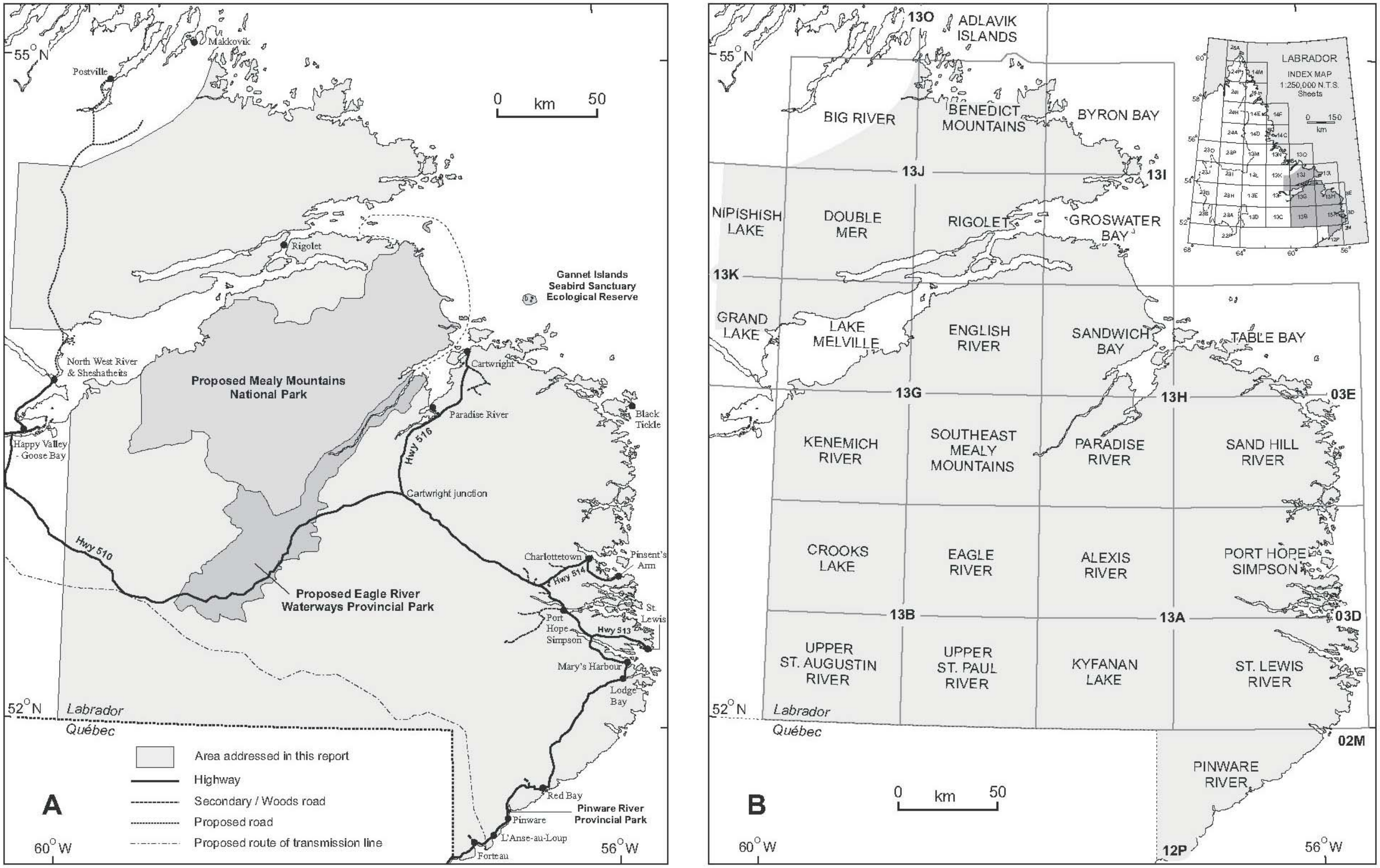


Figure 1. *Eastern Labrador showing area addressed in this report.* ***A.*** *Major communities and cultural features (present and proposed roads, parks and transmission line).* ***B.*** *Names and locations of 1:100 000-scale maps for region.*

viewpoint, the improved access provided by the highway obviously reduces transportation costs, especially reliance on aircraft. Staking of mineral claims demonstrates that there has already been impact on mineral exploration through follow-up of mineral occurrences revealed in roadside outcrops.

Secondary Road Access

The construction of the highway has been the catalyst for a network of subsidiary roads. The longest is a woods road that extends over 50 km in a general southwest direction from Port Hope Simpson with a 12-km subsidiary road leading west, branching off about 14 km west of Port Hope Simpson; part of this road existed before the construction of the Trans-Labrador Highway. Several woods roads in the Charlotte junction area are gradually being developed. At present, three of them have each reached about 10 km from various departure points on the highway. In addition, southeast of Cartwright, about 40 km of roads have been constructed to provide access to a communications installation and for wood harvesting purposes. South of Red Bay, there are several short roads that have been in existence for many years, but none of them extends inland for more than a few kilometres.

Possible Highway from Northwest River to Postville

Aurora Minerals has outlined plans to construct a 140-km-long road from North West River to Postville via its Michelin U deposit, with a branch road to its Jacques Lake U deposit (http://www.aurora-energy.ca/?p=projects&s=labrador; 2010).

PARKS

Proposed Mealy Mountains National Park

In February 2010, the governments of Canada and Newfoundland and Labrador announced that they have agreed to take the necessary steps to establish a national park reserve in the Mealy Mountains area of Labrador. The park reserve will protect 10 700 km^2. The provincial government also announced its intention to establish a waterway provincial park to protect the Eagle River. This will be adjacent to the proposed national park and, collectively the two parks will protect an area over 13 000 km^2. This represents roughly 60% of the 22 000 km^2 area currently designated as the Mealy Mountains National Park study area, which includes, not only the Mealy Mountains and much of the Eagle River drainage basin, but also Porcupine Strand and the northwest side of Sandwich Bay. The 40% region dropped includes some of the western Mealy Mountains and large areas south of the Mealy Mountains, as well as areas east of Rigolet and south of The Backway.

Apart from 1:100 000-scale geological mapping carried out in the 1980s and mineral exploration that was mostly carried out in the 1950s and 1960s, the region within the proposed national park is poorly known from the mineral potential standpoint. In the northeastern half of the region, some mineral potential for U, Mo, Cu, and possibly REE (rare-earth-elements) has been identified, whereas in the Mealy Mountains, the target has been mostly ilmenite–magnetite, with a lesser focus on base metals. Porcupine Strand has also been assessed for ilmenite placer deposits. The Mealy Mountains National Park study area is currently closed to staking.

Provincial Parks

Proposed Eagle River Waterways Park

Concurrently with a joint federal–provincial announcement regarding the creation of the Mealy Mountains National Park, the provincial government announced its intention to create the Eagle River Waterways Park (*see* earlier).

Gannet Islands Seabird Sanctuary Ecological Reserve

The Gannet Island Ecological Reserve is situated 42 km northeast of Cartwright, and was designated as such in 1983. It takes in 22 km^2, of which 20 km^2 is ocean surrounding the islands.

Pinware River Provincial Park

The Pinware River Provincial Park is a 68 hectare park situated near the mouth of the Pinware River, about 32 km from Red Bay. It was opened in 1974, and caters mainly to campers and day visitors.

HYDROELECTRICITY

Power Corridor from Muskrat Falls

Anticipating development of hydroelectric power at Muskrat Falls on the Churchill River, a power line corridor was surveyed across southeast Labrador. If constructed, the immediate effect on mineral exploration would be to make ground access along the corridor easier as a result of removal of forest and underbrush. This, in turn, would improve rock exposure, allow geological maps to be refined, and could lead to the discovery of previously unknown mineral occurrences.

Possible Hydroelectric Developments in Southeast Labrador

Nolan, White and Associates (1978) prepared a report on the hydroelectric potential of southeast Labrador, identifying possible dam sites on the Eagle, Paradise, Alexis, St. Lewis and Pinware rivers. Various schemes for water diversion from one drainage basin to another were also indicated. There has been very little recent public discussion regarding these possible hydroelectric developments, but, should they ever come to fruition, they would obviously have a bearing on mineral development. Areas of flooding, improved road access and sources of power for mining operations are some impacts.

MINERAL EXPLORATION IN EASTERN LABRADOR

PRE-1940s

The period prior to the mid-1940s (at which time mineral exploration, in its modern sense, commenced in eastern Labrador), was one of sporadic, small, and poorly documented discoveries and their attempted exploitation, especially by those living in the region, including aboriginal groups. Post-1900 developments include a small mica quarry opened in 1910 southwest of the community of Paradise River (Douglas, 1953), shallow pits dug on Black Island in Groswater Bay for copper in the early 1900s (Halet, 1946), and attempts to excavate mica on Grady Island and Black Island east of Cartwright (Gardner, 1938). Around the same time, magnetite occurrences were found in the Red Bay area (Hawley, 1944), and Douglas (1953) reported several mineral occurrences during his investigations along the Labrador coast in 1946 and 1947.

1940s

Exploration in the 1940s was conducted by Dome Exploration Limited (Halet, 1946) north of Lake Melville–Groswater Bay, but, within eastern Labrador, it resulted only in documentation of occurrences previously known to local inhabitants. In 1951, Frobisher Exploration Limited obtained a 3-year concession covering the western Mealy Mountains and area to the south (Evans, 1951). Immediately to the west (Figure 2A), Nalco (Newfoundland and Labrador Corporation) had a larger concession, which extended well to the west of the present area (Scharon, 1952a, b). Exploration in both areas was spurred on by the discovery of ilmenite deposits in similar anorthositic rocks at Allard Lake (Lac Tio) in eastern Quebec. The investigations included what were probably the first aeromagnetic surveys in eastern Labrador. Many anomalies were identified and followed by ground investigations. Nalco continued its work in the Mealy Mountains area in 1953 and 1954, focusing on a titaniferous magnetite deposit at Little River, near the northwest margin of the Mealy Mountains (Anderson, 1954; MacDougall, 1953, 1954).

1950s

In 1953, Brinex (British Newfoundland Exploration Limited) was granted exclusive mineral exploration rights to 50 000 square miles of Labrador, which covered (apart from other areas in Labrador) all of eastern Labrador except that already under concession to Frobisher and Nalco. The various areas in Labrador were identified alphabetically (Figure 2A). The northern half of eastern Labrador was termed Area D and the southern part Area E (Beavan, 1954). In 1953, further discoveries of magnetite-bearing pegmatites were made (by Brinex) in the Red Bay area, and a sulphide-bearing gossan found in the same area. During continued exploration in 1954, in Area D, Cu mineralization was found in the vicinity of Lake Michael and radioactivity detected at The Backway and in the Makkovik-Big River area. In Area E, Cu, Co, Ni occurrences were found in the Paradise River–Sandwich Bay area and on Alexis River; radioactivity was detected on White Bear River; and several mica prospects located. Nothing of interest was discovered in the interior parts of Area E, which were relinquished at the end of 1954 (Beavan, 1955; Piloski, 1955a). After 1955, for several years, Brinex concentrated its efforts in the Makkovik area, where several additional uranium showings were found, including the Kitts Pond deposit in 1956. Very little exploration activity occurred in eastern Labrador during this period, but, in 1959, Brinex entered into a joint agreement with Gunnex Limited to explore a block between 61°W to the Atlantic coast and between 54°N and 55°N (*i.e.*, much of the region previously referred to by Brinex as Area D; Figure 2B). The western part of this area was completed in 1959 without success (Kirwan, 1959), but, in 1960, in the eastern part, molybdenite was discovered (and subsequently drilled), at Tessialuk (Jay) Lake. Note that the lake was informally termed J(ay) Lake by explorationists, because of its shape. Sulphide occurrences were also found at Clegg Lake and Rocky Cove. Although the molybdenite mineralization was high grade, the project was abandoned after concluding that the mineralization was not *in situ* (Piloski, 1962).

1960s

In 1959, Brinex carried out an airborne magnetic and electromagnetic survey in the area south of Sandwich Bay. Follow-up, ground investigations were delayed until later (Sutton, 1965) when Brinex entered a joint venture with Pacific Petroleums Limited, The Hanna Mining Company, and Labrador Mining and Exploration Company Limited. The joint venture area covered about 3000 square miles (Figure 2B), extending from Sandwich Bay southeast to the coast. Field work in 1965 concentrated on the area previously covered by the airborne geophysical survey and resulted in discovery of several Cu, Ag and Ni occurrences. Investigations continued in 1966, completing the remainder of the joint ven-

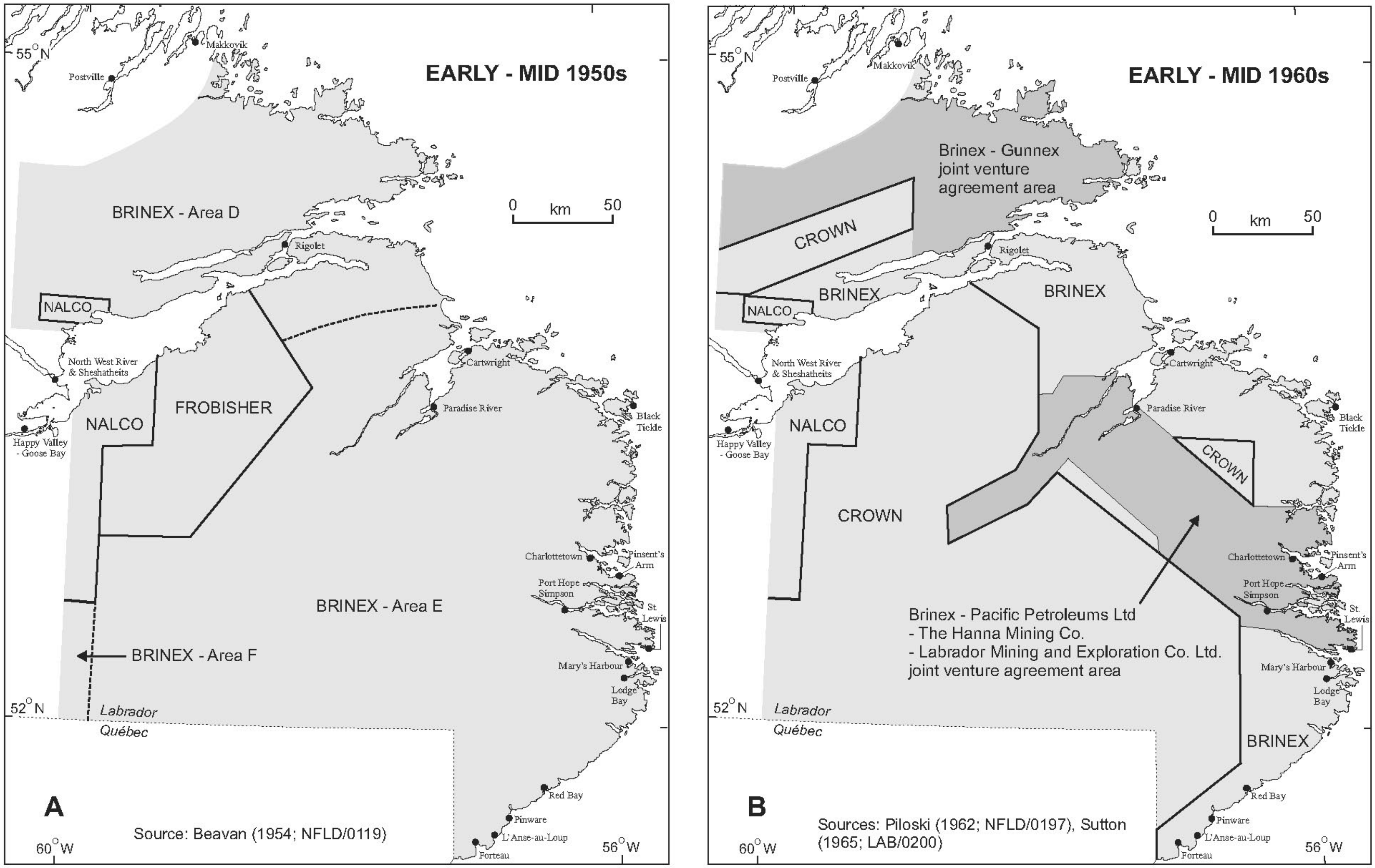


Figure 2. *Distribution of mineral land holdings in eastern Labrador for selected periods. **A.** Early to mid-1950s. **B.** Early to mid-1960s.*

ture area. Previously known gossans at Cape Bluff were mapped, gossans in the Occasional Harbour area were discovered, and drilling (the first in eastern Labrador) was carried out on the Eagle River Cu showing, which had been previously described by Douglas (1953). None of the successes were considered significant enough to continue exploration and activity by Brinex in the region ceased (Westoll, 1971). Despite the lack of follow-up, the program was, in the author's opinion, a huge success, providing a valuable long-term resource for mineral explorationists in that region.

During the 1960s, the 1:500 000 map of Eade (1962) for the Battle Harbour–Cartwright area and the 1:250 000 map of Stevenson (1970) for the Rigolet–Groswater Bay area (both by the Geological Survey of Canada) were completed. Neither project had the benefit of regional aeromagnetic data, most of which were acquired by the Geological Survey of Canada between 1971 and 1974.

1970s

In the 1970s, despite the additional geological and geophysical data, very little mineral exploration took place in eastern Labrador until the end of the decade, when exploration was renewed – partly stimulated by reconnaissance lake-sediment geochemical data, obtained in 1977 under the Canada–Newfoundland Uranium Reconnaissance Program. The following year, the Newfoundland Department of Mines and Energy carried out detailed geochemical lake-sediment and related follow-up surveys (McConnell, 1979) of several anomalous areas revealed by the reconnaissance survey.

In 1979, the focus turned to uranium. In the eastern Makkovik Province, Placer Development Limited entered into a joint agreement with Brinex to conduct exploration in the Benedict Mountains. Follow-up investigations, utilizing an earlier radiometric survey by Brinex, resulted in the discovery of uranium mineralization south of Burnt Island (Davidson and Kowalczyk, 1979). Farther south, in the Double Mer area, based on the discovery of uraniferous minerals by Kerswill and McConnell (1979), Northgate Exploration Limited and Whim Creek Consolidated N.L. carried out detailed exploration, including trenching and drilling, extending the known mineralization in the process (*e.g.*, Snow and Parker, 1979a-e). In the Mealy Mountains area, in ground still retained under its 1951 concession, Nalco carried out radiometric surveys and conducted ground investigations, reporting anomalous radioactivity and molybdenite mineralization (Kents, 1980).

1980s – EARLY 1990s

The 1980s and early 1990s were another quiescent period for mineral exploration in eastern Labrador, although there was some interest in industrial minerals, stimulated by reports from the Newfoundland Department of Mines and Energy (Meyer and Dean, 1986, 1988; Meyer, 1990). Of particular note were the discovery of Zr mineralization in the St. Lewis area, investigation of the silica potential of quartz veins west of Mary's Harbour, and evaluation of the Porcupine Strand beach sands for their heavy-mineral potential, especially ilmenite. The heavy-mineral project, which included shallow drilling, was conducted jointly by Cominco Limited, the Newfoundland Department of Mines and Energy and the Centre of Cold Ocean Resources Engineering (C-CORE) (*e.g.*, Emory-Moore and Meyer, 1992). In addition, as a result of Geological Survey of Newfoundland and Labrador 1:100 000-scale mapping under the direction of the author, an occurrence of muscovite, one of many but large enough itself to warrant industry interest, was found in the Hawke River area in 1985, ilmenite was found west of Port Hope Simpson in 1986, sapphire was found in the St. Lewis area in 1987, and nepheline found in the Red Bay area in 1993. The author and colleagues also published reports outlining the mineral potential of paragneiss in the Grenville Province (Gower and Erdmer, 1984), the relevance of Baltic Shield metallogeny to mineral exploration in Labrador (Gower, 1992), reviewed the mineral potential of the eastern Grenville Province (Gower *et al.*, 1995a) and identified new mineral exploration targets in the Pinware terrane (Gower *et al.*, 1995b). All of the discoveries and exploration targets identified during Geological Survey mapping have been staked and evaluated by industry (*see* below). During this period the author also contributed to a review of mineral exploration opportunities in Labrador (Swinden *et al.*, 1991) and a review of the metallogeny of the Grenville Province (Sangster *et al.*, 1992).

LATE 1990s

In 1994, the mineral exploration climate in eastern Labrador changed dramatically – due to the discovery of the Ni–Cu–Co deposit at Voisey's Bay, in northern Labrador. Regional exploration programs, principally for base-metal sulphide deposits and including airborne geophysical surveys, were conducted by Columbia Yukon Resources in the Paradise River area (Anderson *et al.*, 1996); by Ming Financial Corporation in the Paradise River area (Jones, 1997); by Falconbridge in the Charlottetown area (Thibert and Vaughan, 1999); by Cartaway Resources Corporation in the St Lewis and Kyfanan Lake areas (Beesley, 1996; Eveleigh, 1996, 1997); and by Greenshields Resources Incorporated in the Port Hope Simpson area (Joliffe, 1997). Drilling ensued in the Port Hope Simpson and Kyfanan Lake areas, but results did not encourage continued exploration.

More geographically restricted exploration projects (also principally for base-metal sulphide deposits, but mostly in areas of previously known mineral occurrences) were carried out in many parts of eastern Labrador. They include several areas in the Cape Charles and St. Lewis areas by Rockhopper Corporation (Andrews, 1995a-e); in the Eagle River and Crooked Lake areas by Consolidated Viscount Resources Limited (Connell and Brewer, 1996a-c; van Nostrand and Brewer, 1997); in the in the Hawke Bay to Black Tickle area by Vulcan Minerals Incorporated (Hodge, 1996a-c); in the Dead Islands area by Noranda Mining and Exploration Incorporated (Squires *et al.*, 1997); in the Red Bay, Ship Harbour and New York Bay areas by Consolidated Flin Flon Mines Limited (van Nostrand, 1995, 1996a, b; van Nostrand and Mark, 1996); in the Dykes River area, southeast of Cartwright by 407824 Alberta Limited – a project that included drilling (Clarke and de Carle, 1996); in the Mealy Mountains by Labrador International Mining Company (Wares and Leriche, 1996); in various areas north of Groswater Bay by Hebron Fjord Resources Incorporated (Corbeil and Villeneuve, 1995), Labrex Resources Limited (Dawson, 1996a, b) and Avalon Mines Limited / Ace Developments Limited (Pickett, 1996). Mineralization (mainly Cu), at higher grades than previously recorded, was found at several of the known sites, and several new occurrences were found. Among the more significant was the discovery of high platinum-group-element values in mafic rocks north of Groswater Bay.

During the same period (1995–2000), exploration was also active for commodities other than base-metal sulphides. In particular, investigation for ilmenite was carried out by Vulcan Minerals Incorporated in the Crooks Lake area, southeast of Goose Bay (*e.g.*, Laracy, 1998a). Further evaluation of the muscovite prospect at Hawke River was carried out by Labrador Mica Limited (Balakrishnan, 1995). The ilmenite occurrence west of Port Hope Simpson was evaluated by Tripple Uranium Resources (acquired by Capella Resources Limited, which currently holds the ground). Sapphire in the St. Lewis area was assessed by several groups, commencing with Rockhopper Corporation (Andrews, 1995f, g). The nepheline occurrences north of Red Bay were re-visited by the Unimin Corporation (Clark, 1997) and by Vulcan Minerals Incorporated (Laracy and Wilton, 1999). The silica potential of quartz veins west of Mary's Harbour was examined by Trinity Resources and Energy Limited (Morrissey, 1999). The zirconium occurrence at St. Lewis is currently held in the name of Quinlan.

2000 ONWARD

From 2000 onward, the focus has returned to uranium exploration, although not exclusively so. In the Makkovik Province, Silver Spruce Resources Incorporated discovered further uranium mineralization in the Benedict Mountains and has carried out drilling. Uranium mineralization and rare-earth-element mineralization has also been reported by Mega Uranium Limited farther east in the Benedict Mountains.

In the Grenville Province, during the same time period, Kirrin Resources Incorporated (formerly Monroe Minerals Incorporated) discovered uranium mineralization in the 'Anomaly' Lake area, northwest of Port Hope Simpson, following up ground investigations with drilling in 2008. Silver Spruce Resources Incorporated conducted exploration in the Double Mer area, and made the first discoveries of uranium mineralization in the 'Straits' area, between Henley Harbour and Red Bay.

As of 2010, mineral exploration is still very active in parts of both the Makkovik and Grenville provinces, especially in a belt extending from St Lewis, through Port Hope Simpson and continuing to the northwest. Currently involved companies in that area include Search Minerals Incorporated, Alterra Resources Incorporated, B&A Minerals Limited on the southwest side, and Eagleridge Resources Incorporated on the northeast side.

The most recent contribution to assisting mineral exploration is a high-density lake-sediment and water survey for parts of eastern Labrador completed by McConnell and Ricketts (2010).

MINERAL OCCURRENCES

DATABASE

The mineral occurrence database for eastern Labrador contains information on 545 mineral occurrences, the distribution of which is shown in Figure 3 and a complete listing given in Appendix 1 (the distribution of mineral occurrences correlates markedly with quality of access and rock exposure, but, as will be addressed later in this report, is strongly controlled by geological factors). No attempt has been made to apply stringent constraints on what should be regarded as a mineral occurrence. Some readers will regard many of the mineral occurrences reviewed here as so trivial as to be exasperating, and there will be others who perceive the same occurrences as the path to riches. All information known to the author (except any confidential propriety data) has been included.

A summary of the sources of mineral-occurrence discoveries is of interest. Of the 545 occurrences mentioned in this report, 60% were found during 1:100 000-scale mapping by the Geological Survey of Newfoundland and Labrador by the author and his assistants between 1979 and 2000 (Figure 4A, B). Peaks in mineral occurrence discoveries during this period correlate mostly with more active periods of geological mapping, and troughs correspond to years when no mapping projects took place. An additional 2.5% of the occurrences can be attributed to the author's colleagues or former colleagues (M.E. Cherry, P. Dean, W.L. Dickson, J.W. McConnell, J.R.

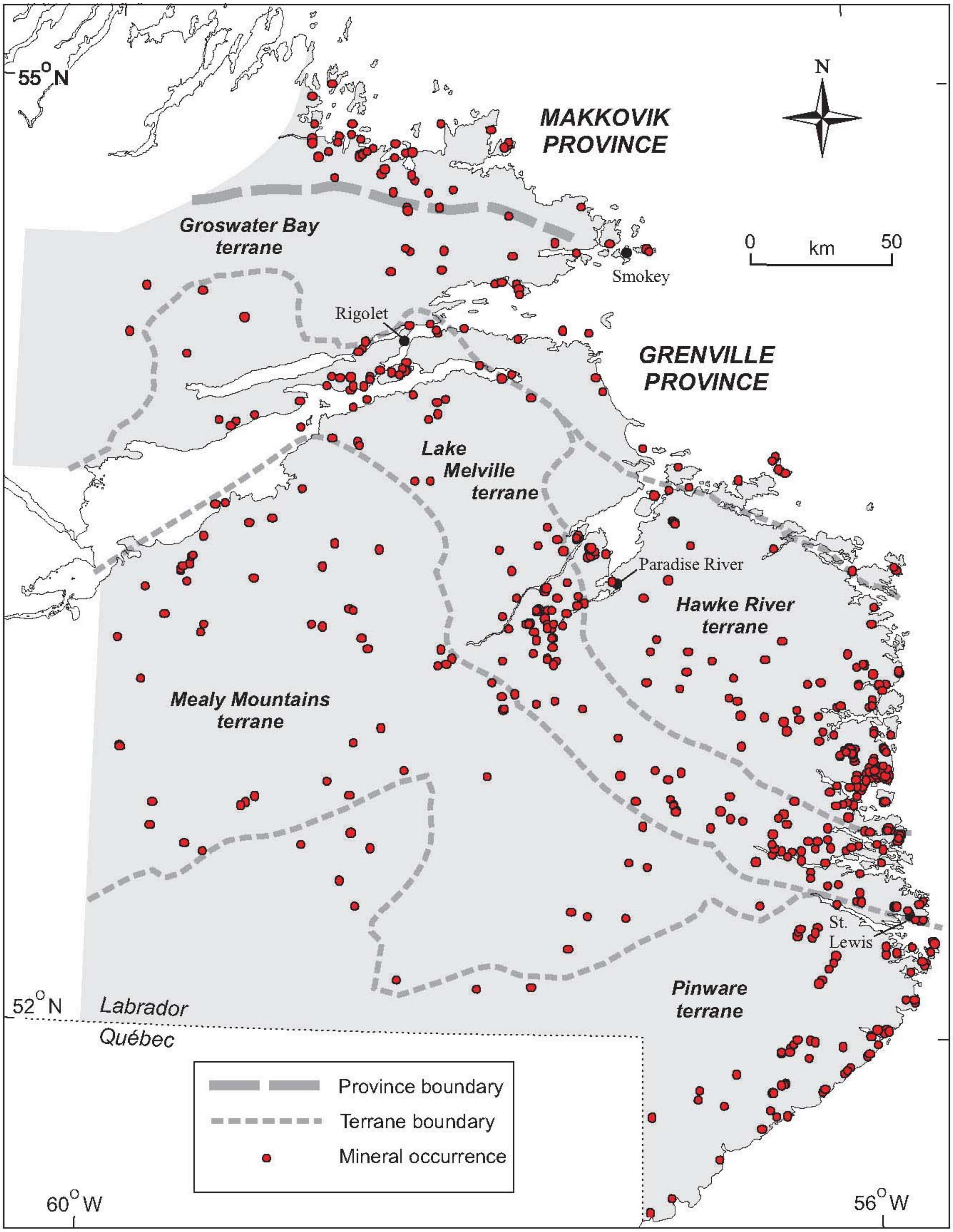


Figure 3. *Distribution of mineral occurrences in eastern Labrador (current to 2009). Also shown are tectonic provinces and terranes – to which repeated reference is made throughout the report.*

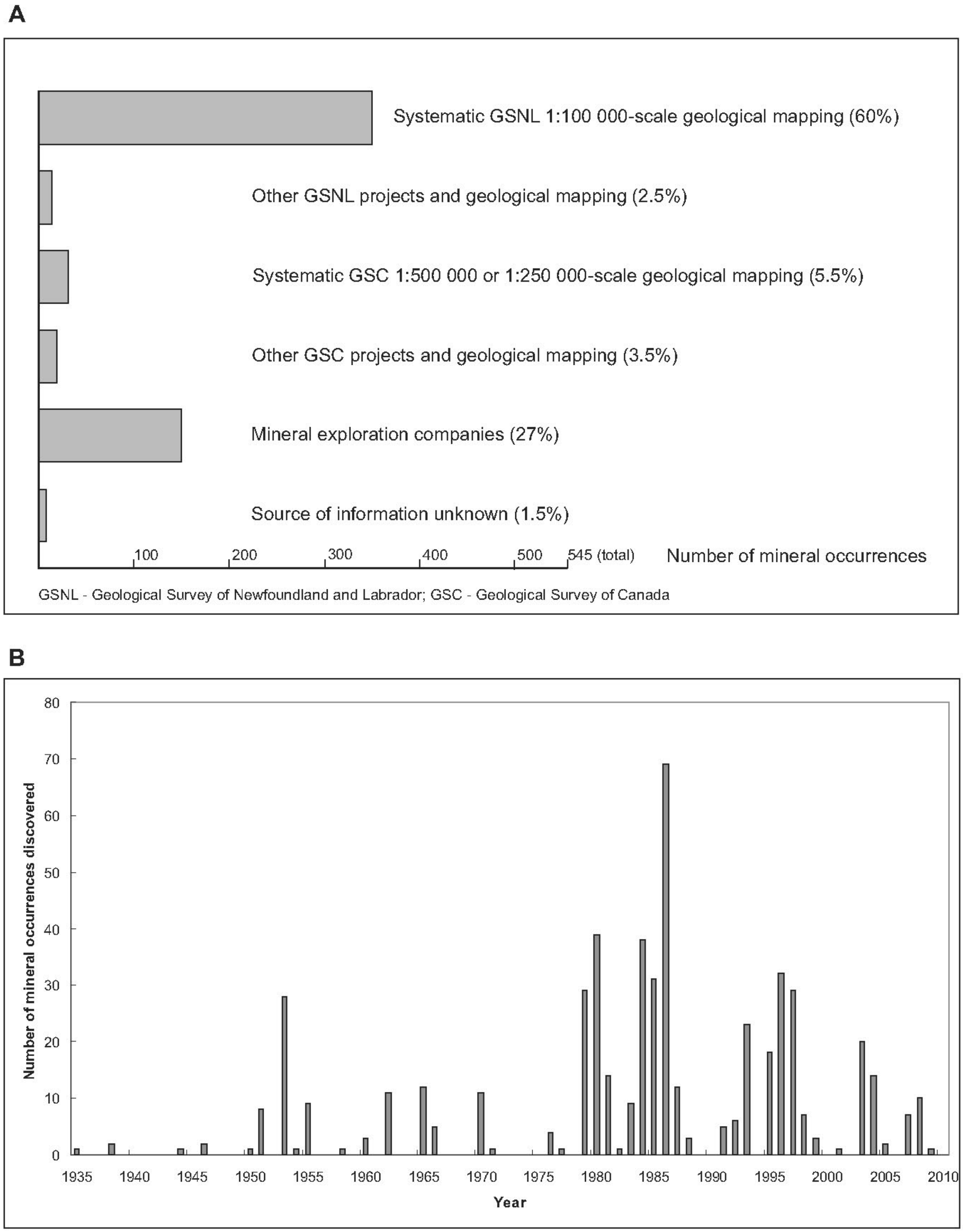


Figure 4. ***A.*** *Histogram showing proportion of mineral occurrences according to the agency that discovered them.* ***B.*** *Histogram showing number of mineral occurrences by year that the discovery was reported.*

Meyer and R.J. Wardle). A further 9% are the result of surveys carried out by the Geological Survey of Canada (H.H. Bostock, A.M. Christie, G.V. Douglas, K.E. Eade, R.F. Emslie, J.A. Kerswill and I.M. Stevenson). Mineral exploration companies contributed 27%, and (despite the best research efforts of the author) the source of the remaining 1.5% is unknown. It may be true that most of the 'higher quality' mineral occurrence discoveries have been made by industry, and that the statistics are biased toward the Geological Survey of Newfoundland and Labrador due to inclusion of localities that might only marginally qualify as mineral occurrences, but, even if (say) as many as half are discounted, the direct contribution of government-executed geological programs to mineral exploration (apart from the geological maps and reports themselves) is clearly demonstrated.

The impact of other regional programs on mineral exploration, such as regional aeromagnetic surveys carried out by the Geological Survey of Canada and the Canada–Newfoundland Uranium Reconnaissance lake-sediment sampling program is more difficult to evaluate, as is the value of the geological maps themselves. The cost of all high-resolution geophysical surveys and rock drilling has been borne by industry.

DEPICTION OF MINERAL OCCURRENCES ON GEOLOGICAL MAPS

On preliminary 1:100 000-scale geological maps from eastern Labrador published by the Geological Survey of Newfoundland and Labrador prior to 1985, all previously identified mineral occurrences are shown, even though the occurrences may not have been confirmed during mapping. Lack of confirmation has several possible causes. In some cases, it was not possible to visit the localities, or not considered a worthwhile expenditure of resources to do so. In many cases, however, attempts were made to find the localities, but were unsuccessful. In consequence of this lack of success, for several years after 1985, only mineral occurrences that were confirmed or discovered during mapping are indicated on preliminary maps from eastern Labrador.

One noteworthy consequence of this informal policy change involved a Cu–Ni–Co mineral showing on the Alexis River, west of Port Hope Simpson. This was first discovered by Brinex in 1954, but during renewed mapping in 1966 Brinex "failed to satisfactorily confirm its existence" (Bradley, 1966). In 1984, the location was visited by Geological Survey of Newfoundland and Labrador personnel, including this author, and evidence of prospecting found, although no showing was identified that would have yielded the metal values reported by Brinex in 1955. During Geological Survey of Newfoundland and Labrador mapping in 1986 (Gower *et al.*, 1987, 1988), no further attempt was made to locate the showing and, given Brinex's earlier failure, it was not shown on Gower *et al.*'s (1988) preliminary 1:100 000 scale map. In 1995, Greenshields Resources Incorporated, much to its credit, went beyond Gower *et al.*'s (1988) map and unearthed the earlier references to the showing. The President of Greenshield Resources is quoted as saying "It [the mineral occurrence] didn't appear on any of the maps. Terry dug this out of the files at the ministry, and any of the maps you picked up, the geological maps, it wasn't there." (The Voisey's Bay News, January, 1996, p. 24). The author stresses that omitting a previously reported mineral showing was not done through ignorance of its existence, and, of course, it was shown on MODS maps. Familiarization with previous industry data archived in Geological Survey of Newfoundland and Labrador records has been routine practice prior to any mapping project in eastern Labrador.

Given that some of the earlier reported mineral occurrences are vague, inaccurately located, appear to be extremely trivial, or report material that was misidentified, it is tempting simply to erase them from the record. Nevertheless, there is commonly uncertainty regarding the 'what' and 'where' of a discovery, and, even if no confirming evidence can be found, a nagging doubt often remains that 'there just might be something in it'. What to do? Just because a later investigator does not locate that which was reported previously, may not mean that it does not exist. The guideline adopted in this report is to include all such occurrences, accompanied by discussion as to their merit. On the 1:100 000-scale geological maps for eastern Labrador (Gower, 2010), even the most egregious examples are still included but indicated with a '?' (in an attempt to avoid confusion among well-informed users, had they been omitted, as much as any other reason). For practical purposes, in the author's opinion, all such cases can be safely ignored.

Some clarification is required regarding labeling mineral occurrences. In the MODS system, mineral occurrences are labelled using a combination of the National Topographic system map sheet in which the occurrence occurs and the principal commodity at that locality. On the 1:100 000-scale geological maps, only the commodity is shown, but where more than one commodity is present, then all are listed. In some cases, there has been some subdivision of MODS categories. For example, instead of mica (Mic), the geological maps use 'Bt' and 'Ms' for biotite and muscovite, respectively.

MINERAL OCCURRENCES AND THIS REPORT

In the text, on the figures and on the 1:500 000-scale map of this report (Map 2010-51), the MODS system is used. In places in this report, occurrences have been grouped differently from how one might expect from their MODS label, but the justification for doing this is given in the relevant text.

In many of company assessment reports, especially the older ones, measurements are given in imperial units. These have been generally retained for two reasons. First, to avoid cumbersome conversions to metric units or imprecise rounding off of numbers, and second, to make it easier for the reader to relate the information given here back to the original report. For the same reason, methods originally used in reporting analytical data (*e.g.*, element versus oxide, percent versus parts per million) have been mostly retained.

Mineral occurrence information in this report is organized as follows:

first by Tectonic Province / orogenic event,
then by Geological Unit,
then by Commodity,
then by Terrane, local area, or other criterion.

If a specific commodity or area is of more interest to the reader than the geological unit, then such information can be directly extracted using third- or fourth-order headings.

REGIONAL GEOLOGICAL SETTING

The region addressed in the report includes the eastern Makkovik Province and the eastern part of the Grenville Province in Labrador (Figures 5 and 6, and Map 2010-51). The Makkovik Province is a segment of a Paleoproterozoic accretionary orogen that developed on the southern flank of pre-Makkovikian Laurentia, mostly between 1900 and 1790 Ma. The Grenville Province comprises Late Paleoproterozoic and Mesoproterozoic rocks that formed during multiple orogenic events between *ca.* 1810 and 950 Ma. In the Grenville Province, four orogenic events have been identified, namely,

i. Pre-Labradorian orogenesis (1810–1770 Ma);
ii. Labradorian orogenesis (1710–1600 Ma);
iii. Pinwarian orogenesis (1520–1460 Ma); and
iv. Grenvillian orogenesis (1085–985 Ma) (Gower and Krogh, 2002, 2003).

The first three of these orogenies were active-margin accretionary events, whereas the Grenvillian orogeny represents a continent-continent collision (which terminated active Proterozoic accretionary tectonism in this region). Types of mineralization are reviewed first in the Makkovik Province and second in the Grenville Province, addressing, in turn, mineralization associated with progressively younger orogenic events. Mineralization related to post-Grenvillian events is also reviewed.

MAKKOVIK PROVINCE (CAPE HARRISON DOMAIN ONLY)

The Makkovik Province is divided into three tectonic elements:

i. The Kaipokok domain in the west;
ii. The Aillik domain in the centre; and
iii. The Cape Harrison domain in the east (Kerr *et al.*, 1996).

The Kaipokok domain comprises reworked Archean gneiss of the North Atlantic craton, overlain by Paleoproterozoic supracrustal rocks of the Moran Lake and Post Hill groups and intruded by Paleoproterozoic granitoid rocks, most of which have been traditionally assigned to the Island Harbour Bay Intrusive Suite. The Aillik domain is underlain mostly by Paleoproterozoic felsic volcanic rocks of the Aillik Group, associated granitoid intrusive units and tectonic slices of Archean gneiss. The Cape Harrison domain comprises mostly Paleoproterozoic granitoid and gneissic rocks, but includes some remnants of felsic volcanic rocks. The terms 'Post Hill' and 'Aillik' groups follow the redefined usage proposed by Ketchum *et al.* (2002).

Only mineralization in the Cape Harrison domain is reviewed in this document, and is categorized into three groups as follows:

i. Felsic volcanic rocks;
ii. Major granitoid intrusive bodies; and
iii. Minor granitoid intrusions.

In reality, they are mostly part of a continuum, so the classification of a particular occurrence is arbitrary in some instances. Mineral occurrences are located on Figure 7.

FELSIC VOLCANIC ROCKS

Felsic volcanic rocks occur in several places in the Cape Harrison domain, but mainly in two areas, namely,

i. South of Burnt Island; and
ii. On the southern flank of the Benedict Mountains.

These are the only areas currently known to host mineralization in felsic volcanic rocks (the other areas of felsic volcanic rock are on the east side of Tuchialic Bay, on Double Island, and south of Deus Cape). The rock types include dacitic to rhyolitic agglomerate, breccia, tuff and porphyry, with subsidiary felsic lava and quartz- and feldspar-rich sediments. Many rocks that could be considered to be lava in the field are seen to be crystal-lithic tuff when examined in thin section. The grade of metamorphism increases from greenschist to amphibolite facies progressing eastward (Gower, 1981).

No geochronological ages directly date felsic volcanic/volcanoclastic rocks in the Cape Harrison domain, so it remains an assumption (Gower, 1981) that these rocks are correlative with those of the Aillik Group *sensu stricto*. The best time constraint relies on an 1853 ± 2 Ma age from a quartz porphyry intruding foliated rhyolite on Double Island, north of Tuchialic Bay (Ketchum *et al.*, 2002). This age is consistent with the 1863 ± 7 to 1850 ± 7 Ma age range determined for the Aillik Group supracrustal rocks farther west (Schärer *et al.*, 1988; LaFlamme *et al.*, 2009).

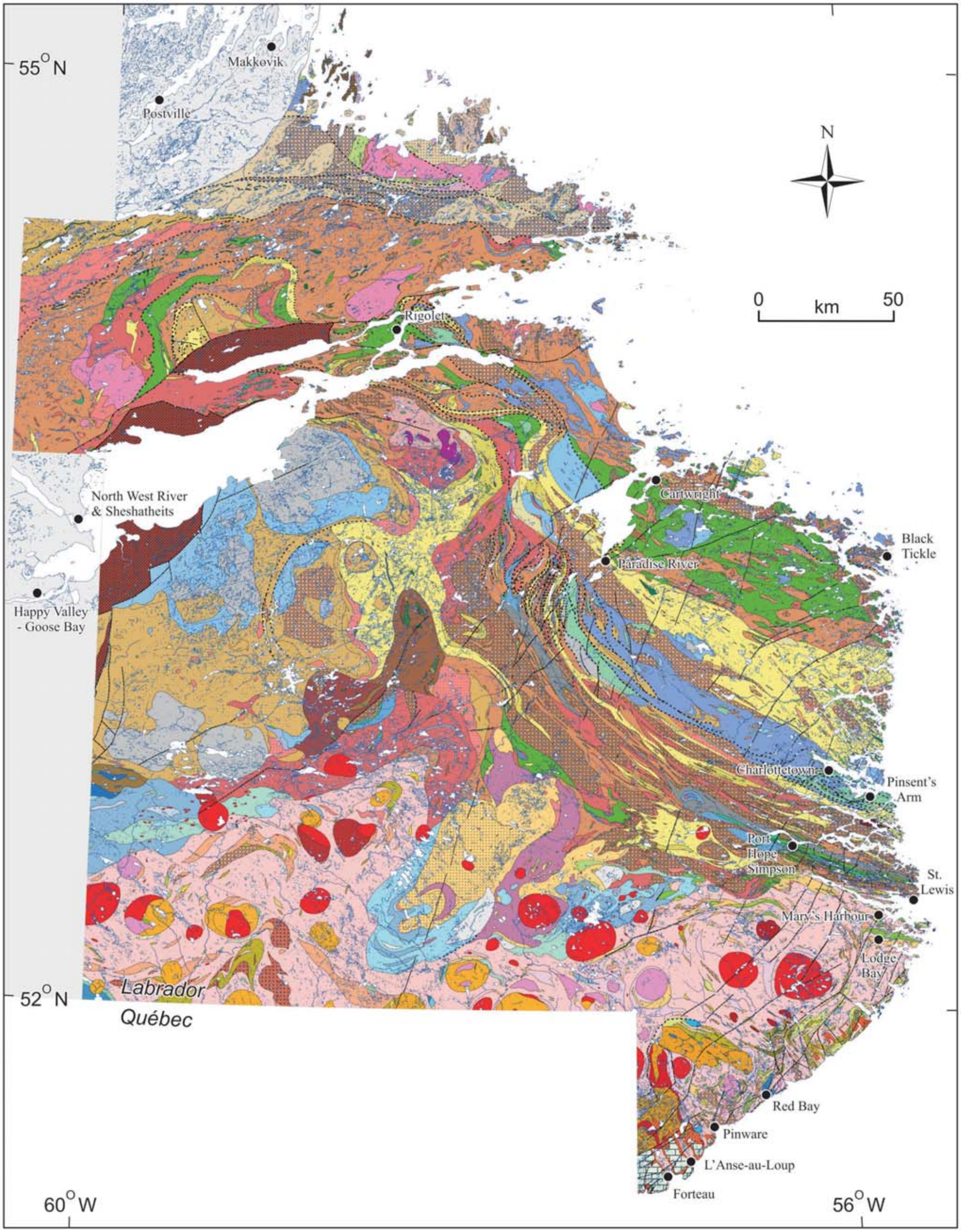


Figure 5. *Geological map of eastern Labrador. This version is included here without legend to facilitate rapid comparison with other figures in the text. A 1:500 000-scale version of the map (Map 2010-51), with legend and mineral occurrences, is an adjunct to this report.*

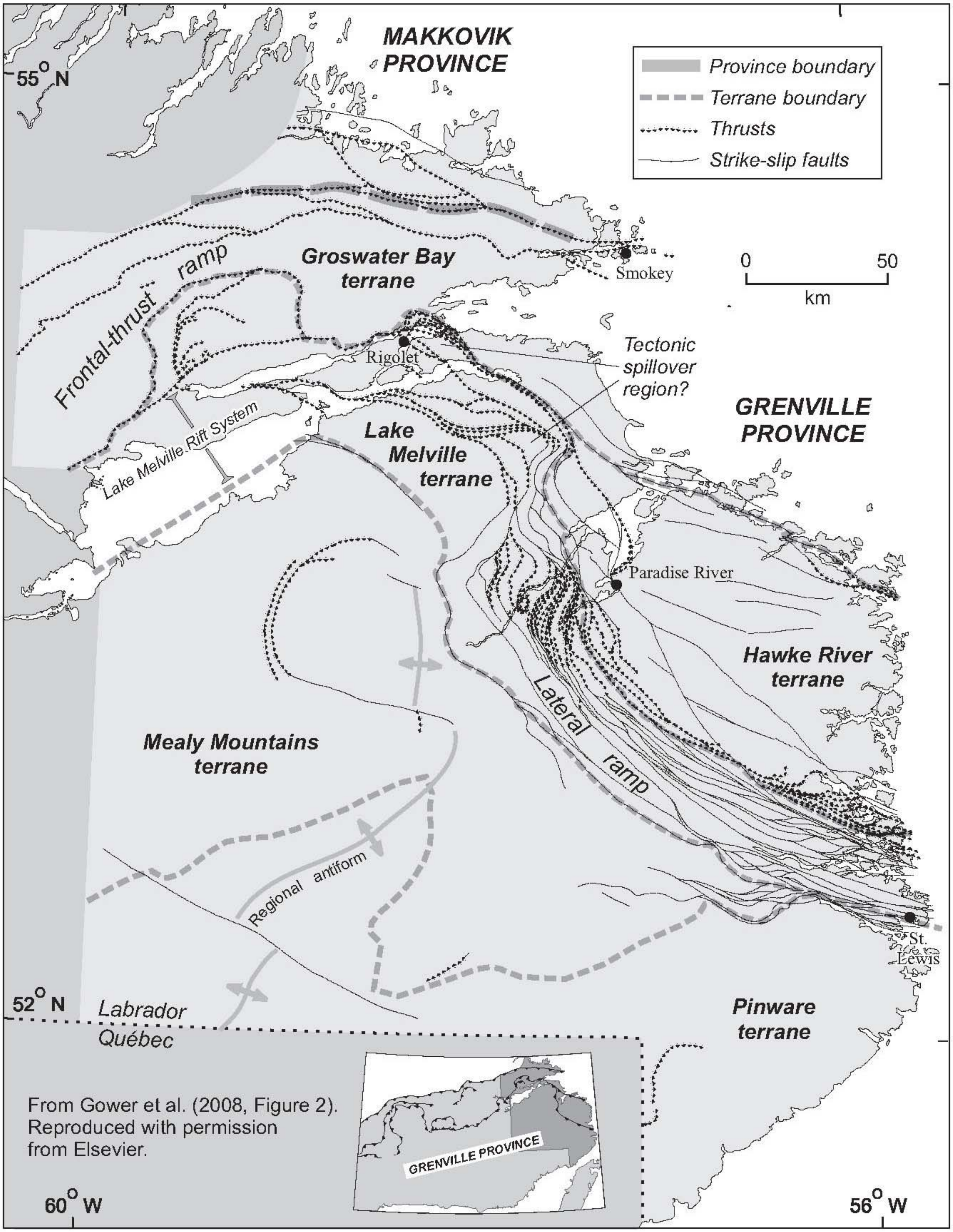


Figure 6. *Structural geology interpretation for eastern Labrador.*

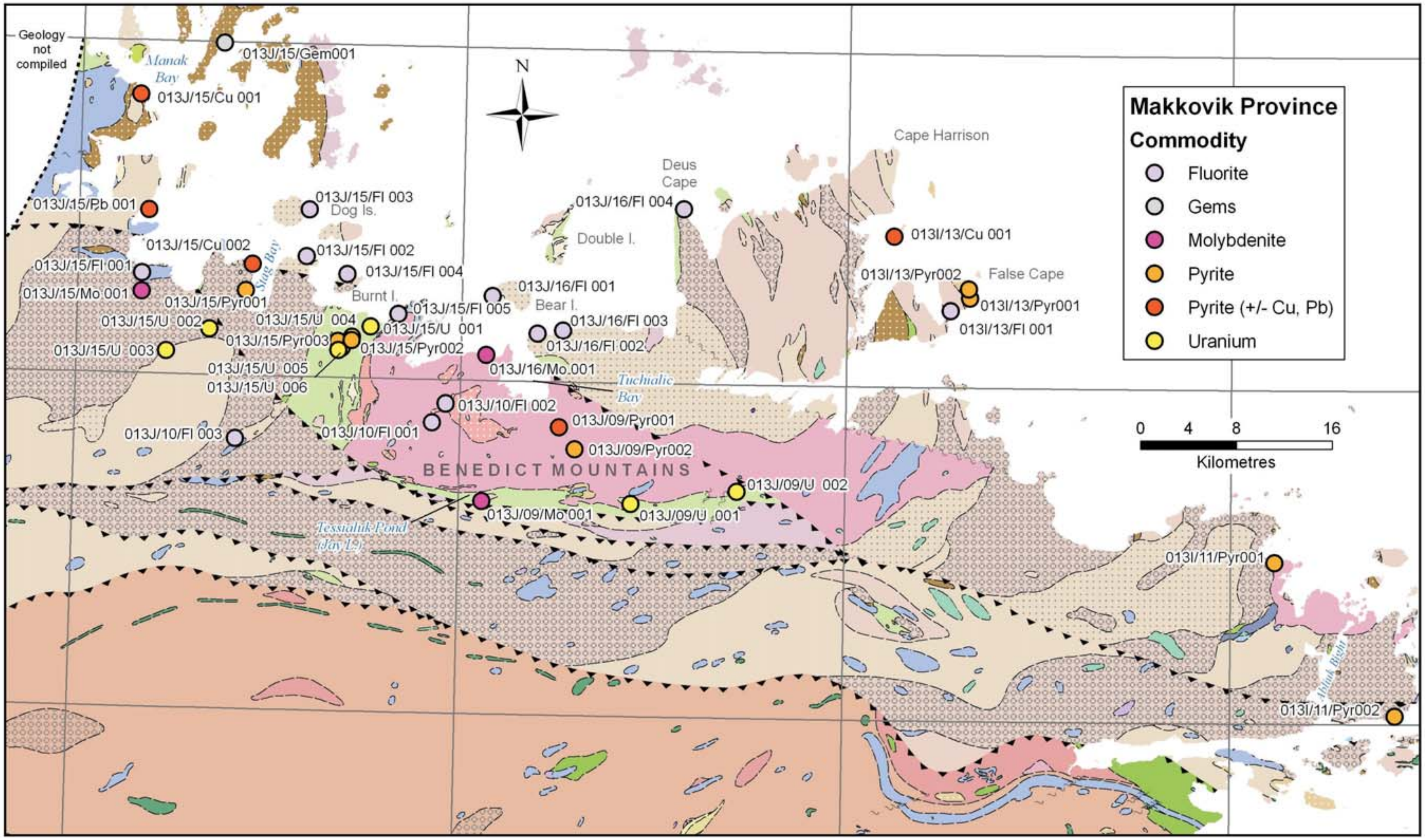


Figure 7. *Distribution of mineral occurrences in the Cape Harrison domain in the Makkovik Province. In this and subsequent similar figures, the occurrence label is that used in the Mineral Occurrence Database System (MODS) of the Geological Survey of Newfoundland and Labrador. The colour coding indicates the subsection of this report in which an occurrence is addressed – this may differ from that anticipated according to the MODS classification.*

Mineralization in the felsic volcanic and volcanoclastic rocks in the Cape Harrison domain is limited to pyrite and uranium occurrences (in contrast to a much wider range of commodities in the Aillik Group in the Aillik domain). The Tessialuk (Jay) Lake molybdenite occurrence is also included here, although its affiliation with felsic volcanic rocks is suspect, for reasons discussed below.

Pyrite

Two felsic volcanic-hosted pyrite occurrences were found during 1:100 000-scale mapping in the region and are within the 5-km-wide belt of volcanic and volcanoclastic rocks that extends south from Burnt Island. In one case (*013J/15/Pyr002*), the pyrite is associated with a 1-m-wide brecciated zone within felsic volcanic rocks (note that the location of this occurrence is revised 830 m, in a southwest direction, from where it was erroneously located by Gower (1981). The brecciation zone is parallel to mafic dykes, but does not appear to be related to them. In the other example (*013J/15/Pyr003*), the pyrite is within very siliceous, fine-grained, rhyolitic rocks.

Uranium

Four of the U occurrences occur in the same belt of felsic volcanic rocks as that hosting the pyritic rocks mentioned above (*013J/15/U 001*, *013J/15/U 004*, *013J/15/U 005*, and *013J/15/U 006*). Of uncertain significance (if any), is that all four occurrences and one of the pyrite localities fall along a northeast trend that is slightly oblique to the structural trend in the area. Occurrence *013J/15/U 001* was discovered during a Placer Development–Brinex joint venture investigation in 1979 (Davidson and Kowalczyk, 1979) as a result of ground follow-up of an airborne radiometric survey (to improve readability, words like 'Incorporated', 'Corporation', 'Limited' have been dropped from here on). Radioactivity is restricted to a narrow unit of agglomeratic felsic pyroclasts within the volcanic sequence. The mineralization is associated with pyrite and hematitic alteration. Samples from the showing mostly yielded less than 0.028% U and had a maximum of 0.0413% U.

The other three discoveries were made by Mega Uranium, information regarding which is on their website (www.megauranium.com/main/?aillikeast; 2010). The most northerly of the three (*013J/15/U 004*) was named the Quinlan showing and consists of uranophane-bearing fractures at the edge of a fine-grained mafic dyke, traceable for at least 125 m. Eight samples collected from the outcrop have a range of 0.011 to 2.09% U_3O_8, and five other samples are above 0.1% U_3O_8. The average value is 0.48% U_3O_8. At the remaining two occurrences (*013J/15/U 005* and *013J/15/U 006*), uranophane is present on fractures in silicified felsic volcanic rocks. From the first, two samples yielded values of 0.10% and 0.19% U_3O_8, and, from the second, two samples yielded values of 0.022% and 0.13% U_3O_8.

In a separate belt of felsic volcanic rocks that has an east–west trend, passing through Tessialuk Pond, Mega Uranium reported two further discoveries. At one of them (*013J/09/U 001*), uranophane was seen on fractures in a mafic dyke and a sample yielded a value of 0.23% U_3O_8. The other occurrence (*013J/09/U 002*) is hosted by felsic volcanic rocks and a sample yielded a value of 0.107% U_3O_8. It should be kept in mind that the east–west trend of this belt is anomalous compared to the typical north-northeast structural trend of the Aillik Group. One explanation is that it might be younger, being comparable in trend and tectonic setting to the Bruce River Group and other felsic volcanic packages farther west, all of which have been interpreted as part of a felsic volcanic carapace to the 1650 Ma Trans-Labrador batholith. The other possibility, given its location at the northern margin of Grenvillian deformation, is that the belt has been reoriented during Grenvillian orogenesis. The author considers the latter possibility unlikely, as the felsic volcanic rocks do not show the severe deformation that would be expected had that been the case.

Molybdenum

High-grade molybdenite (*013J/09/Mo 001*) was discovered by H. Tough near Tessialuk Pond on August 7th, 1960 in an area being explored under a Brinex–Gunnex Joint Venture arrangement (Kirwan, 1960a). The mineralization (Plate 1) consists of molybdenite, chalcopyrite, pyrrhotite and pyrite in a quartz vein along the contact between white quartzite and medium-grained black and white intrusive granite, and along fractures within the quartzite. The quartz vein is very irregular in width, varying between 0 and 2', but the mineralization continues within the quartzite, irrespective of the presence of vein quartz. Heavy molybdenite mineralization, estimated to be in excess of 2%, occurs over an average horizontal width of 4' and exposed length of 15' in the quartzite adjacent to the contact with the granite. The contact strikes at 90° and dips 60–65°S. Three prominent sets of fractures occur in the quartzite, one set parallel to the contact and two other sets at 20° and 80°W. Mineralization occurs within fractures of each set adjacent to the contact. Sparse mineralization occurs within the fractures throughout all of the exposed quartzite (Kirwan, 1960a).

Detailed mapping, geochemical and self-potential surveys were carried out in the vicinity of the showing and the occurrence was drilled late in 1960. Five holes were attempted, one of which had to be abandoned due to caving. A small, irregular mass of chalcopyrite (up to 1/4") was intersected at 36.7' in drillhole 1, which penetrated to a total depth

Plate 1. *Sample of molybdenite. Tessialuk (Jay) Lake, in the Makkovik Province (mineral occurrence 013J/09/Mo 001).*

of 299'. Sparse molybdenite in small, flattened masses up to 1/8" in length was encountered in an aplite between 133.6 and 141.6' in drillhole 2, which penetrated to 189'. No mineralization was found in drillholes 3 (170'), 4 (324.6') or 5 (76') (Piloski, 1961a, b) and no additional exposures of mineralization were found. Piloski concluded that the high-grade molybdenite at surface is of limited extent and probably not in place, but the source was thought to be close. The occurrence was interpreted to be in dislocated bedrock (Piloski, 1962). Results for MoS_2 are given in Table 1.

The above review begs the question, "If the mineralization is not *in situ*, where is its source?" Given the high-grade,

Table 1. Molybdenum, Tessialuk (Jay) Lake, Cape Harrison domain, Makkovik Peninsula

Mineral Occurrence	Reference	Sample	MoS_2	Duplicate
013J/09/Mo 001	013J/09/0068	1001	2.27%	2.23%
013J/09/Mo 001	013J/09/0068	1002	8.74%	9.05%
013J/09/Mo 001	013J/09/0068	920S	9.13%	-

Note: -, not analyzed

this is a question that desires an answer. The glacial transport direction is from the southwest, so one assumes that the source would be in that direction. There are no reports in assessment files indicating that any search for transported boulders has been conducted and there are good reasons to deter such exploration. First, rock exposure is extremely poor, and, second, the area is part of the geologically complex parautochthonous Groswater Bay terrane in the Grenville Province, where multiple thrusting renders geological interpretation difficult. One exploration avenue that the author has thought worth pursuing is investigation of a roughly circular prominent magnetic anomaly, about 30 km to the southwest of Tessialuk (Jay) Lake and directly 'up-ice' (Figure 8). No surface exposure is known near the anomaly, but its shape suggests that it might have a cause distinct (could it be a high-level granitoid pluton?) from many other magnetic anomalies in the Groswater Bay terrane, which can be readily attributed to mafic intrusions. That it is the source of the Mo is, admittedly, speculative; one counter-argument is the lack of Mo lake-sediment anomalies near the circular magnetic anomaly.

MAJOR GRANITOID INTRUSIONS

Granitoid intrusive activity was episodic in the Cape Harrison domain (Kerr *et al.*, 1992), comprising events related to Makkovikian orogenesis, post-Makkovikian plutonism, and Labradorian orogenesis.

The oldest of those related to Makkovikian orogenesis is the 1837 +12/-8 Ma Deus Cape granite (Kerr *et al.*, 1992) and the youngest are 1815 +12/-9 Ma to 1798 +3/-2 Ma tonalite to granodiorite gneisses of the Cape Harrison Metamorphic suite (Ketchum *et al.*, 2002). The 1800 Ma Numok Intrusive Suite (Kerr *et al.*, 1992) in the western Cape Harrison domain was also emplaced at the later time.

Post-Makkovikian plutonism occurred at *ca.* 1720 Ma, having the Strawberry granite in the Aillik domain as its type example. In the Cape Harrison domain, granitoid rocks in the Dog Islands area and in an area north and east of Tuchialic Bay are inferred to be of similar age, based on compositional criteria, but they have not been dated.

During Labradorian orogenesis, two main suites were simultaneously emplaced in the Cape Harrison domain. These are the 1649 ± 3 Ma Mount Benedict and the 1649 ± 1 Ma Adlavik Intrusive suites (Kerr *et al.*, 1992).

Mineral occurrences in major granitoid bodies in the Cape Harrison domain are grouped as pyrite, uranium, molybdenite and fluorite.

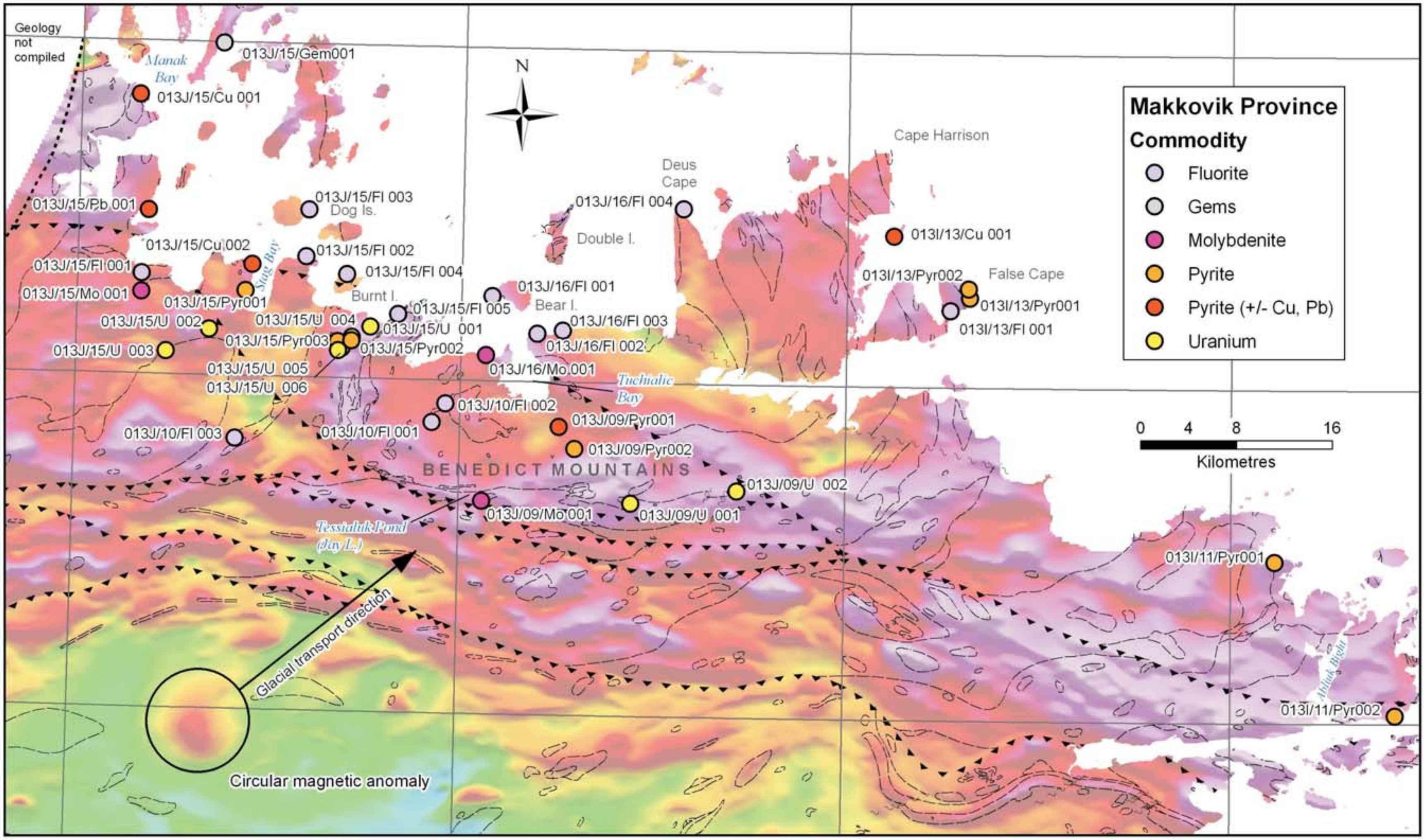


Figure 8. *Aeromagnetic data for the same area as in Figure 7, with major geological features draped over. The purpose of the figure is to draw attention to a circular magnetic anomaly 'up-ice' from molybdenite occurrence 013J/09/Mo 001. The No occurrence has been interpreted as not being* in situ *and it is speculated that the anomaly could represent the source granitoid intrusion.*

Pyrite

Six pyrite occurrences are included here. Five were found during 1:000 000-scale mapping and one was recorded earlier, as detailed below. Four are hosted by syn-Makkovikian granitoid bodies. Two, at False Cape and separated by less than 1 km, consist of pyrite–biotite–garnet–epidote clusters within massive, unfoliated granite (*013I/13/Pyr001* and *013I/13/Pyr002*). A third (*013I/11/Pyr002*), 5 km east of the southern end of Abliuk Bight, is hosted by a strongly foliated biotite-bearing granitoid rock containing large K-feldspar porphyroblasts and consists of minor pyrite with epidote. The fourth, at Stag Bay, is based on observations by Douglas (1953) who noted pyrite in small xenolith masses in granite and gneiss (*013J/15/Pyr001*).

One occurrence (*013I/11/Pyr001*), 8 km northwest of the north end of Abliuk Bight, is at the border between medium- to coarse-grained pyroxene-bearing quartz syenite and rocks having a siliceous, lensy-textured appearance that is suggestive of a felsic volcanic rock. The quartz syenite is suspected to have been emplaced during the post-Makkovikian 1720 Ma plutonic event, on the basis of imprecise Rb–Sr data. Field notes for the locality merely mention pyrite without elaboration. A whole-rock analysis of the host rock is characterized by moderately high Zr at 1632 ppm.

The final occurrence (*013J/09/Pyr002*), 5 km southeast of Tuchialic Bay, was described in field notes as abundant pyrite in a fine- to medium-grained, uniform, equigranular, even-textured, biotite granitic rock, which belongs to the Labradorian Mount Benedict intrusion.

Uranium

Two uranium occurrences are included here and are both hosted by syn-Makkovikian rocks (*13J/15/U 002* and *13J/15/U 003*). They have been named the T-649 showing and, 4 km to the west-southwest, the Super-7 showing by the discoverer, Silver Spruce Resources (www.silverspruceresources.com/s/ ewsReleases.asp; 2008). The T-649 showing is located along a 5-m-wide brook that flows into Stag Bay. The host rock is fine-grained, feldspar-rich granodiorite to monzodiorite that has been intensely fractured and veined with uraninite/pitchblende and which exhibits extensive yellow uranophane staining. Extensive iron oxide (magnetite) and minor sulphides (pyrite/pyrrhotite) are associated with the uranium mineralization. Outcrop at the locality is intensely radioactive, delivering total counts greater than 10 000/sec over a minimum width of 10 m. The anomalous zone strikes across the brook and extends beneath the overburden on both sides, and remains open to the east and west. Results from five samples gave values of 0.186%, 0.997%, 0.046%, 0.463%, and 0.796% U_3O_8, versus background values of 27 and 12 ppm U_3O_8 from two samples taken outside the zone. Little information is provided regarding the Super-7 showing, except that grab samples returned values of 0.56% to 1.05% U_3O_8.

Molybdenum

Two molybdenite occurrences have been reported in the Cape Harrison domain, but both are suspect. One of them (*013J/16/Mo 001*) was identified by Douglas (1953) 2.5 km west of Tuchialic Bay and described as blebs of molybdenite 1/4" in diameter in a pegmatite. The locality was visited during 1:100 000-scale mapping, but molybdenite was not seen. This assumes the site was correctly identified, of course, and, in this regard, it should be clarified that the author has slightly adjusted the co-ordinates given in MODS records to coincide with the only outcrop that the author believes to exist in the vicinity. The other occurrence (*013J/15/Mo 001*) is based on a showing indicated on Stevenson's (1970) map. The information source for this occurrence is unknown. No mention of it is given in either Stevenson's field notes or his published report.

Fluorite

Fluorite is found in all three granitoid groups in the Cape Harrison domain that were outlined earlier.

Syn-Makkovikian

In syn-Makkovikian granitoid rocks, two fluorite occurrences are reported from the western part of the Cape Harrison domain and two from the east. The two western occurrences are both shown on Stevenson's (1970) map. One of these (*013J/10/Fl 003*), previously attributed to Gower in the MODS database, is now credited to Stevenson, although it is not clear that the original observation was Stevenson's, or whether he, in turn, used an earlier source. His data station SG68-311 coincides with the fluorite occurrence, which suggests that the observation was his own, but no mention of fluorite is made in field notes for the locality. The vicinity was visited during 1:100 000-scale mapping by Lalonde for the Geological Survey of Newfoundland and Labrador in 1978, who specifically mentioned that, at data station AL78-205 (the closest to the fluorite locality), no fluorite was observed. As it is unusual to make negative observations of this type in field notes, the author assumes that Lalonde was specifically searching for the occurrence. No details regarding the other occurrence (*013J/15/Fl 001*) are available. It also coincides with one of Stevenson's data stations (SG68-166), but no mention is made of fluorite in his field notes for this locality either, although epidote on fracture surfaces was noted.

The two fluorite occurrences in the eastern part of the Cape Harrison domain are at Deus Cape (*13J/16/Fl 004*) and

False Cape (*013I/13/Fl 001*). The former is shown on Stevenson's (1970) map and coincides with his data station SGJ68-137, at which fluorite was recorded in field notes. The latter was found during 1:100 000-scale mapping in a medium- to coarse-grained biotite granodiorite intruding earlier well-banded, biotite-bearing quartzofeldspathic gneisses. The fluorite was recognized in hand sample, along with an unidentified reddish elongate mineral (rutile?).

Post-Makkovikian

In the post-Makkovikian granitoid rocks correlated compositionally and temporally with the 1720 Ma Strawberry granite, fluorite is found in both the Dog Islands and Tuchialic Bay areas.

In the Dog Islands area (*013J/15/Fl 002*, *013J/15/Fl 003*, and *013J/15/Fl 004*) the host rock is massive, very coarse-grained biotite and/or hornblende granite, containing rare, fine-grained mafic enclaves and intruded by mafic dykes. The fluorite is commonly purple, and found in pegmatitic patches, shears and interstitially in the granite. Note that the location of *013J/15/Fl 002* has been corrected from that given previously in the MODS database, which was based on Gower (1981), where it was located 650 m too far to the west. All three occurrences were discovered during 1:100 000-scale mapping. Fluorine content from whole-rock geochemical analyses of host rocks from some samples is given in Table 2.

Table 2. Fluorine in post-Makkovikian granite, Cape Harrison domain, Makkovik Province

Mineral Occurrence	Sample	F (ppm)
013J/15/Fl 003	CG79-047	1965
013J/15/Fl 004	CG79-034	3800
013J/16/Fl 001	CG79-059	2671

In the Tuchialic Bay area, fluorite occurrences are located in granite on Bear Island (*013J/16/Fl 001*) and on the shoreline to the east of the bay (*13J/16/Fl 002* and *13J/16/Fl 003*). At these localities, purple fluorite is common in epidote-filled fractures transecting massive to foliated, coarse-grained, K-feldspar-rich hornblende granite. Two of the occurrences were recorded during 1:100 000-scale mapping, and one (*13J/16/Fl 002*) by Douglas (1953). Previously, the MODS database described this occurrence as two pegmatite veins 10 inches and 2 inches in width, running vertically up a cliff face. This part of the description applies to a different mineral occurrence (*013J/09/Pyr001*, *see* next section); corrections have been made.

Labradorian

Fluorite in Labradorian granitoid rocks in the Cape Harrison domain has been reported from two sites within the Mount Benedict Intrusive suite, both as a result of observations made during 1:100 000-scale mapping. At occurrence *013J/10/Fl 001*, fluorite was noted in the field in massive, equigranular, biotite–hornblende quartz monzonite, and, at occurrence *013J/10/Fl 002*, fluorite was found in fine- to medium-grained, massive two-feldspar porphyry to granite.

PEGMATITE, QUARTZ VEINS AND SHEARS

The mineral occurrences in the Cape Harrison domain included in this category can all be interpreted to be to late-stage features, but, otherwise, have little in common. They are grouped as 'pyrite (± Cu, Pb)', 'fluorite' and 'gems', although fluorite is also present in two of the 'pyrite (± Cu, Pb)' occurrences.

Pyrite (± Cu, Pb)

The 'pyrite (± Cu, Pb)' category includes all occurrences that do not fit into the other two following, but not considered worth further subdivision. They have been variously designated in the MODS database as Cu, Pb or pyrite occurrences.

Three of the occurrences are based on observations by Douglas (1953). At occurrence *013J/09/Pyr001*, Douglas describes two small pyrite-bearing pegmatitic quartz veins, 10 inches and 2 inches in width, running vertically up a cliff face. Small inclusions of fluorite occur within the host granite. The location of this occurrence requires clarification. Douglas refers to it as being "5 miles north (magnetic) of a United States Army Air Force temporary base". The base is not shown on Douglas's geological sketch map, but a showing is indicated southeast of Tuchialic Bay. A military base existed on the peninsula on the northwest side of Tuchialic Bay, which, if the one to which Douglas refers, would place the occurrence 5 miles south (magnetic bearing) of this base, whereas a point 5 miles north of the Tuchialic Point base is in the sea. The author is unaware of any other base (even a temporary one) having ever been situated elsewhere in the region, so the Tuchialic Bay base must be the one to which Douglas refers, and that he merely mixed up magnetic north and south in his text. The occurrence shown southeast of Tuchialik Bay is therefore taken to be the one described in Douglas's text.

The location of an occurrence in the Manak Bay area (*013J/15/Cu 001*) is described by Douglas (1953) as consisting of small stringers of pegmatite containing pyrite and intruding Aillik quartzite. The location is based on a small-scale geological sketch map by Douglas, so the co-ordinates given in MODS records suggest an unjustified precision. MODS records also note that no geological descriptions are available and that the occurrence is not marked on Brinex maps produced in the 1960s, consequently its existence is rather conjectural. During 1:100 000-scale mapping in 1978, the shoreline in this area was visited, but no mineralization of any kind was recorded.

At Douglas's third occurrence (*013J/15/Cu 002*) he noted "on the point at the west entrance to Stag Bay an epidotized shear zone in granite is cut by small carbonate veins carrying traces of galena, chalcopyrite and fluorite." Again, during 1:100 000-scale mapping in the area in 1978, the shoreline was visited, but no mineralization recorded.

Of the remaining two occurrences, one (*013J/15/Pb 001*) was reported by Johnston (1956), who noted minor arsenopyrite, pyrite and galena in quartz veins and quartz-rich pegmatitic stringers near a contact between granite and diorite. This occurrence is shown as a Pb locality on Stevenson's (1970) map. The other (*013I/13/Cu 001*) was seen during 1:100 000-scale mapping and merely consists of traces of malachite in a shear zone transecting gneissic granodiorite associated with medium-grained granite and pegmatite.

Fluorite

One fluorite occurrence is included in this group (*013J/15/Fl 005*) and was noted during 1:100 000-scale mapping. Fluorite is found in pegmatitic patches within microgranite intruding felsic volcanoclastic rocks assigned to the Upper Aillik Group.

Gems

The gem designation applied to this occurrence (*013J/15/Gem001*) is based on the existence of topaz, which occurs as an accessory mineral in a 5'-wide dyke considered by the discoverer (Wheeler, 1935) as "intermediate between aplite and pegmatite". The rock is fine grained and allotriomorphic. Essential minerals are amazonite (10% as phenocrysts), albite and quartz. Accessory minerals are mica (*cf.* zinnwaldite), topaz, fluorite, apatite, magnetic yellow sulphide, and perhaps rutile or zircon. A whole-rock analysis of the aplite is presented, together with a normative calculation and a modal analysis. Comment is made that the rock has high lithium content. The location is imprecise, due to poor charting at the time. The location was given as Long Tickle, 1 km east of Maconet Bay, and, from a sketch map examined later in St. John's, Wheeler estimated it to be at 55°3' N, 58°46' W.

MAKKOVIK PROVINCE METALLOGENY AND POTENTIAL

Sparkes and Kerr (2008) recognize 9 types of U mineralization in the Central Mineral Belt of Labrador, part of which includes the Cape Harrison domain of the Makkovik Province. Their classification is based on host rocks, namely plutonic rocks (Types 1 and 2), felsic volcanic rocks (Types 3 and 4), sedimentary/metasedimentary rocks (Types 5 and 6), hydrothermal breccias (Types 7 and 8), and hydrothermal veins (Type 9). It would seem that almost all, if not all, of the mineralization in the Cape Harrison domain can be classified into one of the first four types, although localization into shear zones or fractures within these host rocks has commonly played a role. The mineralization can be considered to be of broadly magmatic origin and related to metal concentration in evolved late-stage granitic magmas, with hydrothermal and/or meteoric fluid involvement.

In the context of future exploration, it should be fully recognized that, although it is likely that numerous northwest-verging thrusts separate the Grenville Province from the Makkovik Province, there is no fundamental (cratonic interface) tectonic break, so extrapolation of favourable settings southward into the Grenville Province should not be dismissed, keeping in mind, of course, that, in the south, Makkovikian rocks are largely obliterated by late Paleoproterozoic Labradorian magmatic products. In particular, in the transition zone, it might be worthwhile to examine localities where felsic volcanic rocks are indicated on 1:100 000-scale geological maps and to search for potential extensions to them. Nd isotopic data suggest that 'Makkovikian' crust extends under much of the Grenville Province in eastern Labrador. The source of the molybdenite at Tessialuk (Jay) Lake especially requires further investigation.

GRENVILLE PROVINCE–PRE-LABRADORIAN

METASEDIMENTARY GNEISS

This section of the report is lengthy, but it underscores the metallogenic significance of metasedimentary gneiss, not only as a potential host for mineral deposits, but also as a source material for younger plutonism and mineralization.

Metasedimentary gneiss in eastern Labrador is overwhelmingly pelitic. There are two large coherent swathes of metasedimentary gneiss, namely,

i. The Paradise metasedimentary gneiss belt; and
ii. Unnamed belt east of the Mealy Mountains Intrusive Suite.

In addition, there are many smaller areas, largely reduced to shreds and patches as a result of thrusting and/or strike-slip faulting, during both pre-Grenvillian and Grenvillian orogenesis. These supracrustal units are among the oldest rocks present in the Grenville Province in eastern Labrador. The best estimate for their age is deposition between 1810 and 1770 Ma (Gower *et al.*, 2008a).

The mineral assemblage in the pelitic gneiss varies according to metamorphic grade. The majority of the gneiss is biotite–garnet–sillimanite-bearing, but kyanite is common in parts of the Hawke River and Groswater Bay terranes (terranes shown on Figure 3). Cordierite occurs extensively in the eastern part of the Paradise metasedimentary gneiss belt and in metasedimentary gneiss east of the Mealy Mountains Intrusive Suite. Both relict andalusite and staurolite are only known from single localities. Other noteworthy minerals are osumilite and sapphirine in the Sand Hill Big Pond area; sapphire west of St. Lewis; and sporadic (non-sapphire) corundum.

Associated rocks include minor psammitic gneiss, quartzite/metachert, amphibolite of supracrustal origin, and rocks derived from calcareous protoliths. Quartzite is generally finely laminated and is interpreted to have been derived from chemically precipitated chert and lean banded iron formation. The amphibolite of supracrustal origin is considered to have a mafic volcanic protolith. Unequivocal pillowform mafic volcanic rocks have been recognized in the Dead Islands area (Gower and Swinden, 1991). The rocks derived from calcareous protoliths are mostly calc-silicate types, but rare marble has been found.

Metasedimentary gneiss in eastern Labrador deserves to be a major target for grassroots mineral exploration for a wide range of commodities. That metasedimentary gneiss has high potential was first advanced by Gower and Erdmer (1984); on-going data collection since then has served to endorse, rather than negate, their suggestions. Based on known mineralization, the list of commodities includes the metals Cu, Au, U and Mo, and the minerals garnet and sapphire. Lesser potential exists for other commodities, particularly various aluminosilicate and related minerals.

The organizational approach in the subsections that follow is first by commodity (with Fe-sulphide localities following those for Cu) and then, within that commodity, terrane affiliation, from north to south. The organization approach is somewhat disguised visually in the figures because the distribution of currently known mineral occurrences within pelitic gneiss is governed mostly by two non-geological factors, namely, quality of exposure and ease of access. The author is confident, however, that, as more data become available, the underlying, geological patterns suggested will become increasingly evident.

Figure 9 shows the overall distribution of mineral occurrences in Pre-Labradorian metasedimentary gneiss. Only isolated occurrences are labelled in this figure, the remainder being shown in Figures 10 to 14. The locations of Figures 13 and 14 are indicated on Figure 12.

Copper

Forty-two mineral occurrences within pelitic and semipelitic metasedimentary gneiss have some indication of the presence of Cu, either from primary sulphides or their secondary products. Note that several of the localities where some indication of Cu is present are currently designated as pyrite occurrences, and the distinction between the two is somewhat artificial. Three other occurrences at which Cu has been recorded are also included in this section; two are with amphibolite in the Dead Islands area in the Hawke River terrane, and one is most closely associated with quartzite on Henrietta Island, south of Rigolet, in the Lake Melville terrane.

Groswater Bay Terrane

In the Groswater Bay terrane, three Cu occurrences (Figure 10) are located on Black Island, on the north side of Groswater Bay (later in the report, reference is made to another Black Island, which is east of Cartwright). The earliest known reference to them is by Halet (1946), who noted that chalcopyrite had been previously reported and pits had been dug 40 years earlier. A detailed map of the showing was made by Piloski (1955b). The site was included on the regional geological map of Stevenson (1970) and was visited by the author in 1984 (*013I/05/Cu 003*). Several pits 1–2 m wide, 3–4 m long and 2–3 m deep were seen at that time. Cu mineralization included chalcocite, bornite and malachite associated with abundant epidote alteration and some quartz veining. Two grab samples were analyzed and returned values of 0.67% Cu and 1.81% Cu, but low abundances in other elements (Table 3). During earlier 1:100 000-scale geological mapping, Gower (1981) found traces of Cu at two other sites on Black Island (*013I/05/Cu 002* and *013I/05/Cu 004*), nei-

Table 3. Copper occurrences in quartzofeldspathic supracrustal rocks, Black Island, Groswater Bay terrane

Mineral Occurrence	Reference	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013I/05/Cu 003	CG84-197A	6680	93	16	8	-	72	5	n.d.	n.d.
013I/05/Cu 003	CG84-197B	18100	110	17	12	-	54	5	n.d.	25
013I/05/Cu 004	CG79-800A	6	102	13	2	-	70	4	-	-

Note: n.d., not detected; -, not analyzed

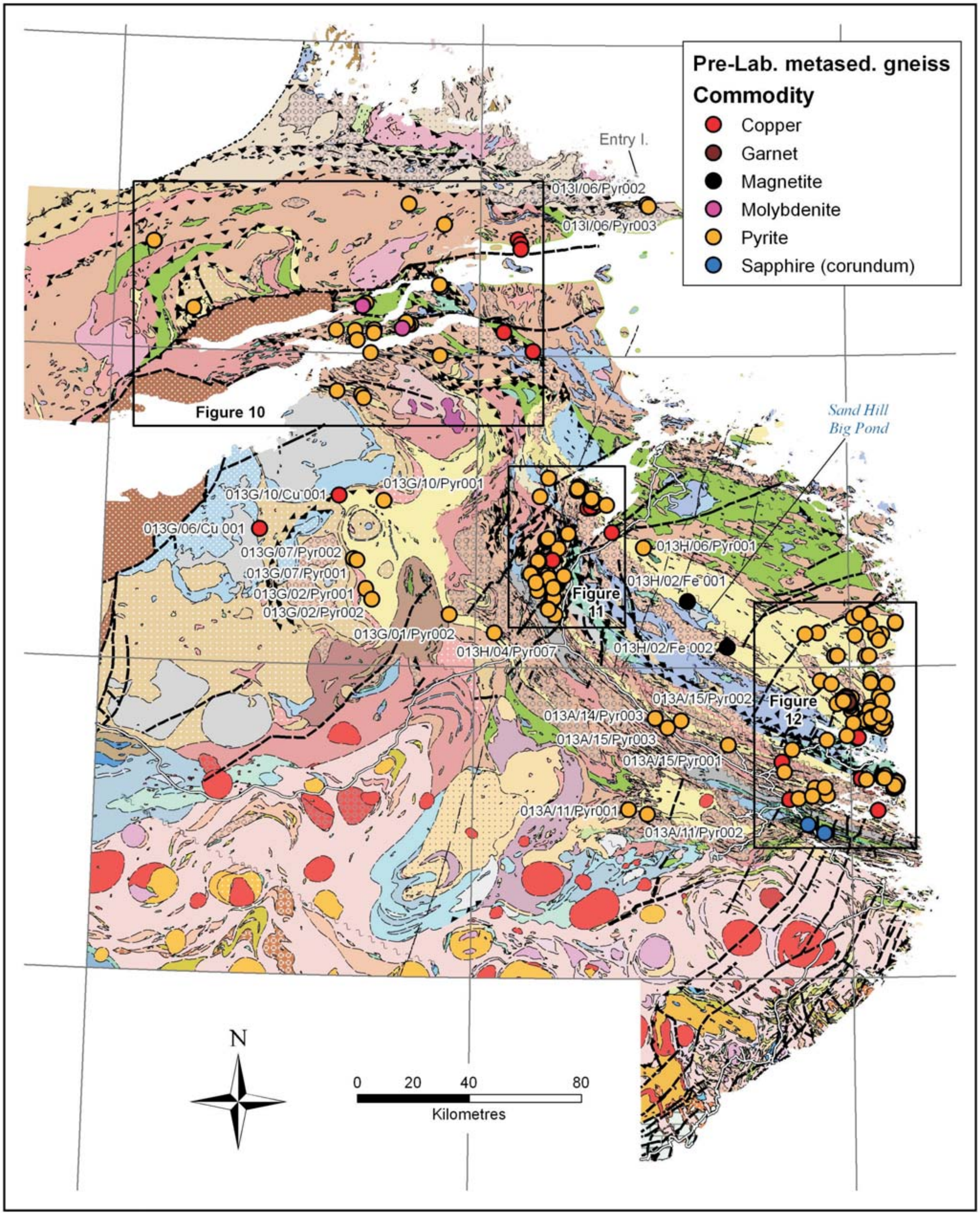


Figure 9. *Distribution of mineral occurrences in pre-Labradorian metasedimentary gneiss. Only mineral occurrences outside the boxed areas are labelled in this figure. Those inside the boxed areas are shown in subsequent figures as indicated, except for two high-concentration areas in the boxed area for Figure 12. Additional figures are required to show these, and are indicated on Figure 12. The reader will need to use all five figures concurrently when accessing this section of the report.*

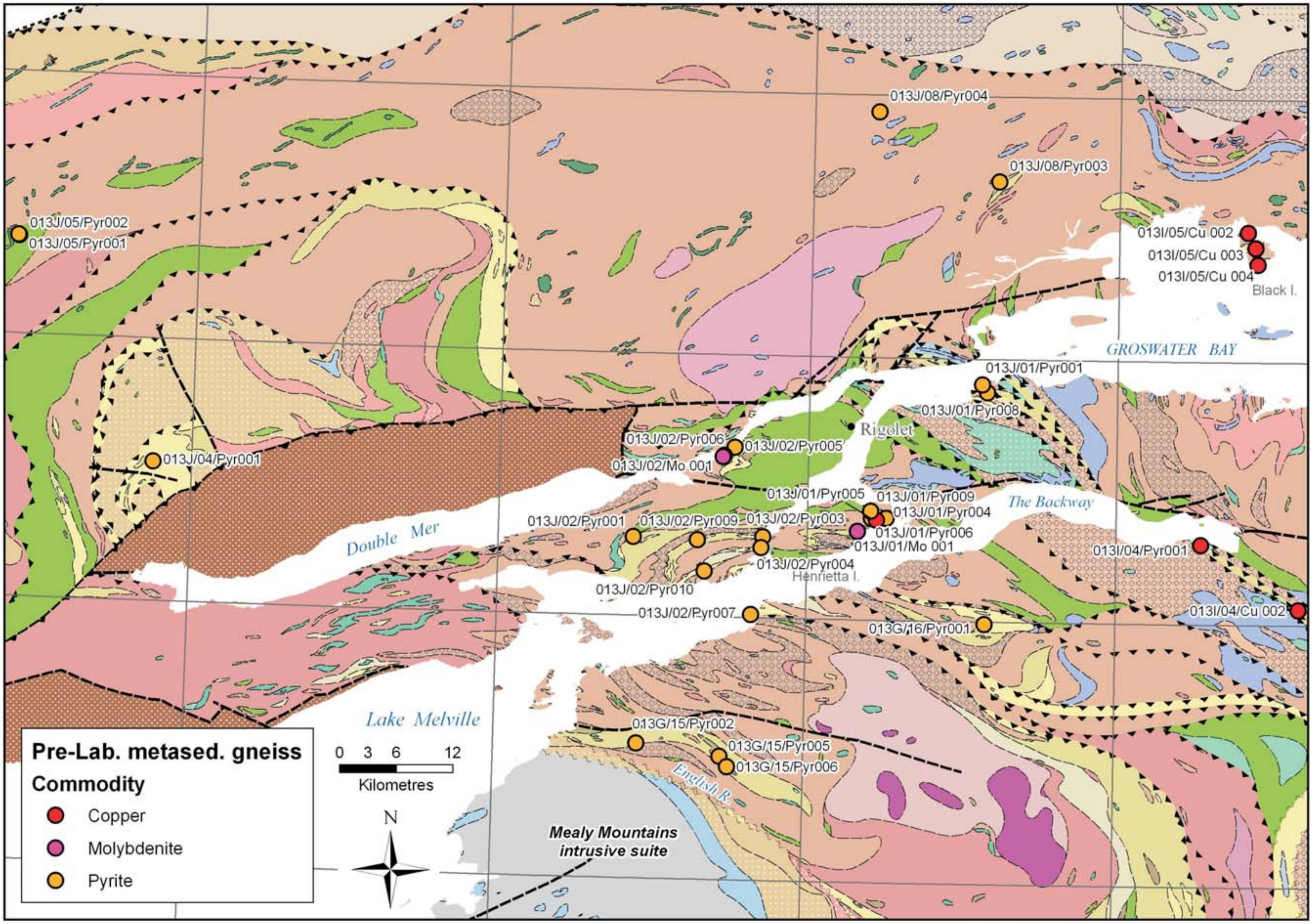


Figure 10. *Distribution of mineral occurrences in pre-Labradorian metasedimentary gneiss in the Rigolet region.*

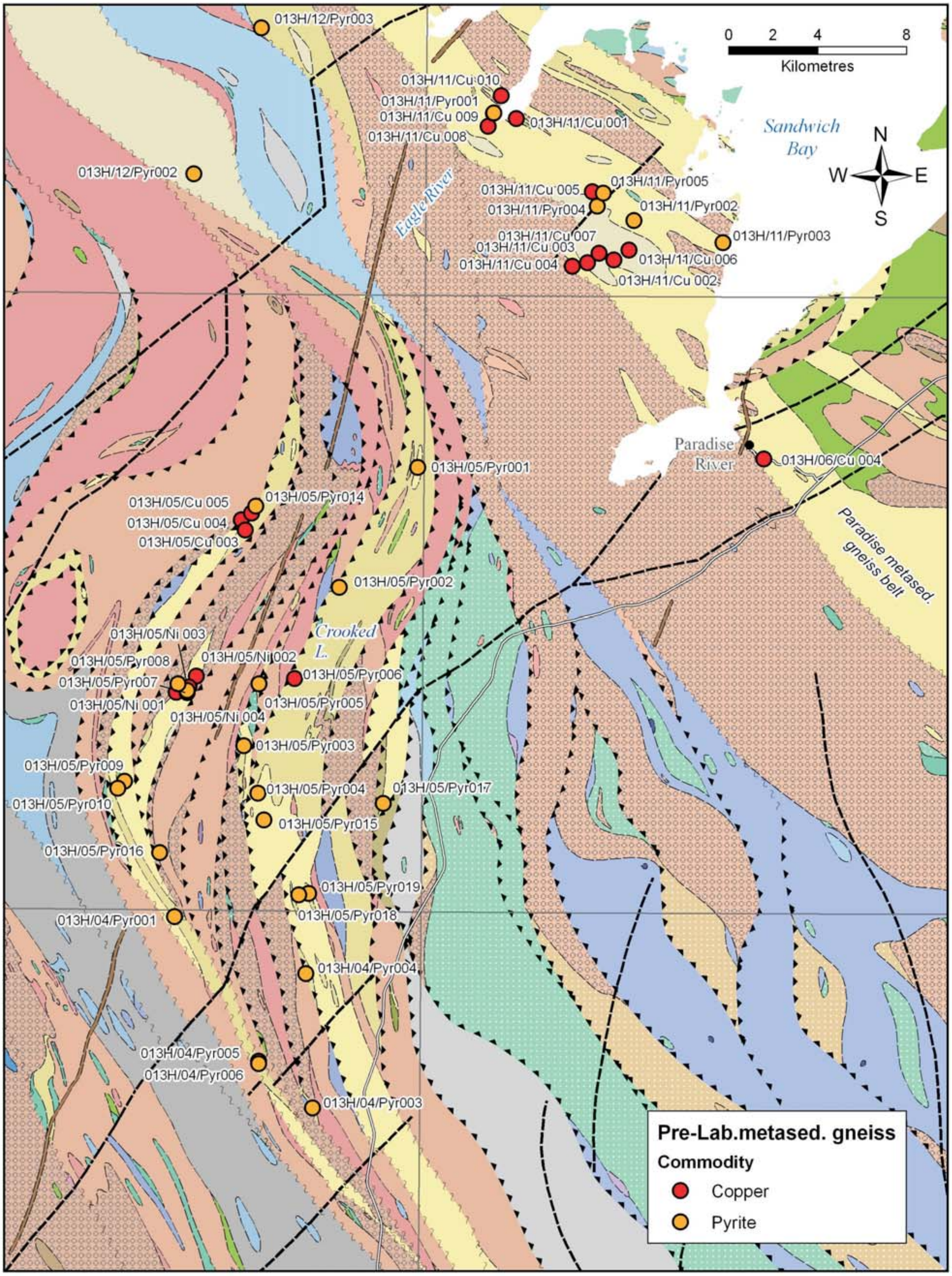


Figure 11. *Distribution of mineral occurrences in pre-Labradorian metasedimentary gneiss in the Crooked Lake region.*

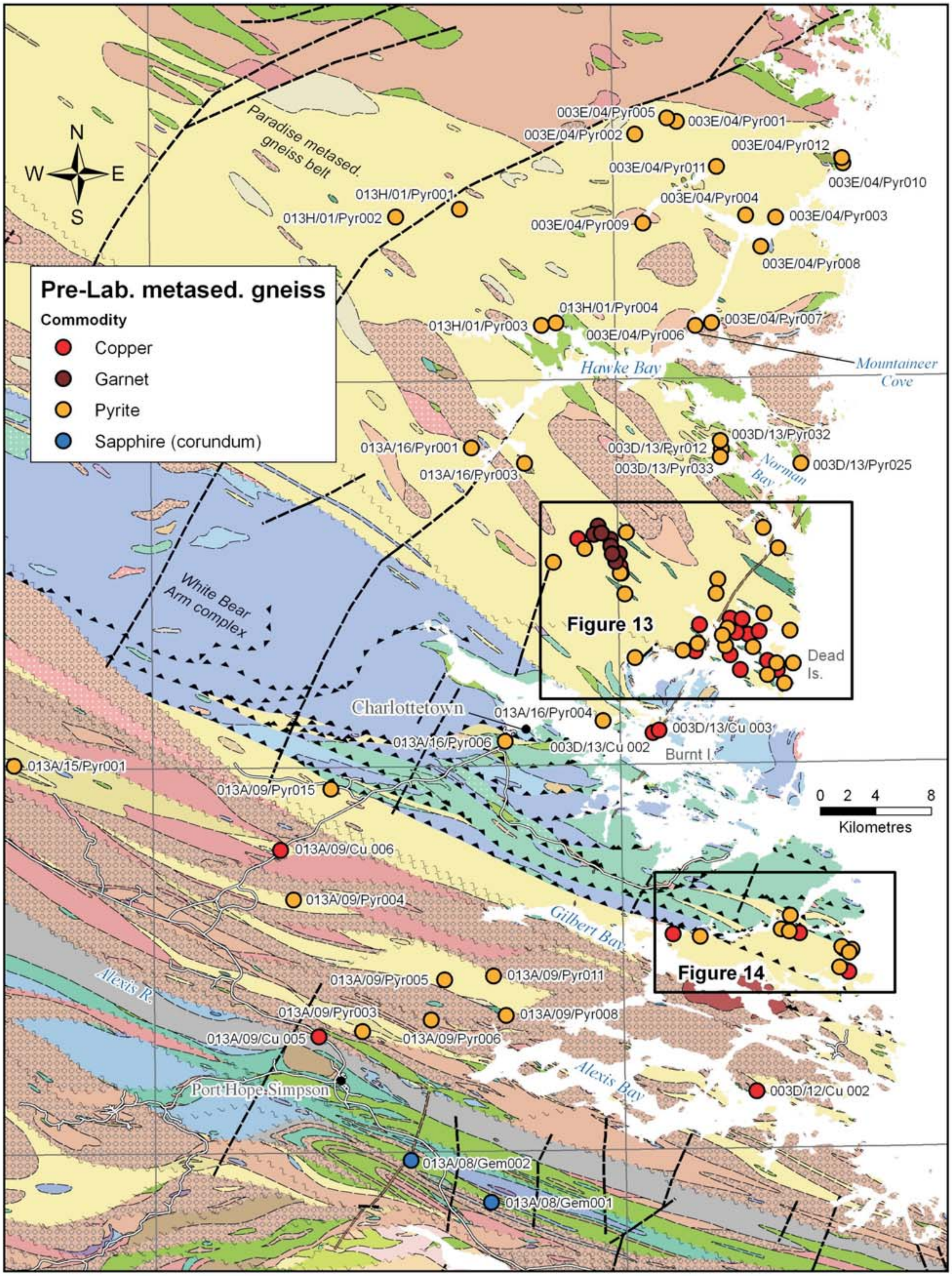


Figure 12. *Distribution of mineral occurrences in pre-Labradorian metasedimentary gneiss in the Hawke Bay to Alexis Bay region.*

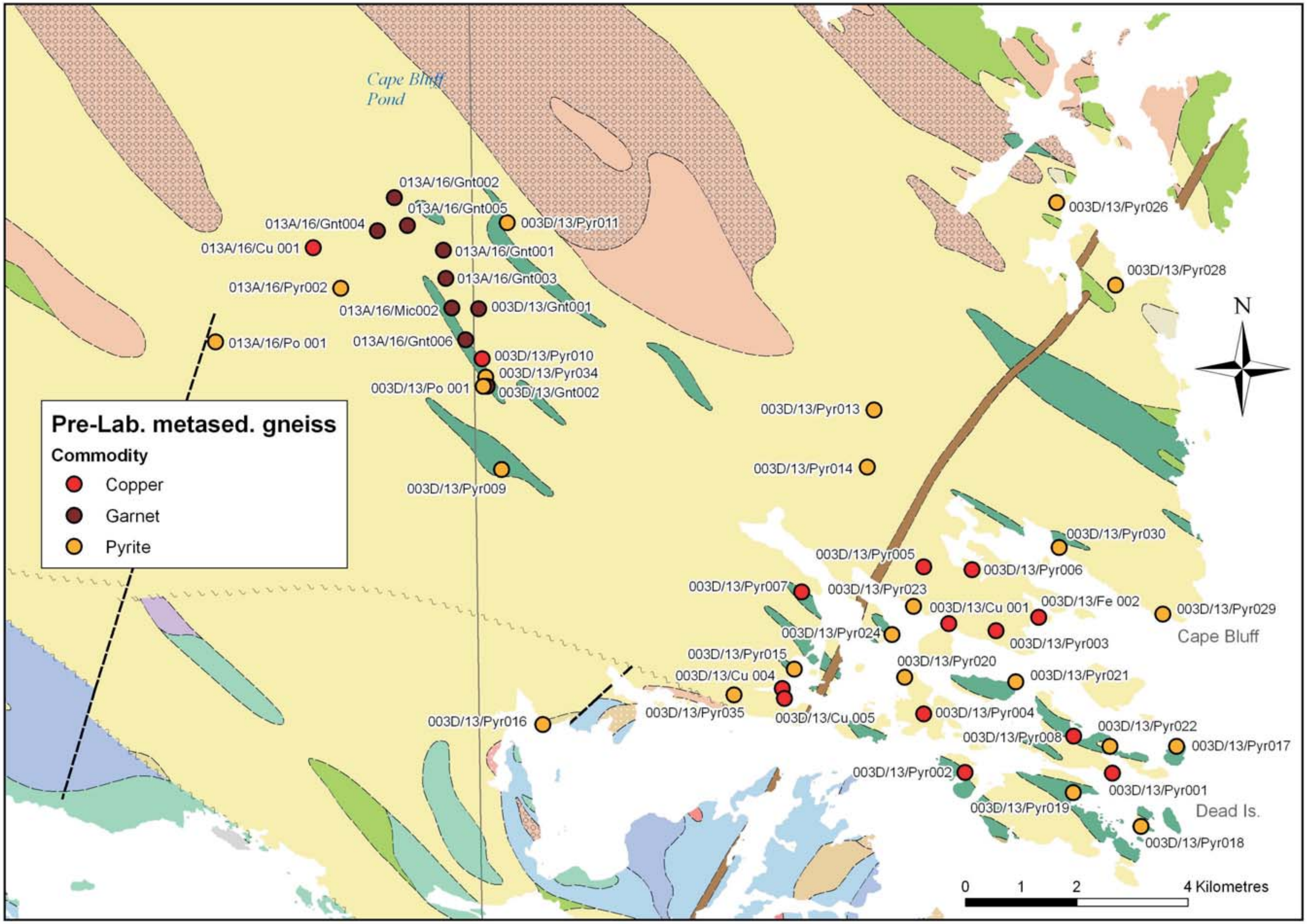


Figure 13. *Distribution of mineral occurrences in pre-Labradorian metasedimentary gneiss in the Dead Islands to Cape Bluff Pond area.*

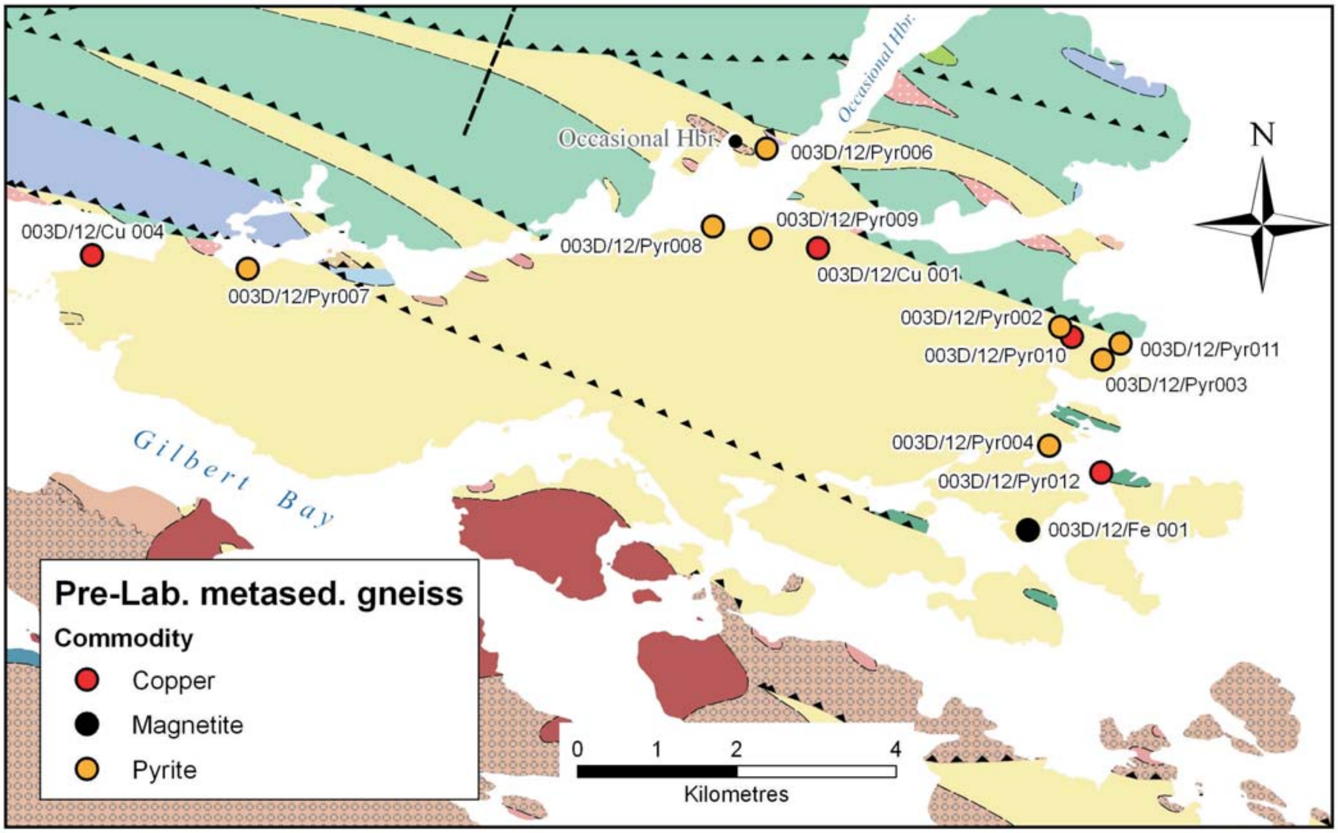


Figure 14. *Distribution of mineral occurrences in pre-Labradorian metasedimentary gneiss in the Occasional Harbour area.*

ther of which are as extensive as at the original discovery. The mineralization seen in outcrop at *013I/05/Cu 004* is not present in a sample from the site, however (Table 3). The host rocks to the mineralization are interpreted to have been derived from clastic metasediments. They are pale-grey weathering, fine grained, continuously and evenly layered, and quartz rich. The layers are defined by subtle mineralogical variations and some concordant, feldspar-rich bands that may be partial melts. Biotite and muscovite and a few epidote-rich pods are present. A pink colour to the epidote pods is most likely due to thulite (Th-bearing epidote group mineral; Appendix 2, sample CG79-794). Minor fluorite was also recorded.

The host rocks for these three occurrences in the Groswater Bay terrane represent a somewhat different geological setting to that of the pelitic-gneiss-hosted Cu occurrences in the terranes farther south (*see* following). The linkage may well be closer to the felsic-volcanic-hosted mineralization in the Makkovik Province.

Hawke River Terrane

Within the Hawke River terrane, all the Cu occurrences hosted by metasedimentary gneiss are within the Paradise metasedimentary gneiss belt and its attenuated extension to the northwest. Three spatial groups of occurrences can be defined, namely, Dead Islands, Sandwich Bay, and northwest of Sandwich Bay.

In gossans in the Dead Islands area (first mentioned by Douglas, 1953), 15 localities are noted as having some signs of Cu mineralization, although only six of these are actually designated as Cu occurrences. Five of these are on the coast (*003D/13/Cu 001*, *003D/13/Cu 002*, *003D/13/Cu 003*, *003D/13/Cu 004* and *003D/13/Cu 005*) and one inland, 12 km to the northwest, at Cape Bluff Pond (*013A/16/Cu 001*) (Figures 12 and 13). Most of the remainder are designated as pyrite occurrences (*see* below).

The two most noteworthy Cu occurrences were discovered by van Nostrand (1996a). At *003D/13/Cu 004*, Cu staining (malachite) is associated with a 24-m-wide body of coarse-grained granite, gradational into pegmatite. The granite intrudes well-banded, interleaved muscovite-rich metasedimentary gneiss and diopside–garnet calc-silicate gneiss. Copper staining in the granite is present as dark-green to blue-green patches, lenses and aggregates of fine- to medium-grained malachite up to 1 m wide and 2 m long. Molybdenite is associated with the Cu staining in several zones and occurs as decimetre-scale patches containing 2–3% disseminated, fine- and medium-grained flakes and aggregates. Malachite occurs over a 15-m-wide section of the exposure and varies from patches and lenses up to 1 m across and 3 m long. Several samples collected from the locality returned Cu values greater than 1% and one yielded a value of 4.78% Cu (Table 4).

Table 4. Copper occurrences, Dead Islands area, Hawke River terrane (van Nostrand, 1996a, b)

Mineral Occurrence	Reference	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Ag ppm	Au ppb
003D/13/Cu 002	003D/13/0024	R13	1848	83	32	43	18	51	0.7	<2
003D/13/Cu 004	003D/13/0025	R9	47870	55	5	10	1	11	14.3	<2
003D/13/Cu 004	003D/13/0025	R10	144	21	4	3	<1	5	<0.3	<2
003D/13/Cu 004	003D/13/0025	R11	11657	124	4	41	16	21	4.3	<2
003D/13/Cu 004	003D/13/0025	R38	3947	28	6	16	2	14	1.9	<2
003D/13/Cu 004	003D/13/0025	R39	11341	28	3	8	<1	7	4.1	<2
003D/13/Cu 004	003D/13/0025	R40	10909	29	3	10	<1	7	3.7	<2
003D/13/Cu 004	003D/13/0025	R41	11444	44	4	13	1	8	2.7	<2
003D/13/Cu 005	003D/13/0025	R12	15733	203	6	247	43	139	5.0	<2
003D/13/Cu 005	003D/13/0025	R13	3347	115	5	62	19	75	0.8	<2
003D/13/Pyr035	003D/13/0025	R26	291	129	4	25	13	36	0.3	<2
003D/13/Pyr035	003D/13/0025	R27	75	142	<3	21	5	69	0.3	<2
003D/13/Pyr035	003D/13/0025	R28	129	63	<3	11	1	49	0.3	<2

At *003D/13/Cu 005*, less than 200 m to the south on the other side of a small inlet, van Nostrand (1996a) reported malachite, forming aggregates and thin layers, within 50 to 75 cm-wide granite veins intruding metasedimentary gneiss. Two samples yielded values of 0.33% and 1.57% Cu (Table 4). Whether or not the zone on the south side of the bay is linked to the larger mineralized area on the north side deserves investigation.

Two of the other Cu coastal occurrences, farther south on Burnt Island (Figure 12), were also reported by van Nostrand (1996b). At *003D/13/Cu 002*, malachite alteration is present in metasedimentary gneiss, granodiorite gneiss, late granite-pegmatite veins, monzonite, and locally within the margin of a Long Range dyke in the area. It is most abundant within 1–10 m of the dyke contact, although it occurs in metasedimentary gneiss up to 250 m to the west of the dyke. Alteration occurs primarily as thin layers along gneissosity planes of the metasedimentary gneiss, but also as cm-scale veins, and disseminated grains within granite veins. At one spot, malachite occurs across a 4-m-wide zone as thin layers and lenses up to 8 cm in diameter, as well as disseminated grains and thin veins in late granite veins. One analysis gave a value of 0.18% Cu (Table 4). At *003D/13/Cu 003*, a 5 m-high vertical section exposes malachite-bearing monzonite, metasedimentary gneiss, and coarse-grained granite and pegmatite veins within 1 to 3 m of the Long Range dyke contact. The Cu alteration is present as blue-green to green, mm- and cm-scale layers on foliation and gneissosity planes, irregular-shaped aggregates and lenses up to 80 cm long, disseminated grains (2–10%) and mm- to cm-scale crosscutting veins. The alteration occurs discontinuously over a 40-m-long section. Three samples collected along this zone failed to yield anomalous metal values, however. A silicified metasedimentary gneiss boulder sampled at the eastern contact of the Long Range dyke, 550 m to the northeast, yielded a value of 554 ppm Cu. For all four occurrences, the restriction of malachite staining to an association of unrecrystallized, coarse-grained granite and pegmatite is interpreted by van Nostrand as suggesting that the mineralization is related to a late-stage alteration event. The proximity of the Cu occurrences to the Long Range dyke indicates that the dyke may have acted as a conduit or possible source for the mineralization (*cf. see* section Grenville Province–Late Proterozoic to Recent; Long Range dykes).

The other coastal occurrence (*003D/13/Cu 001*) was discovered during 1:100 000-scale mapping and consists of abundant Cu staining in a 5- to 10-m-wide gossan associated with biotite-rich migmatitic metasedimentary gneiss and amphibolite. A sample analyzed from the site yielded a value of 0.013% Cu (Table 5). It, also, is not far from a Long Range dyke in the area (*see* Grenville Province–Late Proterozoic to Recent; Long Range dykes).

The inland Cu occurrence, on Cape Bluff Pond (*013A/16/Cu 001*; Figure 13) is shown on the map of Eade (1962) as a pyrite and chalcopyrite locality. It coincides with his data station EA61-042, at which field notes record disseminated pyrite throughout the rock. The site appears to be the same locality as that of Donohoe (1966), who reported chalcopyrite

Table 5. Copper and pyrite occurrences associated with supracrustal amphibolite, Dead Islands area, Hawke River terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
003D/13/Cu 001	MN86-373	131	179	38	23	20	46	4	0.4	3
003D/13/Pyr008	CG84-191	86	122	6	31	-	77	3	-	5
003D/13/Pyr008	JS86-410	159	137	10	45	20	147	19	0.3	24
003D/13/Pyr008	JS86-413	119	206	53	5	11	47	10	0.3	10

Note: -, not analyzed

in a pegmatite associated with biotite, minor orthoclase and quartz. Donohoe wrote "mineralization in the zones is almost non-existent except for some disseminated pyrite and chalcopyrite". Bradley (1966) describes the gossans as mappable units of limonite-stained quartz–garnet–biotite paragneiss that locally contain pyrite and/or pyrrhotite and rarely chalcopyrite. He goes on to say that the thickness of units varies from several inches to a fairly typical thickness of 20', and that the original sediments, before metamorphism, appear to have been lean pyritiferous, quartz-rich pyritic or sideritic facies of iron formation, together with impure limestone, impure sandstone, and very thin and local basic flows and tuffs. The rusty zones on the highlands are very impressive-looking until fresh surfaces are exposed, when it can be seen that the sulphides are sparse, with only rare malachite staining and no other economic minerals identifiable. A map of the gossans is provided by Bradley (1966, Plate XI).

In the same area, the pyrite occurrences (Figure 13) at which evidence of Cu mineralization has been reported, are *003D/13/Pyr001*, *003D/13/Pyr002*, *003D/13/Pyr003*, *003D/13/Pyr004*, *003D/13/Pyr005*, *003D/13/Pyr006*, *003D/13/Pyr007* and *003D/13/Pyr010*. One locality showing minor Cu mineralization, but designated in MODS as an Fe occurrence (*003D/13/Fe 002*), is geologically comparable to the pyrite localities. At *003D/13/Pyr001* and *003D/13/Fe 002*, green malachite staining, associated with rusty staining, was reported by Wardle (1976). At the first site, malachite occurs along foliation planes in granodiorite – spotted granitic gneiss (the latter interpreted during 1:100 000-scale mapping to be metasedimentary gneiss) and Cu is concentrated along the hanging-wall side of a thin amphibolite–diorite unit and is continuous for 6 m along strike. At the second site, the malachite is associated with vertical joints. At *003D/13/Pyr002*, recorded during 1:100 000-scale mapping, a sample from a pyritic zone 20 m wide, associated with biotite–sillimanite–garnet metasedimentary gneiss, was found to be slightly geochemically anomalous in Cu. Pyrite occurrences *003D/13/Pyr003* to *003D/13/Pyr007*, were all identified by Piloski (1955a), who described the mineralization as quartz veins and small stringers of quartz, accompanied by fine, disseminated pyrite, in highly folded paragneiss. A few specks of chalcopyrite were observed in some specimens and are the basis for inclusion here. The area was examined in detail by Donohoe (1966). A sample analyzed from locality *003D/13/Pyr003* assayed 0.06% Cu and 0.10% Ni. At the inland site, on Cape Bluff Pond (*003D/13/Pyr010*), chalcocite was identified in a pyritic gossan within metasedimentary gneiss (Donohoe, 1966).

One of two Cu occurrences associated with supracrustal amphibolite in the Dead Islands area is characterized by abundant Cu staining in a 5–10-m-wide gossan (*003D/13/Cu 001*). Apart from amphibolite, biotite-rich migmatitic metasedimentary gneiss is present. Partial whole-rock analytical data are given in Table 5. The other (*003D/13/Pyr008*) was shown as a pyrite occurrence on Eade's (1962) map and was previously examined by members of Douglas's 1947 expedition, courtesy of Mr. Alexander Campbell who showed the locality to them (Douglas, 1953). A pyritic gossan at the locality was mapped by Wardle (1976, 1977). The site was visited in 1984 by the author, who described it as comprising numerous rusty weathering zones associated with a wide range of rock types that include: i) fine-grained amphibolite with calcic pods, possibly derived from mafic lavas; ii) tightly folded mafic dykes; iii) pure, white quartzite; iv) quartz–garnet–magnetite banded iron formation; v) biotite- and garnet-rich schistose zones associated with banded iron formation; and vi) lensy-looking rocks with a fragmental appearance that could be of pyroclastic origin. Formal geological mapping of the area at 1:100 000-scale was carried out in 1986. Analytical results from samples from the site were earlier reported by Douglas (1953), who wrote that Au and Ag values were of no economic interest. Further sampling was carried out by the author (CG84-191) and during 1:100 000-scale mapping (JS86-410 and JS86-413). Partial results are reported in Table 5, but apart from anomalous Mo and Au, in one sample, do not offer encouragement to the explorationist. Sample CG84-191 has high F (1142 ppm) and Li (45 ppm).

In the Sandwich Bay area (Figure 11), the Paradise metasedimentary gneiss belt crosses the southwest end of Sandwich Bay and is well exposed along both shorelines and on inland hills. Eleven localities have been designated Cu occurrences in this area.

The first discovery was made near the mouth of the Eagle River by Douglas (1953), who shows a small sketch map of the locality (*013H/11/Cu 001*). Douglas (1953) wrote that "malachite was observed on the surface of a quartzite remnant in the gneiss, and chalcopyrite and bornite were identified in the fresh rock. The remnant was approximately 14' wide and was traced for about 100' along strike, parallel with the shoreline. A mineralized zone within it is about 2' wide and a sample from it assayed 2.8 percent copper." The locality is referred to as Showing 14 by Sutton (1965), who reported the average of two samples as having 3.17% Cu and 0.02 oz/ton Ag. One sample carried 6.09% Cu and the other 0.25% Cu (samples JJ66-65 and JJ68-65). Sutton (1965) described a basic horizon in the gneiss as having a width of 12' and striking almost east–west. This horizon is very lightly mineralized by pyrite and there appears to be a zone about 2' wide showing malachite staining and containing some chalcopyrite and possibly bornite. A strike length of 50' is exposed at the west end and another exposure occurs 50' farther east, around a minor point, before the zone disappears in that direction under beach material. Five diamond-drill holes were attempted on the showing by Brinex in 1966. Holes 66-2 and 66-4 were completed and three others terminated. Hole 66-2, drilled to a depth of 78 m, intersected a small amount of pyrite and a trace of Cu sulphide. Hole 66-4 showed one width of scattered sulphides over a core length of 2' and this assayed 0.14% Cu. Surface sampling was done across the zone in line with hole 66-1. Two mineralized sections separated by 8' of barren rock occur in a width of 12.7' and are closely associated with an amphibolite horizon in migmatized gneiss. The hanging-wall section assayed 0.04% Cu over 2.7' and the foot wall section assayed 0.70% Cu over 2'. Maps showing the exact location of the showing are included as Plates V and VI by Bradley (1966). The showing has been visited by the Geological Survey of Newfoundland and Labrador – in 1977 by Cherry (1978a, b) and by the author in 1981 and 1984. Two drillholes were located and evidence of prospecting found. A sample from the locality contains 561 ppm Cu, 80 ppm Zn and 4.7 ppm U. Further exploration in the vicinity was carried out by Consolidated Viscount Resources (Connell and Brewer, 1996b) and additional showings discovered in the surrounding area (*see* below). The showing discovered by Douglas (1953) is referred to by Connell and Brewer (1996b) as the "Old Brinex" showing. Analytical results for selected elements for samples analyzed from occurrence *013H/11/Cu 001* are listed in Table 6. Sample 20429 is from a site 200 m east of the earlier-discovered showing.

Boulders of mineralized float were discovered near the shoreline 600 m due west of the Old Brinex showing. One boulder (UTM co-ordinates 593570N and 470150E) is 0.6 m in diameter and contains 15% sulphides, including bornite and chalcopyrite (JM02-08-95). The second boulder, 35 m east of the first, is quartz–biotite gneiss containing up to 10% pyrite (AW-SBN-1). Analytical results for selected elements for samples from the two boulders (20413 and 20414) are given in Table 6.

A sample of massive amphibolite (20427) and a sample of nearby, epidote-altered float (20428), both near the shore of Eagle River 1 km southwest of the Old Brinex showing, were also analyzed for the same suite of 35 elements but did not give economically significant results, unless the >10000 ppm Cu value (*see* above) came from sample 20427.

Three additional showings were located in the same area in 1995 by Connell and Brewer (1996b), on the other (west) shoreline of the Eagle River. At *013H/11/Cu 008*, the host rock was described as quartz–biotite–garnet gneiss and recorded to be strongly weathered and to show heavy malachite staining. Chalcopyrite and bornite were observed in hand samples and, locally, magnetite reaches 25% of the rock. The mineralization is in a shear zone having a maximum width of 2 m. The location is based on distances from descriptive reference points and is imprecise. At *013H/11/Cu 009* quartz–biotite–feldspar–sillimanite–garnet gneiss was found containing disseminated pyrite mineralization parallel to regional foliation. The pyritic band is *ca.* 0.6 m wide, containing a 0.2 m-wide seam of magnetite and minor chalcopyrite. This site is essentially the same locality (within 20 m) as a pyrite occurrence recorded during 1:100 000-scale mapping (*013H/ 11/Pyr001*), although, at that time, Cu mineralization was not noted. At *013H/11/Cu 010*, biotite gneiss is transected by a 1.5-m-wide mineralized shear zone containing pyrite, chalcopyrite, and possibly bornite. Analytical results for selected elements for samples from occurrences *013H/11/Cu 008*, *013H/11/Cu 009* and *013H/11/Cu 010* are given in Table 6. Note that on p. 11 of Connell and Brewer's (1996b) report, a value of 1180 ppm Cu is given for sample 20415, which differs with respect to that recorded in their analytical table.

The remaining six Cu occurrences in the Paradise metasedimentary gneiss belt in the Sandwich Bay area are all located inland between 5 and 8 km to the southeast of those described above. All are hosted in inhomogeneous to homogeneous metasedimentary diatexite derived from pelitic gneiss, and some have mafic material associated.

Three of the occurrences were mapped during 1:100 000-scale investigations. At *013H/11/Cu 002*, one pyritic patch was seen consisting of layers 5 cm wide and continuous over a few metres. A mineralized sample (LM-65-29) from the

Table 6. Copper occurrences in Paradise metasedimentary gneiss belt in the Eagle River area, Hawke River terrane

Mineral Occurrence	Reference	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Ag ppm	Au ppb
013H/11/Cu 001	013H/11/0049	20417	1665	68	12	95	43	0.4	20
013H/11/Cu 001	013H/11/0049	20418	282	114	14	41	20	<0.2	42
013H/11/Cu 001	013H/11/0049	20419	60	167	8	13	25	<0.2	<2
013H/11/Cu 001	013H/11/0049	20420	7430	115	12	41	19	2.6	<2
013H/11/Cu 001	013H/11/0049	20421	353	74	12	34	23	0.2	<2
013H/11/Cu 001	013H/11/0049	20422	695	48	14	64	30	0.4	16
013H/11/Cu 001	013H/11/0049	20429	253	258	6	8	27	<0.2	<2
013H/11/Cu 001	013H/11/0049	20413	445	90	14	102	67	<0.2	18
013H/11/Cu 001	013H/11/0049	20414	475	78	8	92	34	0.4	10
013H/11/Cu 008	013H/11/0049	20424	22	84	2	21	13	<0.2	<2
013H/11/Cu 008	013H/11/0049	20425	371	70	8	29	15	<0.2	30
013H/11/Cu 008	013H/11/0049	20426	1845	44	18	12	31	0.8	<2
013H/11/Cu 009	013H/11/0049	20415	1120	108	32	48	45	0.2	40
013H/11/Cu 010	013H/11/0049	20423	991	84	16	85	71	0.2	28

Note: In the text and on Map 1 of the report, sample 20429 is reported as containing >10000 ppm Cu, whereas the assay results certificate indicate that this result came from sample 20427, which is from 1 km to the southwest.

same locality collected by a prospector employed by Brinex analyzed 0.11% Cu. Further exploration in the area was carried out by Consolidated Viscount Resources in 1995 (Connell and Brewer, 1996a). Numerous samples of rock, stream-sediments and soils were collected in the vicinity. A sample (20441) from close to this locality had the values listed in Table 7. Occurrence *013H/11/Cu 003* comprises a pyritic layer about 2 m wide and continuous along strike for about 100 m. During 1:100 000-scale mapping only pyrite was seen, but an analysis of a sample (20450) collected during subsequent exploration by Consolidated Viscount Resources in 1995 (Connell and Brewer, 1996a) show anomalous Cu (Table 7). Connell and Brewer (1996a) infer that the locality is part of a zone of several en echelon folded gossans containing 10–15% pyrite and minor chalcopyrite. Mineralization occurs as stringers and pods of pyrite in parallel subzones that can be traced for over 2 km and may continue farther east and are associated with mafic gneiss. Locality *013H/11/Cu 004* comprises pyritic layers in diatexite and was mapped by the author in 1981. It was revisited and sampled in 1984 (Plate 2) and further exploration in the area was carried out by Consolidated Viscount Resources in 1995 (Connell and Brewer, 1996a). Pyrite and chalcopyrite were noted in outcrop and samples collected, one of which yielded a much higher Cu value than that obtained earlier from a sample (CG84-189) collected by the author (Table 7).

Table 7. Copper occurrences in the Paradise metasedimentary gneiss belt, Sandwich Bay area, Hawke River terrane

Mineral Occurrence	Reference	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Ag ppm	Au ppb
013H/11/Cu 002	013H/11/0048	20441	1390	138	<2	128	81	0.2	-
013H/11/Cu 003	013H/11/0048	20450	1680	86	<2	20	35	<0.2	-
013H/11/Cu 004	013H/11/0048	20454	1220	146	<2	87	144	<0.2	-
013H/11/Cu 004		CG84-189	447	265	22	73	-	-	5

Note: -, not analyzed

Plate 2. *Pyritic gossan having anomalous Cu values within the Paradise metasedimentary gneiss belt. Northwest of the community of Paradise River (mineral occurrence 013H/11/Cu 004).*

The other three occurrences (*013H/11/Cu 005*, *013H/11/Cu 006* and *013H/11/Cu 007*) were discovered during exploration by Brinex and samples were assayed from them (Juilland, 1965; Sutton, 1965). One of the three localities (*013H/11/Cu 006*) was subsequently visited by Cherry (1978a, b), who recorded pyrite and chalcopyrite in his notes (MC77-194) and showed its location on his map. Analytical results obtained by Brinex are given in Table 8.

Table 8. Copper occurrences reported by Brinex in the Paradise metasedimentary gneiss belt, Sandwich Bay area, Hawke River terrane

Mineral Occurrence	Sample	Showing	Cu%	Ag%
013H/11/Cu 005	1139	LM-65-15	0.12	trace
013H/11/Cu 006	1211	LM-65-28	0.10	0.02
013H/11/Cu 007	1212	LM-65-35	0.11	0.03

The final occurrence in the Sandwich Bay area is somewhat isolated from the previous group, being situated 11 km farther southeast, within the community of Paradise River (*013H/06/Cu 004*). It was found by the author during examination of road-cuts resulting from highway construction and consists of a rusty-looking layer within sillimanite-bearing pelitic gneiss. An analysis yielded anomalous Cu (Table 9).

Table 9. Copper occurrence in Paradise metasedimentary gneiss belt at Paradise River, Hawke River terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013H/06/Cu 004	CG04-285B	1782	96	11	40	19	46	n.d.	0.8	17

Note: n.d., not detected

Northwest of Sandwich Bay, the Paradise metasedimentary gneiss belt tapers out as a consequence of Grenvillian thrusting and strike-slip faulting. As a result, it is very uncertain whether the slivers of metasedimentary gneiss found more than about 25 km northwest of Sandwich Bay should really be regarded as the belt's continuation. Two occurrences containing Cu mineralization are known in the attenuated region (Figure 10), although only one is designated specifically a Cu occurrence (*013I/04/Cu 002*). At the Cu site, which was located during 1:100 000-scale mapping, the rocks are well-layered metasedimentary gneisses that include schistose metasediments, probable mafic tuffs and quartzite. One band of quartzite 20 cm wide shows malachite staining along bedding surfaces. The other is classified as a pyrite occurrence (*013I/04/Pyr001*) and occurs 13 km along strike to the northwest of the Cu locality, on the south shore of The Backway. The occurrence was reported by Beavan (1980) who recorded a limonitic gossan zone containing disseminated chalcopyrite. A sample (KR-19) yielded the results given in Table 10. This gossan was located during 1:100 000-scale mapping of the area (data station RG80-114), and revisited in 1984 (data station CG84-196). In field notes, the gossan is noted as associated with metasedimentary gneisses that include metagreywacke, sillimanite schist, quartzite, probable tuffaceous rocks, possible mafic supracrustal rocks and some calc-silicate rocks. Two samples were collected during the first visit, a fine-grained amphibolite of probable supracrustal origin (RG80-114A) and pelitic/psammitic gneiss (RG80-114C). Two samples of gossan were collected in 1984 (CG84-196A and CG84-196B). Partial data for all four samples are included in Table 10. Remember that the RG80 samples are not from the gossan. For the gossan, the CG84 samples yielded Cu, Zn and Pb values somewhat similar to those obtained by Beavan, but Cr and Mo differ. In particular, the high Cr value of Beavan was not replicated.

Table 10. Pyrite occurrence on the south shore of The Backway, Hawke River terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013I/04/Pyr001	KR-19	190	206	27	-	67	3150	1	-	-
013I/04/Pyr001	RG80-114A	5	105	21	19	-	50	5	-	-
013I/04/Pyr001	RG80-114C	14	125	63	117	-	181	6	-	-
013I/04/Pyr001	CG84-196A	163	197	13	55	-	89	26	-	n.d.
013I/04/Pyr001	CG84-196B	179	177	n.d.	71	-	101	8	-	20

Note: n.d., not detected; -, not analyzed

Lake Melville Terrane

Within the Lake Melville terrane, metasedimentary gneiss occurs as strike-slip-bounded slivers, typically 10's of km long and less than 3 km wide. This is a consequence of a Grenvillian structural dextral strike-slip (lateral-ramp) tectonic regime (Gower *et al.*, 2008b) superimposed on a Labradorian southwest-verging thrust setting (Gower *et al.*, 1997). The persistent northwest structural trend makes projecting potential extensions to any discoveries easier, but, on the other hand, creates a difficult exploitation environment, as any mineral deposit is likely to be highly elongate and very narrow. The occurrences fall into three groups, namely, i) Occasional Harbour area, ii) Crooked Lake area, and iii) Henrietta Island.

In the Occasional Harbour area (Figure 14), the earliest discovery made is situated on the south side of Occasional Harbour (*003D/12/Cu 001*). It was first reported by Eaton (1950), who described it as a shear-zone, traceable by yellow outcrops for ½ mile. A width of 30' is characterized by typical gossan material. Eaton (1950) notes that two old stakes were found, inscribed W1 and W2, which he suggested indicated previous staking, possibly by Western Mining Co. The site was further evaluated by Brinex (Bradley, 1966) and described as a 20' band (or bands) of sulphide-bearing, rusty, quartz-garnet paragneiss in tight, westerly plunging folds. The rock contains 10–30% sulphide, but analyzed Cu content (0.10%) is minor.

Along strike to the east, van Nostrand (1995), reporting on behalf of Consolidated Callinan Flin Flon Mines, mapped a gossan zone at least 1.3 km long and up to 400 m wide (*003D/12/Pyr010*), and continuing southeast under water beyond the shoreline. The gossan zone is characterized by garnet- and muscovite-rich semipelitic gneiss and schist which locally contain disseminated pyrite, chalcopyrite and pyrrhotite. The rocks are pervasively hematitic, limonitic and silicified. Pyrite occurs as 1 to 5% fine, disseminated grains and aggregates and as mm-scale stringers within zones up to 3 m wide. Chalcopyrite and pyrrhotite are present as 1–2% fine disseminated grains along margins of pyrite aggregates and as isolated grains. The sulphides are concentrated in both the muscovite–garnet-rich restite and the quartzofeldspathic leucosome. Analyses showed that most of the samples contain less than 300 ppm Cu, and were not anomalous in other metals, but one sample gave 4207 ppm Cu (Table 11). In the same area, but 2 km to the south-southeast, another pyritic gossan zone (*003D/12/Pyr012*) was mapped by van Nostrand (1995), with which metasedimentary gneiss, some amphibolite, a mafic dyke, a quartz vein and shear zone are associated. Anomalous Cu values, up to 739 ppm, were obtained from several analyzed samples (Table 11).

Farther west, in Gilbert Bay, in the same pelitic metasedimentary gneiss sliver, two gossans separated by 50 m (grouped as occurrence *003D/12/Cu 004*) contain Cu minerals. An analysis of a sample from the locality yielded 627 ppm Cu (Table 12).

Table 11. Pyrite occurrences in the Occasional Harbour area, Lake Melville terrane

Mineral Occurrence	Reference	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
003D/12/Pyr010	003D/12/0026	R23	4207	54	9	50	20	69	2	0.6	<2
003D/12/Pyr012	003D/12/0026	R34	739	104	9	122	68	87	7	0.6	<2
003D/12/Pyr012	003D/12/0026	R35	234	113	8	82	62	54	4	0.4	<2
003D/12/Pyr012	003D/12/0026	R36	318	70	5	88	22	40	4	0.3	<2
003D/12/Pyr012	003D/12/0026	R37	696	55	22	119	46	9	4	0.5	<2
003D/12/Pyr012	003D/12/0026	R38	33	18	<3	145	22	71	1	<0.3	<2
003D/12/Pyr012	003D/12/0026	R39	298	116	10	68	107	73	5	0.4	<2

Table 12. Copper occurrences in the Gilbert Bay–Alexis Bay area, Lake Melville terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013A/09/Cu 004	MN86-264	627	135	10	45	37	20	4	0.7	4
013A/09/Cu 005	CG03-227D	879	126	22	212	113	55	2	0.6	26
013A/09/Cu 006	CG04-043B	1889	96	41	22	16	40	1	1.8	n.d.

Note: n.d., not detected

About 4 km southwest of the head of Gilbert Bay (Figure 12), trace Cu mineralization on joint and gneissosity surfaces in metasedimentary gneiss was recorded (*013A/09/Cu 006*; Table 12; Plate 3). Note that an acicular mineral thought to be apatite was also seen here – *see* section on quartz veins. On the south side of Rexxon's Island in Alexis Bay (Figure 12), malachite staining (*003D/12/Cu 002*) was seen in pelitic metasedimentary gneiss in a 10-cm-wide zone extending 2 m along strike marginal to an amphibolitized mafic dyke. A thin section of pelitic gneiss included some of the mineralization, showing it to reside in fractures within opaque oxide. Roughly 3 km northwest of the causeway across the Alexis River (Figure 12), sulphide-rich layers consisting of pyrite and minor chalcopyrite hosted by sillimanite-bearing pelitic gneiss, were noted. A sample from the locality (*013A/09/Cu 005*) yielded 879 ppm Cu (Table 12). The first of these three occurrences was recorded during 1:100 000-scale mapping and the other two during examination, by the author, of road-cuts created as a result of road construction.

Plate 3. *Malachite and azurite staining on joint surfaces in metasedimentary gneiss within the Lake Melville terrane. West of Gilbert Lake (mineral occurrence 013A/09/Cu 006).*

In the Crooked Lake area (Figure 11), eight localities in metasedimentary gneiss have indications of Cu. Five of them result from exploration by Brinex (Kranck, 1966), and three of the sites are classified as Cu occurrences (*013H/05/Cu 003*, *013H/05/Cu 004* and *013H/05/Cu 005*). The other two have been designated as Ni occurrences in MODS (*013H/05/Ni 001* and *013H/05/Ni 002*). No geological details are given by Kranck for the individual localities and the basis for their designation as mineral occurrences relies mostly on data for analyzed samples, which are listed in Table 13.

One other locality in close proximity to the Ni occurrences mentioned above is also included here (*013H/05/Ni 004*). This occurrence is based on investigations by van Nostrand and Brewer (1997) for Consolidated Viscount Resources. The locality is termed Showing A, and the rock type is described as hematitic and limonitic, altered, semipelitic gneiss containing up to 4% disseminated pyrite and trace chalcopyrite. The area was traversed during 1:100 000-scale mapping and mapped as sillimanite-bearing pelitic gneiss.

Table 13. Copper and nickel occurrences in the Crooked Lake area, Lake Melville terrane, reported by Brinex (Kranck, 1966)

Mineral Occurrence	Sample	Showing	Cu %	Ni %	Ag oz/ton	Au oz/ton
013H/05/Cu 003	1148	LM65-17	0.35	0.02	0.005	0.005
013H/05/Cu 004	1149	LM65-18	0.02	-	0.04	-
013H/05/Cu 005	1150	LM65-19	0.03	-	-	-
013H/05/Ni 001		L-108	0.16	0.154	-	-
013H/05/Ni 002	1144	JJ65-4	0.04	0.13	0.02	-

Note: -, not analyzed

Extensive pyrite present was recorded (*cf.* *013H/05/Pyr007* and *013H/05/Pyr008*). Samples collected from the occurrence by van Nostrand and Brewer (1997) yielded Cu, Ni and Co values as indicated in Table 14.

Table 14. Nickel occurrences in the Crooked Lake area, Lake Melville terrane (van Nostrand and Brewer, 1997)

Mineral Occurrence	Reference	Sample	Showing	Cu ppm	Ni ppm	Co ppm
013H/05/Ni 004	013H/05/0047	011	A	257	349	38
013H/05/Ni 004	013H/05/0047	012	A	667	301	37
013H/05/Ni 004	013H/05/0047	013	A	713	362	41
013H/05/Ni 004	013H/05/0047	013	A	618	637	62
013H/05/Ni 003	013H/05/0047	009	B	51	281	59
013H/05/Ni 003	013H/05/0047	010	B	52	389	78
013H/05/Ni 003	013H/05/0047	021	B	77	285	63
013H/05/Ni 003	013H/05/0047	023	B	131	581	113
013H/05/Ni 003	013H/05/0047	026	B	351	603	135

Nearby is Ni occurrence *013H/05/Ni 003* (Table 14). The host rock here was mapped by van Nostrand and Brewer (1997) as gabbro. Given, (i) the possible linkage between pelitic gneiss and Long Range dykes in generating Cu mineralization (*see* elsewhere in this report), and (ii) the presence of an unexposed major Long Range dyke projected to pass less than 2 km to the east, the author wonders whether the gabbro could be an example of another Long Range dyke in the area, so far unmapped.

Another occurrence in this group is situated on the western shore of Crooked Lake (*013H/05/Pyr006*). It was first identified by Cherry (1978a, b), who described the outcrop (MC77-107) as comprising blocks of well-banded, medium-grained, biotite–garnet–quartz–feldspar gneiss within pegmatite. At the contact between the pegmatite and medium-grained gneiss there is a fine-grained, grey, massive, quartz-rich rock containing abundant pyrite, and possibly also pyrrhotite and chalcopyrite. During 1:100 000-scale mapping, the author visited the site and recorded the assemblage as rusty-weathering, mauve–garnet-bearing psammitic gneiss and white-weathering, garnet-bearing pegmatite. High scintillometer readings were obtained from the pegmatite, and further reference to this locality is made elsewhere in this report (*see* Uranium in pegmatite and diatexite).

On Henrietta Island (Figure 10), a Cu occurrence associated with metasedimentary gneiss is very trivial, consisting of malachite staining in a pegmatitic pod adjacent to a joint surface (*013J/01/Pyr006*; Table 15). The rocks at the locality consist of very pyritic, foliated, quartz–feldspar–muscovite rock, interpreted to have been derived from a quartzite protolith. A whole-rock analysis of quartz–feldspar–muscovite schist from the vicinity (RG80-008) comprises 84.4% SiO_2 and 10.95% Al_2O_3, but is low in base metals.

Table 15. Pyrite occurrence on Henrietta Island, Lake Melville terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013J/01/Pyr007	CG84-103	309	154	10	102	-	54	28	-	-

Note: -, not analyzed

Mealy Mountains Terrane

Two occurrences are included here (Figure 9), neither of which are currently described as hosted by metasedimentary gneiss. Both were located by explorationists and visits to the vicinity of each of them were made by the author in 2009.

Occurrence *013G/10/Cu 001* was first described by Wares and Leriche (1996), reporting on behalf of Labrador International Mining and the Labrador Nickel Syndicate. Of the two areas they prospected in detail, their Area B proved to be of most interest. It is where the samples listed in Table 16 were collected and is where the mineral occurrence has been located. The host rock was termed pyroxene gneiss and is the host to pyrite-rich lenses 5–15 cm thick over a 20-m-wide zone traceable for 100 m along strike. The gneiss zones were suggested to be either granitic gneiss caught up in a shear zone, or the deformed margin of the quartz monzonite found elsewhere in the region. Eleven rocks samples were collected from the property, the five yielding the most anomalous results being listed in Table 16.

This area was neglected during regional mapping, falling between various mapping projects. With respect to the host rock, at issue is whether the rocks are quartz monzonite or high-grade metasedimentary gneisses. On the eastern flank of the Mealy Mountains Intrusive Suite they are difficult to

Table 16. Copper occurrence in metasedimentary gneiss, Mealy Mountains terrane

Mineral Occurrence	Reference	Sample	Cu ppm	Zn ppm	Ni ppm	Co ppm	Ag ppm	Au ppb
013G/10/Cu 001	013G/10/0052	103879	772	14	267	117	0.9	17
013G/10/Cu 001	013G/10/0052	103880	541	163	227	90	0.6	9
013G/10/Cu 001	013G/10/0052	103882	2360	29	128	50	0.5	20
013G/10/Cu 001	013G/10/0052	103886	1033	17	383	162	1.1	14
013G/10/Cu 001	013G/10/0052	103887	898	25	250	99	0.6	20

distinguish without petrographic work, because the metasedimentary gneiss loses both its fabric and diagnostic alumina-rich minerals, and becomes coarser grained. The mineral occurrence was visited in 2009 by the author who concluded (despite some of it having a fairly homogeneous 'igneous-looking' texture) that much of the host rock is of metasedimentary origin, on the basis of its quartz- and garnet-rich character and probable presence of graphite. Atypical, pyroxene-bearing (typically also cordierite bearing), poorly banded metasedimentary gneiss is characteristic farther south where it is transitional eastward into normal biotite–sillimanite–garnet pelitic gneiss, as grade of metamorphism decreases.

Occurrence *013G/06/Cu 001* was described by Jones (1997), reporting on behalf of Ming Financial. Three 030°-trending subparallel gossans were located, one of which is hosted by leucogabbro and anorthosite and is 1–2 m wide and extends discontinuously along strike for 53 m. The other two, hosted in 'diabase(?)', are also 1–2 m thick and extend discontinuously along strike for 283 m and 61 m, respectively. Mineralization consists of fine-grained disseminated pyrite, chalcopyrite and pyrrhotite. From the second gossan, fourteen rock samples gave values of 12–269 ppm Ni and 131–892 ppm Cu, and from the third gossan, three rock samples gave values of 18–183 ppm Ni and 23–853 ppm Cu. In 2009, the author made a helicopter stop about 800 m to the northeast of the occurrence to examine rusty-looking rocks seen from the air. Given the trend recorded by Jones, these should be along strike from the designated mineral occurrence. Fine- to coarse-grained quartz-rich rocks containing common opaque oxide and biotite, and, in some layers, cordierite (*i.e.*, implying metasedimentary gneiss), were seen interlayered with gossan zones.

Cordierite was also discovered by the author in 2009 at a third site (NAD 27 Zone 21 359968 5934882) at which no metasedimentary gneiss had been previously mapped. The author, in 2007, also recognized that cordierite-bearing metasedimentary gneiss in the Muskrat Lake area, 20 km south of occurrence *013G/06/Cu 001*, is far more extensive than realized during 1:100 000-scale mapping in 1995. When these observations are coupled with the high correlation between metasedimentary gneiss and pyrite–Cu sulphide occurrences, a higher potential for mineralization in the Mealy Mountains, than previously supposed, is indicated.

Pyrite

As the copper mineralization is closely associated with pyrite in metasedimentary gneiss this seems to be the most appropriate stage at which to address the pyrite occurrences. Although the pyrite occurrences are very unlikely to have economic significance in themselves, they perform a useful pathfinder role with respect to indicating where other commodities of value might occur, hence require equally thorough review. Following the same organizational format, pyrite occurrences are reviewed by terrane, from north to south.

Groswater Bay Terrane

Six pyrite occurrences, associated with pelitic gneiss or schist (somewhat uncertain in one case), have been recorded from the Groswater Bay terrane.

Two occurrences are on Entry Island (Figure 9). The first occurrence (*013I/06/Pyr002*) is based on Stevenson's (1970) map. No details are given in the accompanying report, but a thin section from the locality (SG-181A-8) is a sillimanite–kyanite–orthopyroxene pelitic gneiss. The author visited this site in 1979 and confirmed the existence of rusty-weathering rock and, in thin section, the presence of kyanite. Owen's (1985) more detailed map shows the pelitic gneiss to occupy a very small area, associated with jotunitic to charnockitic gneiss and K-feldspar megacrystic biotite–hornblende quartz monzodiorite to granodiorite. At the second occurrence (*013I/06/Pyr003*), the rock is garnet–biotite–plagioclase schist, associated with well-banded amphibolitic and quartzofeldspathic layers and injected by common deformed pegmatites. The schist hosts an ocherous zone, assumed here to be due to pyrite. Gower *et al.* (1983) indicated the presence of molybdenite at this locality on his preliminary Groswater Bay map, but, as Gower is now unsure of his identification, it has been omitted from the final map for the area.

Two localities are 30 km northeast and 33 km north-northeast of Rigolet, respectively (Figure 10). The first (*013J/08/Pyr003*; Table 17) results from observations made during 1:100 000-scale mapping. Muscovite-bearing quartzofeldspathic rocks, meta-arkose and epidote-bearing, quartzofeldspathic, well foliated granoblastic gneiss are present. They may have been derived from a clastic metasedimentary or felsic volcanic protolith. All are pyritic. The second locality (*013J/08/Pyr004*) is based on an investigation by Dawson (1996a) for Labrex Resources. In the process of following

Table 17. Pyrite occurrences in quartzofeldspathic supracrustal gneiss, Groswater Bay terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013J/08/Pyr003	DB79-214	2	15	18	n.d.	-	17	5	-	-
013J/05/Pyr001	CG83-267A	38	30	26	n.d.	-	2	5	-	-
013J/05/Pyr001	CG83-267B	2	43	17	n.d.	-	5	3	-	-
013J/05/Pyr002	CG83-432	7	42	19	6	-	12	3	-	-

Note: n.d., not detected; -, not analyzed

up on a gossan previously recorded by Stevenson (1970) on his map (which is mineral occurrence *013J/08/Pyr002* in a mafic rock at Stevenson's data station SG68-053 – *see* Figure 18), a 30-cm-wide zone of limonite, exposed over a strike length of 9 m was found about 2 km to the northwest. The zone occurs within quartz–feldspar–biotite gneiss, interpreted to be a paragneiss. The limonite staining was inferred to be the result of weathering of biotite, magnetite and very minor pyrite. Sample 29564, assayed from this locality, contains anomalously high Mo (33 ppm), but no other indication of economic interest. The author mapped this region as orthogneiss, but has not seen this particular site and acknowledges that this could be a remnant derived from a supracrustal protolith, such as is found sporadically throughout the Groswater Bay terrane.

The remaining two localities (*013J/05/Pyr001* and *013J/05/Pyr002*; Table 17), about 40 km north-northwest of the west end of Double Mer (Figure 10), are hosted by just such a supracrustal remnant. It was described in the field during 1:100 000-scale mapping as ocherous-weathering, muscovite–quartz schist (Gower, 1986). Some silvery yellow sulphide was seen and considered to be either pyrite or arsenopyrite, possibly with traces of chalcopyrite, although the latter is not indicated in the analytical data.

Hawke River Terrane

As was the case for Cu mineralization, all pyritic showings within metasedimentary gneiss in the Hawke River terrane are in the Paradise metasedimentary gneiss belt. Most of these are at its southeast end, but a few additional pyritic showings occur farther northwest, in the Sandwich Bay area. Those at the southeast end of the Paradise metasedimentary gneiss belt are subdivided into: i) north of Hawke Bay, ii) Norman Bay area, and iii) Dead Islands and northwest area (Figure 12). North of Hawke Bay, two pyrite occurrences associated with quartz-rich metasedimentary gneiss have been included and, in the Dead Islands area, pyrite occurrences associated with supracrustal amphibolite have also been included.

Fourteen occurrences are in the southeast part of the Paradise metasedimentary gneiss belt, north of Hawke Bay (Figure 12). The earliest discovery (*003E/04/Pyr006*) was at Mountaineer Cove by Douglas (1953), who recognized three mineralized lenses, the largest of which extended over 100', striking northwest, parallel to the regional trend (Plate 4a). The minerals observed in the lenses are garnet, biotite, pyroxene, sulphides, hematite and quartz. Samples 1, 2, and 3 gave results of 25.94%, 16.75% and 20.03% for Fe, respectively, and no detectable U or Th. The locality was visited during 1:100 000-scale mapping and described as banded quartzite, garnet–biotite–muscovite schist, granitic leucosome and biotite-bearing, migmatitic paragneiss. Several rusty-weathering pyritic zones were noted and the rock was recorded as magnetic. The sulphides are fine grained and likely residing in 1- to 3-mm-wide muscovite-bearing bands. The area was further investigated in 1996 by Vulcan Minerals (Hodge, 1996a). The gossan zone is recorded as being exposed for 232 m along the northwest side of Mountaineer Cove, having a height of 250 m, and traceable along the top of the ridge for 760 m. It was noted as containing 1–2% fine-grained disseminations and 1–2 mm discontinuous stringers of pyrite and minor magnetite. Three samples were collected and analyzed from this locality during 1:100 000-scale mapping (Table 18), and results for two additional samples, collected and analyzed by Vulcan Minerals (Table 18, samples 537434 and 537438), are also available. None of the results encourage further exploration. Another, very similar, pyrite occurrence (*003E/04/Pyr007*) was discovered during 1:100 000-scale mapping a short distance to the east-northeast (1.2 km) and described as rusty-weathering, bedded and massive quartzite with very fine-grained pyrite. It was also been explored by Vulcan Minerals (Hodge, 1996a). Three samples were collected by Vulcan Minerals, but not analyzed.

After Douglas (1953), no additional occurrences were found until the mapping of Eade (1962), who reported two additional pyrite showings in the area (*003E/04/Pyr001* and *003E/04/Pyr002*) (Figure 12). No information is available for the first occurrence, apart from its location on Eade's map, but a thin section was prepared by Eade from the second locality. It contains quartz, plagioclase, microcline, biotite, muscovite and an opaque oxide mineral, but no obvious sulphide. The author visited the second site during 1:100 000-scale mapping, noting extensive gossans exposed in biotite–muscovite schist and that the rusty zones also contain garnet and sillimanite.

The remainder of the pyrite occurrences in the Paradise metasedimentary gneiss belt north of Hawke Bay are all based on observations made during 1:100 000-scale mapping (*003E/04/Pyr003*, *003E/04/Pyr004*, *003E/04/Pyr005*, *003E/04/Pyr008*, *003E/04/Pyr009*, *003E/04/Pyr010*, *013H/01/Pyr001*, *013H/01/Pyr002*, *013H/01/Pyr003* and *013H/01/Pyr004*) (Figure 12). The rock type mapped at these localities is rusty-weathering, biotite and/or muscovite schist or gneiss, commonly sillimanite and garnet bearing, locally interleaved with quartzite or mafic rocks, and sheared or contorted in places. Pyrite is found in bands 0.1 to 3 cm wide and is generally fine grained. Vulcan Minerals (Hodge, 1996b) has carried out assessment at two of the occurrences. Locality *003E/04/Pyr003* was described as quartz–muscovite schist with local moderate to strong hematite alteration, in a pyritic zone 10–45 m wide and 315 m long that contains up to 2% pyrite in patches, disseminations and discontinuous stringers. Locality *003E/04/Pyr004* was described as quartz–feldspar gneiss with moderate to strong limonite alteration in a zone

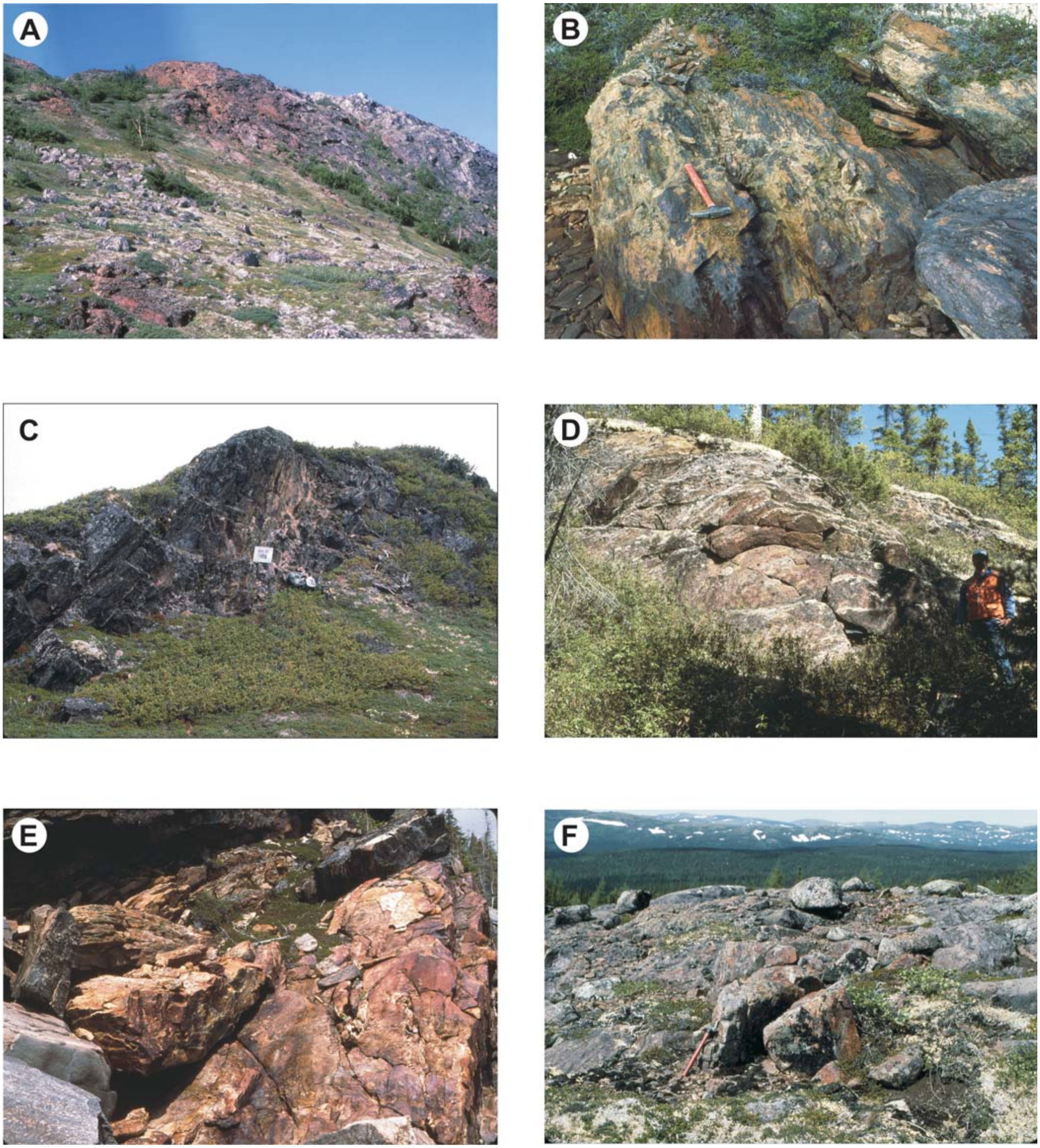


Plate 4. *Pyritic gossans in metasedimentary gneiss.* **A.** *Mountaineer Cove (mineral occurrence 003E/04/Pyr006).* **B.** *Dead Islands area (mineral occurrence 003D/13/Pyr015).* **C.** *Dead Islands area (mineral occurrence 003D/13/Pyr024).* **D.** *Crooked Lake area (mineral occurrence 013H/05/Pyr004).* **E.** *Rigolet area (mineral occurrence 013J/01/Pyr004).* **F.** *Southeast Mealy Mountains (mineral occurrence 013G/07/Pyr001).*

Table 18. Pyrite occurrences in pelitic gneiss, in southeastern Paradise metasedimentary gneiss belt, Hawke River terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
North of Hawke Bay										
003E/04/Pyr003	CG85-482	186	186	51	9	20	54	n.d.	n.d	2
003E/04/Pyr003	537419	249	169	9	27	-	-	-	0.5	5
003E/04/Pyr003	537420	46	141	6	26	-	-	-	0.5	5
003E/04/Pyr003	537421	174	129	5	35	35	78	n.d.	n.d.	n.d.
003E/04/Pyr004	CG85-563	132	173	35	52	35	78	n.d.	n.d.	n.d.
003E/04/Pyr004	537422	13	18	22	3	-	-	-	0.5	5
003E/04/Pyr005	CG85-565A	99	111	23	29	22	52	3	n.d.	n.d.
003E/04/Pyr005	CG85-565B	80	120	22	19	17	61	6	n.d.	n.d.
003E/04/Pyr006	CG85-558A	80	257	16	22	31	34	n.d.	n.d.	5
003E/04/Pyr006	CG85-558B	123	184	15	14	27	27	n.d.	0.2	9
003E/04/Pyr006	CG85-558C	147	198	14	23	32	25	n.d.	0.1	7
003E/04/Pyr006	537434	80	54	-	19	-	-	-	0.5	5
003E/04/Pyr006	537438	130	31	-	24	-	-	-	0.5	5
013H/01/Pyr004	CG85-559A	127	116	52	34	63	14	n.d.	n.d.	9
013H/01/Pyr004	CG85-559B	132	117	27	43	79	29	n.d.	0.3	12
Norman Bay area										
003D/13/Pyr025	MN86-344B	23	112	47	n.d.	13	49	n.d.	0.1	n.d.
003D/13/Pyr026	SN86-312	242	74	35	4	17	36	53	0.4	n.d.
003D/13/Pyr028	SN86-320	280	140	13	23	21	47	2	0.4	32
003D/13/Pyr032	CG86-362A	400	168	23	40	35	29	4	0.6	n.d.
003D/13/Pyr033	CG86-364A	23	134	11	5	39	6	n.d.	0.1	n.d.
Cape Bluff and northwest										
003D/13/Pyr002	CG86-542	303	221	103	58	30	29	n.d.	0.7	8
003D/13/Pyr013	CG86-404	190	162	20	42	24	56	9	0.3	<1
003D/13/Pyr014	CG86-405	218	103	23	23	19	38	5	0.6	3
003D/13/Pyr020	CG86-537	197	175	19	34	21	47	n.d.	0.3	6
003D/13/Pyr022	JS86-403	186	218	23	43	19	43	1	0.5	15
003D/13/Pyr022	JS86-405	226	272	10	36	16	27	1	0.3	14
003D/13/Pyr029	SN86-347	149	185	24	9	12	74	3	0.2	5
003D/13/Pyr029	SN86-348	175	114	10	10	12	21	3	0.1	n.d.
003D/13/Pyr029	SN86-349	72	171	25	6	13	33	n.d.	0.2	n.d.
003D/13/Pyr029	SN86-350B	57	177	41	56	58	46	4	0.4	2
003D/13/Pyr030	SN86-352	293	100	37	43	33	50	n.d.	1.0	1
003D/13/Pyr030	SN86-353C	207	69	13	n.d.	7	35	n.d.	0.1	n.d.
003D/13/Pyr030	SN86-355	53	101	4	19	45	82	1	2	n.d.
013A/16/Pyr003	CG86-124	68	371	<1	n.d.	8	27	n.d.	0.1	20
013A/16/Pyr003	CG86-125	79	260	4	n.d.	5	29	n.d.	0.3	22
013A/16/Pyr003	CG86-126	350	137	5	5	13	51	n.d.	0.3	8
013A/16/Pyr004	JS86-435B	143	127	<1	192	83	347	n.d.	0.4	44

Note: n.d., not detected; -, not analyzed

10–25 m wide and approximately 200 m long. Vulcan Minerals reported data from the two occurrences they investigated, and, during 1:100 000-scale mapping, samples were analyzed from four sites (*see* Table 18; CG85- prefix, but also including data from the Mountaineer Cove locality and Vulcan Minerals' data; 537419–537422 samples). None of the results encourage further exploration, despite the impressive appearance of some of the gossans in the field, especially that at *013H/01/Pyr004* (frontispiece).

The two occurrences associated with quartz-rich rocks within the Paradise metasedimentary gneiss belt north of Hawke Bay are *003E/04/Pyr011* and *003E/04/Pyr012*. At the first, the rock type is garnetiferous and was interpreted to have a lean banded iron formation protolith and, at the second, the rock is a biotite-rich quartzite. Pyrite in both cases is within a gossan, which, at the second locality, was noted to be 5 m thick.

In the southeast Paradise metasedimentary gneiss belt, in the Norman Bay area, six pyrite occurrences were discovered during 1:100 000-scale mapping (*003D/13/Pyr012*, *003D/13/Pyr025*, *003D/13/Pyr026*, *003D/13/Pyr028*, *003D/13/Pyr032* and *003D/13/Pyr033*) (Figures 12 and 13). All were described as gossanous/pyritic zones in sillimanite–biotite metasedimentary gneiss. To this can be added that cordierite is typical in the pelitic gneiss in this area, and that there is a close association with a rock type of uncertain protolith dubbed 'dioritic' gneiss (but not necessarily of igneous plutonic origin). Samples were collected during mapping and analyzed (except at the first occurrence listed), yielding the results given in Table 18. Apart from some samples showing mildly anomalous Cu, Zn and Au (higher than north of Hawke Bay), the only noteworthy feature is anomalously high Mo, at 53 ppm, in sample SN86-312. None of these occurrences has been assessed by explorationists (based on assessment file information).

Numerous pyrite occurrences have been located in the southeast Paradise metasedimentary gneiss belt, at Dead Islands and along strike to the northwest. The northern end of this area is taken as the southwestern end of Hawke Bay (Figure 12), in which area two pyrite occurrences have been mapped. One (*013A/16/Pyr001*) is indicated on the map of Eade (1962), at which site, based on thin-section examination of a sample collected (EA-47-61), the host rock is cordierite-bearing metasedimentary gneiss containing some sulphide. At the other (*013A/16/Pyr003*), rusty-weathering metasedimentary gneiss, containing abundant garnet and associated with inhomogeneous amphibolite containing calc-silicate pods, was recorded during 1:100 000-scale mapping. Partial analyses for three samples from this area are given in Table 18.

Roughly 10 km farther to the southeast (Figure 13), on the shores of Cape Bluff Pond, two additional pyrite showings are indicated on Eade's map (*003D/13/Pyr009*, *003D/13/Pyr010* and *003D/13/Pyr011*), plus a pyrite/chalcopyrite occurrence already addressed earlier (*013A/16/Cu 001*). These were also reported by Donohoe (1966). Mention of pyrite occurrence *003D/13/Pyr010* was also made earlier in the section on Cu occurrences in pelitic gneiss, as Donohoe reported that chalcocite might be present at this locality. Four additional pyrite/pyrrhotite occurrences in the Cape Bluff Pond area were added by Squires *et al.* (1997), investigating on behalf of Noranda Mining and Exploration. At one pyrite occurrence (*003D/13/Pyr034*) the mineralization was described as 15% pyrite on foliation planes in biotite–quartz gneiss; at another (*013A/16/Pyr002*), 5–7% disseminated pyrrhotite was recorded in a moderately to strongly limonitic and weakly magnetic biotite–garnet–quartz gneiss; at the third (*003D/13/Po 001*), 5–10% pyrrhotite was recorded in a very fine-grained biotite–quartz gneiss; and, at the fourth (*013A/16/Po 001*), 5–7% pyrrhotite was recorded in weakly limonitic and strongly magnetic biotite–quartz gneiss.

Farther to the southeast still, huge gossanous ridges can be seen at Cape Bluff (Figure 13). These extend inland for several kilometres. A map showing their distribution was prepared by Bradley (1966). The rock type is pyritic, schlieric-banded, garnet–biotite–sillimanite gneiss, with which amphibolite and quartzite are associated. Four spots along these ridges have been marked as pyritic occurrences, although representation in this manner tends to disguise their obvious continuity (*003D/13/Pyr013*, *003D/13/Pyr014*, *003D/13/Pyr029* and *003D/13/Pyr030*). Values for selected elements for samples collected during 1:100 000-scale mapping and subsequently analyzed are given in Table 18. The results do not encourage further exploration, but, it is as well to remember that, 1 km to the south, Cu mineralization is present in a parallel zone of pyrite occurrences.

About 3 km southwest of Cape Bluff, in the Dead Islands area, and its strike continuation to the northwest, there are many more pyritic occurrences. The rock types underlying this area include a complex mixture of pelitic metasedimentary gneiss, quartz-rich rocks probably representing meta-chert, and amphibolitic rocks derived from mafic volcanic rocks, pillowform in part. An attempt has been made to subdivide the pyritic occurrences according to their specific supracrustal rock type, but it is difficult to do this consistently (and, perhaps, not very meaningful either). The pyritic occurrences associated with biotite–sillimanite/muscovite–garnet pelitic gneiss are *003D/13/Pyr002*, *003D/13/Pyr020*, *003D/13/Pyr022*, *003D/13/Pyr023* and *003D/13/Pyr035*. Four were recorded during 1:100 000-scale mapping, although with regrettable dearth of detail. For example, only at *003D/13/ Pyr002* was the thickness (20 m) of the pyritic zone noted. Samples were collected and analyzed from three of the sites and partial data are given in Table 18. The fifth occurrence (*003D/13/Pyr035*) was discovered by van Nostrand (1996a), investigating on behalf of Consolidated Callinan Flin Flon Mines.

Two pyrite occurrences in pelitic gneiss remain to be mentioned in this district (Figure 12). One, 7 km east of Charlottetown, was recorded during 1:100 000-scale mapping very close to the boundary between the Paradise metasedimentary gneiss belt and the White Bear Arm complex (*013A/16/Pyr004*) as a small gossan in sillimanite–garnet pelitic gneiss, interlayered with pods of amphibolite. Partial analytical data for a sample analyzed is given in Table 18. The other, less than 1 km south of Charlottetown (*013A/16/Pyr006*), consists of pyrite in medium- to coarse-grained amphibolite associated with sulphide-bearing pelitic gneiss. These form a structural sliver tectonically imbricated with the White Bear Arm complex.

Several pyrite occurrences are spatially closely related to amphibolite (Figure 13). The only pyritic zone of significant width is at *003D/13/Pyr015* where a 10-m-wide pyritic showing in banded amphibolitic gneiss associated with banded chert was recorded (Plate 4b). At the other occurrences (*003D/13/Pyr016*, *003D/13/Pyr017*, *003D/13/Pyr018*, *003D/13/Pyr019*, *003D/13/Pyr021* and *003D/13/Pyr024*; Plate 4c) the host rock was variously described as garnetiferous amphibolite of probable supracrustal origin, amphibolitic gneiss, schistose gneiss with some pegmatite and amphibolite, banded amphibolite gneiss with calcic pods, and layered amphibolite. The pyritic rock associated with the amphibolite at some localities was suggested to have a sulphide-facies cherty protolith. Partial analytical data for samples collected at some of the amphibolite-related sites is given in Table 19.

Table 19. Pyrite occurrences in amphibolite, in southeastern Paradise metasedimentary gneiss belt, Hawke River terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
003D/13/Pyr015	CG86-507	229	74	31	50	25	34	4	0.7	5
003D/13/Pyr017	CG86-526	46	133	15	8	10	27	2	0.1	6
003D/13/Pyr018	CG86-529	177	236	44	67	30	44	18	0.5	9
003D/13/Pyr018	CG86-530	296	202	58	77	44	48	9	0.7	3
003D/13/Pyr019	CG86-532	218	132	50	82	34	45	10	0.9	3
003D/13/Pyr021	CG86-546	282	179	28	46	45	54	10	0.6	14

Six pyrite occurrences within pelitic gneiss of the Paradise metasedimentary gneiss belt are present in the Sandwich Bay area (Figure 11). It has already been pointed out one locality (*013H/11/Pyr001*) is essentially the same site as *013H/11/Cu 009*. It was designated first as a pyrite occurrence as a result of observations made during 1:100 000-scale mapping, but was later examined by Consolidated Viscount Resources (Connell and Brewer, 1996b) and some Cu mineralization found. The rocks are sillimanite–garnet–biotite schists, associated with minor grey quartzite and inhomogeneous diatexite. A 0.6-m-wide pyritic band was noted. A sample of the sillimanite-garnet schist collected during 1:100 000-scale mapping contains background base-metal values only (Table 20).

Table 20. Pyrite occurrence in pelitic gneiss, in northeastern Paradise metasedimentary gneiss belt, Hawke River terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013H/11/Pyr001	CG81-170B	3	74	9	13	-	84	2	-	-

Note: -, not analyzed

The second locality (*013H/11/Pyr002*) consists of pelitic schists with minor quartzite layers, less than 1 cm wide, and some associated amphibolite. The rock was noted to be pyritic. The third locality (*013H/11/Pyr003*) comprises inhomogeneous phlebitic diatexite with sillimanite and garnet. A particularly biotite-rich layer containing abundant garnet and apatite(?) was recorded. Some very garnetiferous quartz-rich pyritic layers are present and minor chalcopyrite was seen in association with pyrite. Both of these were recorded during 1:100 000-scale mapping. Two other localities (*013H/11/Pyr004* and *013H/11/Pyr005*) were discovered by Brinex (Juilland, 1965) and (Sutton, 1965). Analytical results obtained by Brinex are given in Table 21.

The final locality in this group (*13H/06/Pyr001*) is situated 14 km southeast of the community of Paradise River (Figure 9) and was recorded during 1:100 000-scale mapping. It consists of minor pyrite in well-banded quartzofeldspathic gneiss. This was mapped as granodioritic orthogneiss in the field, but subsequently interpreted to have a psammitic protolith.

Table 21. Pyrite occurrences in pelitic gneiss, in northeastern Paradise metasedimentary gneiss belt, Hawke River terrane reported by Brinex (Juilland, 1965)

Mineral Occurrence	Sample	Showing	Cu%	Ag%
013H/11/Pyr004	1137	LM-65-13	0.03	0.03
013H/11/Pyr005	1147	LM-65-16	0.04	0.02

Lake Melville Terrane

Pyrite occurrences in metasedimentary gneiss in the Lake Melville terrane can be subdivided into four areas, namely: i) Occasional Harbour area; ii) north and northwest of Port Hope Simpson; iii) Crooked Lake area; and iv) Rigolet area. As was seen in the Hawke River terrane, this distribution is similar to that seen for Cu occurrences, except being more scattered.

Eight pyrite occurrences in pelitic metasedimentary gneiss (*003D/12/Pyr002*, *003D/12/Pyr003*, *003D/12/Pyr004*, *003D/12/Pyr006*, *003D/12/Pyr007*, *003D/12/Pyr008*, *003D/12/Pyr009* and *003D/12/Pyr011*) have been identified in the Occasional Harbour area (Figure 14), including one (*003D/12/Pyr007*) about 10 km to the west of the main cluster. Note that two other pyrite occurrences in the area have already been addressed, because they have minor Cu mineralization. Bradley (1966) mapped the distribution of pyritic gossans south of Occasional Harbour, concluding that they could be interpreted as part of an isoclinally folded sequence. Of the specific locations listed here, all, except one (*003D/12/Pyr011*), are based directly on observations made, and samples collected, during 1:100 000-scale mapping. The host rock at the localities is biotite–sillimanite pelitic gneiss, but locally amphibolite is also present. Garnet and/or magnetite are additional noteworthy minerals at some sites. Occurrence *03D/12/Pyr007* differs slightly from the others in that the host rock is described as ‘a quartzofeldspathic rock thought to be metasedimentary gneiss’. More detail is available for (*003D/12/Pyr011*) as a result of assessment by Consolidated Callinan Flin Flon Mines (van Nostrand, 1995), who mapped a gossan 1.3 km long and up to 400 m wide in the area and described the rocks as garnet-muscovite-rich semipelitic gneiss and schist that locally contain disseminated pyrite. A detailed geological map was made of the occurrence. Partial geochemical data for some of these occurrences is given in Table 22.

Seven pyrite occurrences in pelitic metasedimentary gneiss have been designated north and northeast of Port Hope Simpson (*013A/09/Pyr003*, *013A/09/Pyr004*, *013A/09/Pyr005*, *013A/09/Pyr006*, *013A/09/Pyr008*, *013A/09/Pyr011* and *013A/09/Pyr015*; Figure 12). All are based on observations made during 1:100 000-scale mapping. The rocks are generally described as ocherous- or rusty-weathering, schistose metasedimentary gneiss containing abundant sillimanite and garnet, in places associated with white-weathering diatexite or, rarely plagioclase–hornblende-bearing rock, possibly derived from metamorphosed leucogabbronorite. Generally, the ocherous zones are only a few metres wide at best, but at *013A/09/Pyr015* a 40-m-wide gossan was noted. Sulphide content in the gossans is low. About 60 km northwest of Port Hope Simpson, two other pyrite occurrences have been recorded (*013A/14/Pyr003* and *013A/15/Pyr003*), both during 1:100 000-scale mapping (Figure 9). Information is limited to the noting of pyrite in garnet–sillimanite pelitic gneiss. Analytical data are listed in Table 23. Although these two localities are designated pyrite occurrences, both have anomalous Cu.

Two other pyrite occurrences are found in the same region, but are more closely associated with quartzite (*013A/15/ Pyr001* and *013A/15/Pyr002*; Figure 9). At both sites, the quartzite is interlayered with rusty-weathering sillimanite-bearing pelitic gneiss. Specks of a silvery mineral suspected to be molybdenite were seen at the second locality listed.

In the Crooked Lake area (Figure 11), numerous pyrite occurrences are present in pelitic metasedimentary gneiss, almost all of which result from information collected during 1:100 000-scale mapping (*013H/04/Pyr001*, *013H/04/Pyr004*, *013H/04/Pyr005*, *013H/04/Pyr006*, *013H/05/Pyr001*, *013H/05/Pyr002*, *013H/05/Pyr003*, *013H/05/Pyr004*; Plate 4d, *013H/05/Pyr005*, *013H/05/Pyr006*, *013H/05/Pyr007*, *013H/05/Pyr008*, *013H/05/Pyr009*, *013H/05/Pyr010*, *013H/05/Pyr014*, *013H/05/Pyr017*, *013H/05/Pyr018* and *013H/05/Pyr019*). The rocks are described as rusty- or orange-weathering, finely laminated, fine- to medium-grained, lensy to continuously banded, pelitic to semipelitic gneiss or schist, grading into psammitic gneiss or even quartzite in places. Fine-grained amphibolite is present locally. The pelitic rocks are migmatitic and commonly have associated white-weathering pegmatitic diatexite. Garnet, mauve to blood red, is common and the most aluminous pelitic gneisses contain sillimanite. Despite the ocherous aspect of the rocks, sulphide content is generally minor, although may be concentrated in bands 1–2 m thick. Three of the pyrite occurrences receive mention elsewhere in this report, as minor Cu mineralization is present. Anomalous radioactivity was detected at *013H/05/Pyr006*. No analytical data are available for any of these localities.

Amphibolite was recorded as a significant host rock at three occurrences in the Crooked Lake area (*013H/04/Pyr003*, *013H/05/Pyr015* and *013H/05/Pyr016*), being part of a lithologically mixed assemblage that also includes psammite, quartzite, diatexite and calc-silicate rocks.

About 25 km north of Crooked Lake, northwest of Eagle River, two additional pyrite occurrences in pelitic metasedimentary gneiss were recorded during 1:100 000-scale mapping. At one (*013H/12/Pyr002*), the rock is a white-weathering diatexite associated with mauve-garnet-bearing pelitic gneiss, and, at the other (*013H/12/Pyr003*), the pelitic material is subordinate to psammitic gneiss. The sulphide content is minor at both.

All of the pyrite occurrences in pelitic metasedimentary gneiss in the Rigolet area (Figure 10) are based on observations made during 1:100 000-scale mapping in the region (*013G/16/Pyr001*, *013J/01/Pyr001*, *013J/01/Pyr004*; Plate 4e, *013J/01/Pyr005*, *013J/01/Pyr008*, *013J/01/Pyr009*, *013J/02/Pyr001*, *013J/02/Pyr003*, *013J/02/Pyr004*, *013J/02/Pyr005*, *013J/02/Pyr006*, *013J/02/Pyr007*, *013J/02/Pyr009* and *013J/02/Pyr010*). It is worth keeping in mind that the Rigolet area is structurally extremely complex, being at a tectonic corner (syntaxsis) defined by a lateral ramp to the south and frontal ramps to the west (Gower *et al.*, 2008b). Also, one should be aware that the area was mapped during the very early stages of the regional mapping project in eastern Labrador and that the knowledge of the rocks that is now available had yet to be accumulated. One example of lack of knowledge at the time was inadequate discrimination, in a high-grade metamorphic state, between psammitic and granitoid protoliths (which, even for experienced mappers, is rarely unequivocal). From field notes, it

Table 22. Pyrite occurrences in pelitic gneiss, Occasional Harbour area, Lake Melville terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
003D/12/Pyr002	JS86-462	70	32	13	n.d.	2	15	5	0.7	12
003D/12/Pyr003	JS86-463	54	71	n.d.	4	6	35	4	0.2	1
003D/12/Pyr004	JS86-467	38	99	17	n.d.	6	37	4	0.2	3
003D/12/Pyr008	SN86-397	140	95	65	14	16	60	n.d.	2	4
003D/12/Pyr009	SN86-398A	50	36	21	n.d.	4	34	n.d.	0.4	4
003D/12/Pyr011	R-9	393	203	<3	102	30	38	3	<0.3	<2

Note: n.d., not detected

Table 23. Pyrite occurrences in pelitic gneiss, northeast of Port Hope Simpson, Lake Melville terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013A/09/Pyr015	CG04-074	447	158	29	125	73	111	2	0.3	15
013A/14/Pyr003	CG03-364	1066	183	29	52	56	72	4	0.9	-

Note: -, not analyzed

seems that there is greater association with psammitic host rocks than elsewhere, but this may be an artifact of inadequate rock recognition during mapping at that time. The typical host for the pyritic occurrences is sillimanite–biotite–garnet metasedimentary gneiss containing metatexite or diatexite bands, locally with granodioritic to tonalitic gneiss and amphibolite. At *013J/01/Pyr004*, the rocks are mostly quartzite, but some pelitic horizons carrying abundant sillimanite are present, along with muscovite-bearing, metatexitic melt rocks. Partial analytical data from pyrite occurrence *013J/02/Pyr007* are given in Table 24.

Farther to the southwest, in the English River area, three pyrite occurrences were located during 1:100 000-scale mapping (*013G/15/Pyr002*, *013G/15/Pyr005* and *013G/15/Pyr006*). They are all interpreted to be hosted by quartzite, and all to belong to the same sliver of metasedimentary gneiss. Beyond noting the quartzite to be pyritiferous/gossanous and biotite rich, no information was recorded.

Locality *013J/01/Pyr001*, 14.5 km east-northeast of Rigolet, was revisited in 1984 and three zones of pyritic material in garnet-rich quartzitic rock were noted. Partial geochemical data from samples collected are listed in Table 24. Interestingly, the highest Cu values are for a sample recorded as psammitic gneiss (CG84-198B), whereas the sample recorded as a gossan (CG84-198A) yielded much lower Cu concentration.

One other occurrence (*013J/04/Pyr001*; Figure 10) is grouped here although it is structurally separated from the others, being on the north side of the Lake Melville rift system. Nevertheless, the area is lithologically similar to other parts of the Lake Melville terrane and is soled by thrusts, implying that it is allochthonous with respect to the regions to the north. The locality, which was discovered during 1:100 000-scale mapping, features a sequence of well-banded metasedimentary gneisses that include, i) white quartzite with mauve garnet, ii) dark green and red banded calc-silicate rocks containing diopside, garnet and plagioclase, with some pure, white carbonate layers, and iii) sillimanite- and garnet-bearing pelitic gneisses. The pyrite occurs in the pelitic layers, concordant with bedding, up to 1 m thick and containing up to 15% sulphide. The pyritic layers are continuous over the outcrop – at least 200 m^2, but the limits were not determined. Minor chalcopyrite was also equivocally identified.

Mealy Mountains Terrane

Pyrite occurrences in pelitic gneiss in the Mealy Mountains terrane can be subdivided into three areas from southeast to northwest, namely: i) *ca.* 60 km west of Port Hope Simpson; ii) 60–70 km southwest of Sandwich Bay; and iii) on the east flank of the Mealy Mountains Intrusive Suite (Figure 9). All were identified during 1:100 000-scale mapping.

Two occurrences (*013A/11/Pyr001* and *013A/11/Pyr002*) occur about 60 km west of Port Hope Simpson. They are hosted by biotite–sillimanite–garnet-(muscovite) metasedimentary gneiss, and, in both examples, the sulphide is minor.

The pyrite occurrences 60–70 km southwest of Sandwich Bay (*013H/04/Pyr007* and *013G/01/Pyr002*) are in pelitic to semipelitic migmatitic, biotite–sillimanite–garnet gneiss and have only minor sulphide. At the second locality listed, a few 1-m-wide pyritic zones were noted.

Pyrite occurrences in pelitic gneiss on the east flank of the Mealy Mountains Intrusive Suite (*013G/02/Pyr001*, *013G/02/Pyr002*, *013G/07/Pyr001*; Plate 4f, *013G/07/Pyr002* and *013G/10/Pyr001*) differ from those seen farther south, being hosted by anhydrous pelitic gneiss. The mineral assemblage includes pyroxene and, in some examples, cordierite. The rocks tend to have high magnetite content and discordant, pink granitic veins are present at some sites. The pyrite is disseminated and minor, generally being in zones less than 30 cm across, but, at *013G/07Pyr001*, two rusty-weathering zones, each about 2 m across were noted, neither of which yielded anomalous metal values (Table 25).

Table 24. Pyrite occurrences in pelitic gneiss, Rigolet area, Lake Melville terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013J/02/Pyr007	NN80-258A	31	51	27	11	-	n.d.	3	-	-
013J/01/Pyr001	CG84-198A	310	143	21	100	-	97	5	-	25
013J/01/Pyr001	CG84-198B	969	23	7	28	-	86	3	-	25

Note: n.d., not detected; -, not analyzed

Table 25. Pyrite occurrences in pelitic gneiss, east of the Mealy Mountains, Mealy Mountains terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013G/07/Pyr001	CG95-161C	60	173	12	14	9	39	4	n.d.	n.d
013G/07/Pyr001	CG95-161D	94	122	3	70	58	78	n.d.	n.d.	n.d

Note: n.d., not detected

Molybdenum

Two molybdenite occurrences are linked to metasedimentary gneiss (Figure 10). Both are located in the Lake Melville terrane, south and west of Rigolet; both are based on observations apparently made during 1:100 000-scale mapping in the area; and both are poorly documented. What little is known about them is included, reasoning that doing so makes confirmation (or otherwise) possible.

One of the supposed occurrences is sited on the southeast shoreline of Henrietta Island (*013J/01/Mo 001*), in an area the author mapped, but there is no mention of molybdenite in his field notes. In the post-field season report, Gower *et al.* (1981) mention three localities at which molybdenite was seen. One of them is noted to be associated with calc-silicate rocks, which is consistent with what was mapped at the site, but after 30 years, any memory of seeing molybdenite there has faded. Also, given the presence of calc-silicate rocks, the author also wonders, in hindsight, whether it might have been graphite that was seen.

The second occurrence (*013J/02/Mo 001*) fares slightly better, inasmuch as Gower and Erdmer (1984) indicated a molybdenite showing at this locality, noting that it occurs in quartz veins in metasedimentary gneiss. No reference to it in field notes could be found, however – in fact, it does not exactly coincide with any field station in the area.

The third occurrence (*013J/02/Mo 002*) of molybdenite in the Rigolet area that is mentioned by Gower *et al.* (1981) is documented in field notes. It is described in a subsequent section (Grenville Province–Late Proterozoic to Recent; Quartz Veins; Quartz with Sulphide in Minor Veins).

Gold

Although no Au occurrences have been recognized in metasedimentary gneiss, 17 mineral occurrences show anomalous values (arbitrarily taken as 10 ppb or higher). Two additional localities where the mineral occurrences are hosted by supracrustal amphibolite within metasedimentary gneiss can be added to these. Most of the anomalous Au values are from pyritic gossans within pelitic metasedimentary gneiss of the Paradise metasedimentary gneiss belt, Hawke River terrane. Apart from one, the remaining localities are in slivers of metasedimentary gneiss, interpreted to be temporal correlatives, in other terranes. The exception is quartzofeldspathic supracrustal gneiss on Black Island, on the north side of Groswater Bay, in the Groswater Bay terrane, which may not be part of the same package of rocks (*see* earlier). About half of the anomalous Au localities are also anomalous in Cu (*i.e.*, >500 ppm), but generally show low values for other metals.

Magnetite

Three Fe occurrences, all magnetite, have been designated in pelitic metasedimentary gneiss. Two are in the Hawke River terrane (*013H/02/Fe 001* and *013H/02/Fe 002*), and neither is of any known commercial interest (Figure 9). The first was reported by Donohoe (1966), who described quartz-microcline gneiss containing up to 30% magnetite close to the contacts with the Sand Hill Big Pond gabbronorite (note that in the original reports, the rock was referred to as anorthosite and Sand Hill Big Pond was termed Rooftop Lake or Don Lake). The second results from 1:100 000-scale mapping and designated as a Fe occurrence simply on the basis that the rock is magnetic enough to cause significant compass deviation on outcrop. The rock at the locality was described as finely laminated metasedimentary gneiss. The third occurrence is in the Lake Melville terrane (*003D/12/Fe 001*), at Fishing Ships Harbour (Figure 14). It was described by Eaton (1950) as a magnetite band 1.5' wide and 5' long. A partial analysis of this material gave 36.77% Fe, 6.10% TiO_2 and 16.22% SiO_2.

It should be kept in mind that the pelitic metasedimentary gneisses are characteristically very magnetic, a consequence of magnetite generation during high-grade metamorphism.

Garnet

All of the garnet occurrences identified as mineral occurrences in metasedimentary gneiss in eastern Labrador are confined to a small part of the Hawke River terrane, in the Cape Bluff Pond area (*013A/16/Gnt001*, *013A/16/Gnt002*, *013A/16/Gnt003*, *013A/16/Gnt004*, *013A/16/Gnt005*, *013A/16/Gnt006*, *003D/13/Gnt001* and *003D/13/Gnt002*; Figure 13). This is a completely artificial concentration, simply due to prospecting documentation of garnet in that area by Squires *et al.* (1997), reporting on behalf of Noranda Mining and Exploration. Garnet is equally abundant in pelitic gneiss elsewhere in eastern Labrador. The host rock is described as magnetic or non-magnetic grey-green or rusty pelitic gneiss. The garnets are red, purple and pink, and range from 4–50% of the rock (averaging *ca.* 30%). From the author's own observations in that area and elsewhere, this is likely an overestimate of their concentration and it is very improbable that they could be economically exploited in the foreseeable future.

One other locality in the same area (*013A/16/Mic002*) has been included in the MODS database as a mica occurrence, on the basis of a rock described by Squires *et al.* (1997) being strongly limonitic garnet–mica–quartz gneiss containing 40% muscovite and 30% garnet. It is included here because of its garnet content, but it is likely that both the muscovite and garnet are overestimated. Muscovite-rich pelitic schist and gneiss is common in the southern half of the Paradise metasedimentary gneiss belt.

Sapphire (Corundum)

The, now well-known, sapphire locality between St. Lewis Inlet and Port Hope Simpson, in the Lake Melville terrane, was discovered by the author during 1:100 000-scale geological mapping (*013A/08/Gem001*; Figure 12). The location is shown on the 1:100 000-scale published geological map of the region (Gower *et al.*, 1988a) and was described in a Current Research report in the same year (Gower *et al.*, 1988b). In the report, the mineral is referred to as blue corundum and the recommendation made that it should be evaluated for its gemstone (sapphire) potential. The report included a one-paragraph description of the outcrop and a close-up outcrop photograph of the corundum. The gem potential of the corundum was also identified in a poster display at the Newfoundland Dept. Mines and Energy 'Open House', in November, 1987, and a large sample displayed.

The sapphire (corundum) probably resulted from the interaction between the anorthosite/leucogabbronorite (a relatively low-silica rock type) with the pelitic gneisses during high-grade metamorphism. Corundum is not normally an abundant constituent of pelitic gneisses because such rocks also have high SiO_2 activity, hence producing aluminosilicate instead. The trace Ti and Fe required for the blue colour could have come from the anorthosite/leucogabbronorite.

The corundum crystals have hexagonal, prismoidal form and range in size from a few millimetres to 2.5 cm across and several centimetres long. Being more resistant to weathering than the dominantly plagioclase–biotite matrix in which they occur, the corundum crystals weather in positive relief – the cliché ‘sticking out like sore thumbs’ describes them well (Plate 5). The crystals are quite abundant in places and form between 10–15% of the rock. In thin section, the margins of the corundum crystals are seen to be altered to white mica and to contain inclusions.

Plate 5. *Sapphire (pale lilac hexagonal crystals). North of St. Lewis Inlet (mineral occurrence 013A/08/Gem001).*

The corundum locality was staked by Rockhopper in January, 1994 and field investigations carried out in the same year (Andrews, 1995f, g). Samples of corundum were collected and nine crystals sent to U.S. Gem Inc. in California. The stones were tumbled in 40% HF for five days and then sent to Sri Lanka for cutting, yielding a total of 22.93 carats finished product. The report estimated that the occurrence contained a visible reserve of 350 000 carats (1 carat = 0.2 g). Further field evaluation was carried out in 1995, including a search for alluvial sapphire (Andrews, 1995f, g). More sapphire was found at the initial location and 1700 carats of material were collected. Assessment work continued in 1996 (Andrews and Beecham, 1997) at which time the discovery also attracted the attention of news media (*e.g.*, The Evening Telegram, July 9th, 1996). Administrative Services carried out exploration in late 1996 on claims flanking the south side of those staked by Rockhopper, but no material of economic interest was discovered (Ralph and Hennessey, 1996).

In 1996, Cartaway Resources entered into an agreement with Rockhopper and, in 1997, conducted a program of prospecting, gridding, trenching-stripping and till sampling (Beesley, 1998). Channel samples were collected and the material submitted for evaluation as to its amenability to heat treatment. The property was returned to Rockhopper in 1998. After their licence expired in 2004, South Coast Ventures staked six claims covering the prospect. A brief field program was conducted in 2004, followed by compilation and digitization of all previous work. Lapidary crystal polishing was carried out on some of the sapphires (Dearin and Wilton, 2005).

As a result of its 1997 exploration, ‘raised blue crystals on surface outcrop in a large exposure of biotite–hornblende dioritic gneiss, reminiscent of the surface exposures of sapphire in pelitic gneiss [at the original site]’ were discovered by Cartaway Resources 6.5 km to the northwest, roughly along strike (Beesley, 1997). A detailed grid was established over the locality and 30 samples collected using a diamond saw. It is not known to the author whether the material that was seen was subsequently confirmed as sapphire, but the locality has been provisionally assigned occurrence status by the author, given that it might be (*013A/08/Gem002*).

Given the similarity of geological setting along strike, it would seem likely that other occurrences exist, although none have yet been found, despite exploration efforts in both directions. It should be noted that corundum has been found at other localities in southeast Labrador, although the mineral elsewhere is colourless and the grains generally small.

Other Minerals

Several other minerals deserve mention. They are more likely of interest to mineralogists and mineral collectors than explorationists, although some could be of economic interest under particular circumstances. The list includes:

i. Kyanite; found in the pelitic gneiss in the Groswater Bay terrane, and in parts of the Hawke River terrane.

ii. Sillimanite; widespread in all terranes.

iii. Cordierite; abundant in the eastern part of the Paradise Metasedimentary gneiss belt and in pelitic gneiss east of the Mealy Mountains Intrusive Suite.

iv. Andalusite; only one occurrence known in eastern Labrador, in the Mealy Mountains terrane. It is seen as a relict grain in thin section.

v. Staurolite; one occurrence is known from the Paradise metasedimentary gneiss belt near Sand Hill Big Pond.

vi. Osumilite; this is a cordierite-like mineral that only forms under atypical P-T-X metamorphic conditions. The author knows of only two areas in Canada (the other is also in Labrador, in the Nain region). Despite its restricted global occurrence, it is not necessarily rare where found. In eastern Labrador, it is abundant in a metamorphic aureole adjacent to the Sand Hill Big Pond gabbronorite in the Hawke River terrane (Arima and Gower, 1991). The mineral does not have a prepossessing appearance in hand sample, and is probably of more interest to the metamorphic petrologist than the mineral collector.

vii. Sapphirine; small grains that are seen in thin section. In eastern Labrador, it is most commonly found in association with osumilite.

METASEDIMENTARY GNEISS METALLOGENY AND POTENTIAL

Metals

An attractive analogue for the metasedimentary gneisses in eastern Labrador is the southern part of the Ketilidian Mobile Belt in southernmost Greenland (Figure 15). This area has been traditionally subdivided into two zones, the psammite zone in the north and the pelite zone in the south. The psammite zone includes, in additional to psammite, minor basic metavolcanic rocks (including pillow lavas), variably migmatized pelitic and semipelitic rocks, calcareous metasediments, conglomerate and graphitic chert. The pelitic zone consists mainly of turbidite sediments, deposited in a deeper, more distal setting. Both zones are intruded by various mafic and granitic rocks. The supracrustal rocks were deposited between 1820 and 1790 Ma and are thought to represent sediments eroded from the emerging 1850–1800 Ma calc-alkaline Julianehåb batholith and its felsic volcanic carapace, and deposited in intra- and fore-arc basins (Chadwick and Garde, 1996; Garde *et al.*, 2002). The metasedimentary rocks in the Ketilidian Mobile Belt are very closely matched, in both lithological association and age, with those in eastern Labrador, where the best estimate for age of deposition is 1810–1770 Ma. Deposition of the sediments in eastern Labrador was coeval with, or shortly after, the emplacement of granitoid magmatic rocks (Gower *et al.*, 2008a).

Exploration in the Ketilidian Mobile Belt has resulted in the discovery of Au–As, Au–Cu and Fe–Cu–Zn mineralization. The Au–As mineralization is found in silicified shear zones, aplites and quartz veins hosted by mafic metavolcanic rocks within the metasedimentary package. Gold is associated with pyrrhotite, löllingite and arsenopyrite (Steenfelt, 2000). Significant discoveries include the deposit at Nalunaq, which was mined between 2004 and 2008. In its 2007 Annual Report, Crew Gold, the deposit's owner, quoted indicated resources of 535 000 tonnes at 18 g/t, yielding 315 000 ounces of Au (http://www.crewgold.com/crew_ar07/ rev_op_nan.php; 2010).

Au–Cu mineralization is found within basic volcano-sedimentary packages resting unconformably on the Julianehåb batholith and is associated with shears or quartz veins. The main copper minerals are bornite and chalcocite, but ilmenite, magnetite, hematite, chalcopyrite, electrum and native copper are also associated. Kangerluluk is an important example.

The Fe–Cu–Zn mineralization occurs in association with stratiform, rusty- and graphite-rich layers, commonly extensive laterally and spatially linked with chert and mafic volcanic rocks within the clastic metasediments. Sulphides present include pyrrhotite, chalcopyrite and sphalerite. Examples include Søndre Sermilik, Danell Fjord and Illukulik (Stendal and Frei, 2000). The metallogenic model suggested by Stendal and Frei (2000) envisages mineralizing fluids associated with volcanism with subsequent mobilization into shears and veins. The Fe–Cu mineralization was proposed to be of volcanic-sedimentary exhalative Besshi type.

The Au–As and Fe–Cu–Zn mineralization settings compare closely with those found in the metasedimentary rocks in eastern Labrador. In particular, an association of pelite and psammite, and rocks having chert and mafic volcanic protoliths, is very much like that found in the Dead Islands area northeast of Charlottetown. Gower and Swinden (1991) sug-

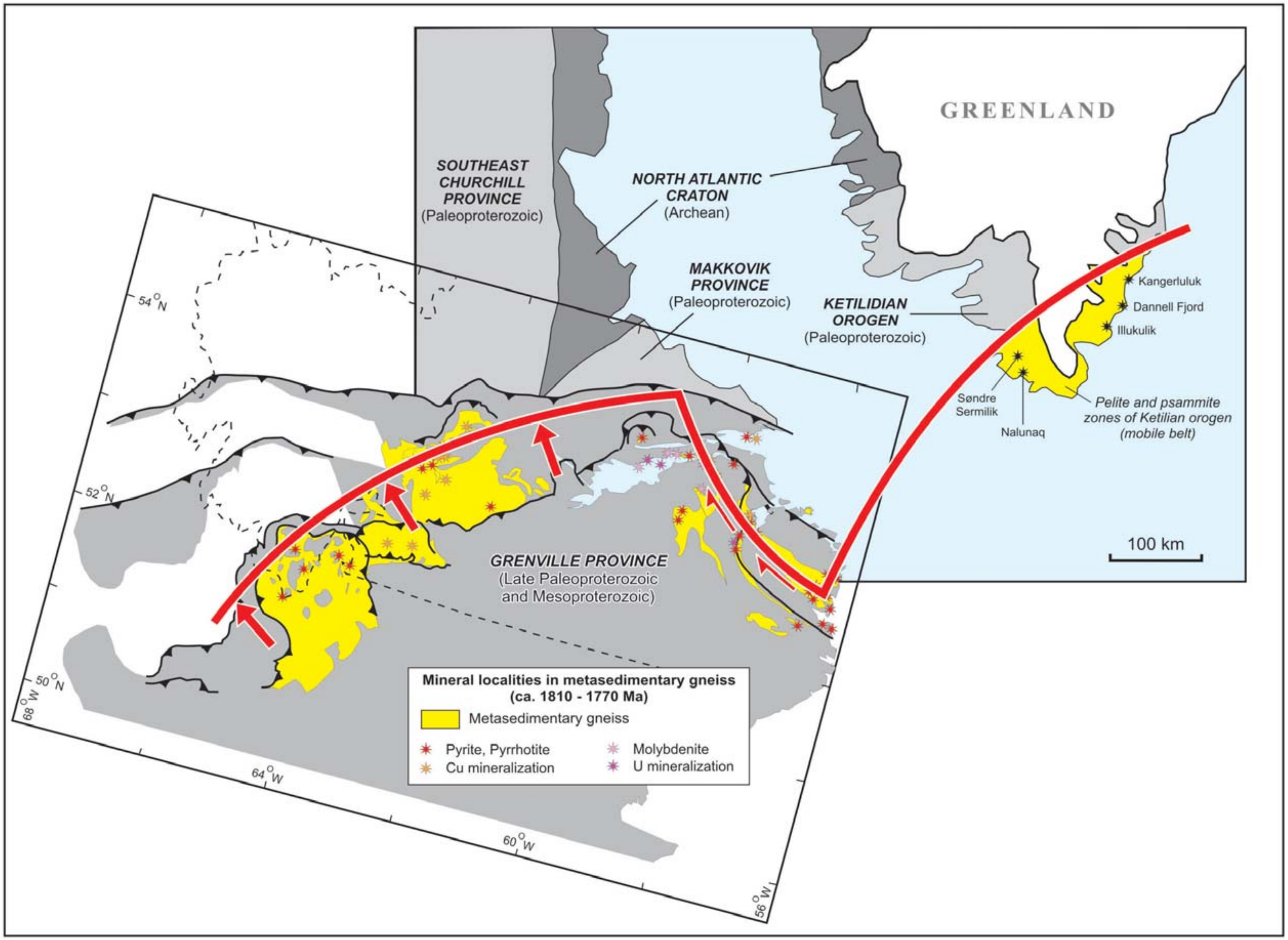


Figure 15. *Possible correlation between metasedimentary gneiss in the Ketilidian Orogen (Mobile Belt) and pre-Labradorian metasedimentary gneiss in southern Labrador in a syn-Grenvillian and pre-Labrador Sea reconstruction. The tectonic depiction is after Gower* et al. *(2008a) for post-early Grenvillian thrusting (pre-*ca. *1030 Ma), but pre-late Grenvillian thrusting (1010–990 Ma). The latter mainly affected western Labrador. The model implies that the* ca. *1810–1770 Ma metasedimentary gneisses in eastern Labrador have been thrust 300 to 400 km northwest, relative to their Ketilidian counterparts. Only mineral localities in the Ketilidian Orogen that are mentioned in the text are shown.*

gested that the associated mineralization could be identified as of Besshi or SEDEX type. To date, in eastern Labrador, only Fe and Cu sulphides have been recognized in most occurrences, without Au or Zn mineralization. Gold has been reported to be anomalous at sub-economic levels, however (*see* earlier) and Zn is elevated (at a trace element level) in many analyzed samples. To the author's knowledge, quartz veins and shear zones associated with metachert and mafic metavolcanic rocks have not been specifically targeted by explorationists. As Gower and Swinden (1991) pointed out, rocks interpreted to be pillowform mafic volcanic rocks have also been recorded farther northwest, along strike from Dead Islands, in the southeast Sandwich Bay and eastern Backway areas (but considerably more deformed). Similar rocks are probably present in the less-well-exposed intervening inland areas.

Similar mineralization in metasedimentary gneiss has been found in several places in central Labrador. The most recent report is from Wolverine Exploration who cite Cu values up to 6.4% and Au values up to 556 ppb from the Cache River area, 129 km west of Goose Bay (http://www.wolverineexplorationinc.com web site and press releases, *e.g.*, July 7th, 2010).

Mineralization involving U and Mo within metasedimentary gneiss is associated with diatexitic rocks and is mentioned later in this report (*see* Grenvillian Metallogeny).

Non-metals

Non-metallic products from metasedimentary gneiss deserve attention from explorationists, even if only in terms of auxiliary products to keep in mind during exploration for metal-mineral deposits. Of the commodities reviewed earlier, sapphire has received the most attention. The conditions favouring formation of sapphire, and additional areas where it might be discovered, were addressed earlier. Regarding other non-metallic commodities, it is less likely that any will be found in large enough amounts to be of economic interest.

GRENVILLE PROVINCE–LABRADORIAN

ULTRAMAFIC AND MELANOCRATIC MAFIC ROCKS

Chromium

This section focuses on mineralization in ultramafic rocks (greater than 90% mafic minerals), but also includes abnormally melanocratic mafic rocks. It does not include mineralization in 'normal' gabbroic, noritic, or troctolitic rocks, which is addressed later.

Ultramafic rocks are not abundant in eastern Labrador and the number of mineral occurrences in them is correspondingly small. Four localities (Figure 16) in close mutual prox-

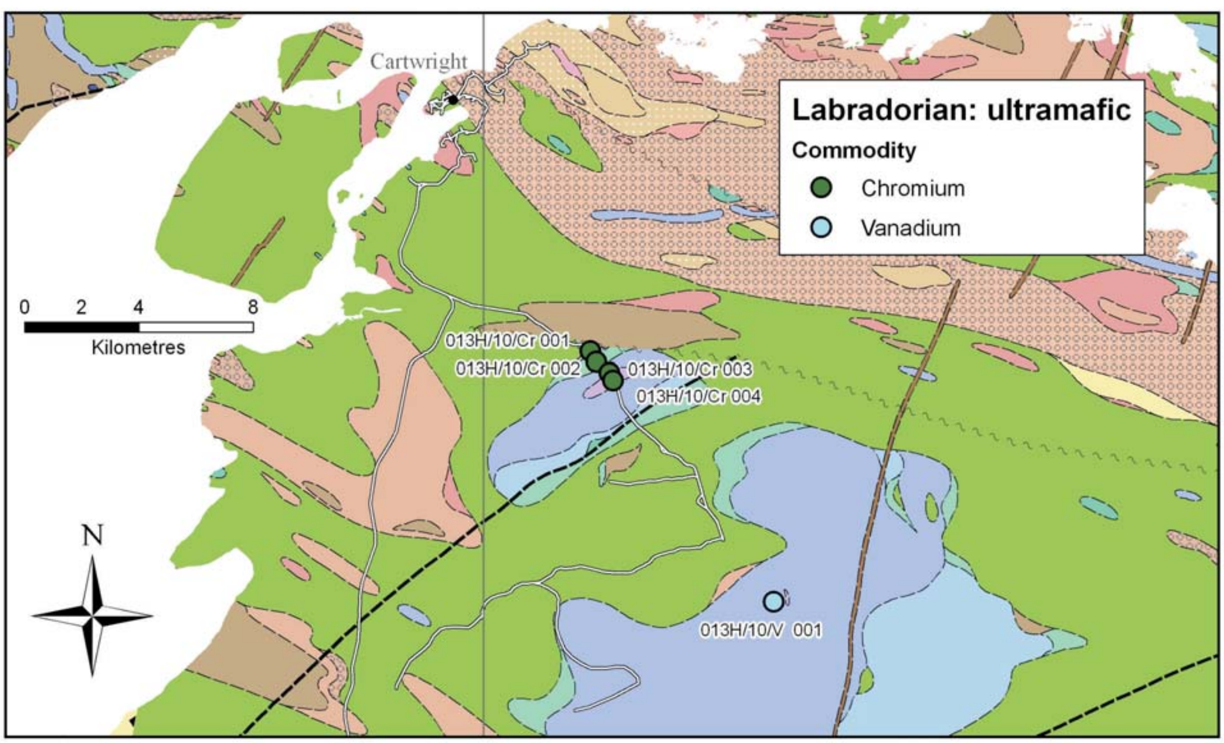


Figure 16. *Distribution of mineral occurrences in Labradorian ultramafic and melanocratic mafic intrusive plutonic rocks southeast of Cartwright.*

imity in the Hawke River terrane, approximately 11 km southeast of Cartwright (roughly 17 km by a woods road), have been designated as Cr occurrences on the basis of anomalous geochemistry. No chromium minerals have been identified, and samples are also anomalous in other elements (*013H/10/Cr 001*, *013H/10/Cr 002*, *013H/10/Cr 003* and *013H/10/Cr 004*). If these occurrences are deemed worthy of further exploration, then the search could be expanded to include similar host rocks west of Porcupine Strand.

The Cr occurrences were investigated by 407824 Alberta Ltd–High G Minerals. The rocks are described as peridotite, olivine gabbro and schillerized gabbro. A ground magnetic and EM survey was carried out in 1996 (Clarke and de Carle, 1996) and four holes were drilled in 1997 (Lucko, 1997). Sulphides, where encountered, are generally <1-2%, but locally exceed 5%. Ilmeno-magnetite is common. Lucko mentions that local prospectors had obtained assays up to 2200 ppm Cu from samples collected elsewhere in this district. Some analytical results are given in Table 26, and additional information is available in the source report.

The author visited the area in 2004 and described the surface rocks as metamorphosed ultramafite (possibly derived from dunite and pyroxenite) and metagabbro (Plate 6). The rocks are rusty-weathering in places and also contain lenses of metallic oxide, up to 30 cm wide and several m long. Partial analytical results for samples from the four Cr occurrences are given in Table 27.

Vanadium

One locality, in a similar setting to the Cr occurrences described above but 10 km to the southeast (Plate 7), has been assigned as a V showing (*013H/10/V 001*), also on the basis of geochemistry (1037 ppm V). Partial analytical results are included in Table 27. Vanadium values at the four designated Cr occurrences in Table 27 are between 59 and 283 ppm. Vanadium is used mostly as ferrovanadium or as a steel additive, particularly in the manufacture of steels for high-speed tools. It is of increasing recent interest because of its use in the vanadium redox battery, a type of rechargeable flow battery.

WHITE BEAR ARM (GABBRONORITE) COMPLEX

The White Bear Arm complex is singled out in this section because of its coherence and huge size, but most of the rocks addressed in the next section (Other Gabbro, Gabbronorite, Troctolite Bodies) are probably temporally more-or-less equivalent to it. The intrusion is situated in the Hawke River terrane and extends from Sandwich Bay to the south-

Table 26. Analytical data from drill-hole samples for layered ultramafic–mafic rocks southeast of Cartwright, Hawke River terrane (Lucko, 1997)

Hole	Depth (ft)	Highlights	Ni (max ppm)
97-1	200	Elevated Ni values in peridotite	730
97-2	270	Elevated Ni values in olivine gabbro and schillerized gabbro	1300
97-3	500	Elevated Ni values in schillerized gabbro and in a magnetite zone	910
97-4	180	Modest Ni values in samples analyzed from a magnetite zone	222

Whole-rock analyses on three samples from hole 97-1 (oxides in percent)

	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	Na_2O	K_2O	TiO_2	P_2O_5	MnO	CrO
97-1-13	24.50	12.30	40.27	6.97	2.13	0.48	3.92	7.73	0.05	0.17	0.087
97-1-15	13.38	8.00	59.09	7.97	1.70	0.38	0.41	7.32	0.11	0.23	0.148
97-1-16	34.54	10.79	24.75	16.15	5.89	1.09	0.76	2.53	0.26	0.21	0.142

	Ba ppm	Cu ppm	Zn ppm	Ni ppm	Co ppm	Sr ppm	Zr ppm	Nb ppm	Sc ppm	LOI(%)
97-1-13	1421	803	279	390	133	102	16	26	15	1.1
97-1-15	58	94	274	436	185	53	40	23	12	1.1
97-1-16	138	164	86	460	121	197	96	<10	10	2.9

Table 27. Surface-sample analytical data for layered ultramafic–mafic rocks southeast of Cartwright, Hawke River terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013H/10/Cr 001	CG04-243A	54	70	6	982	88	1700	n.d.	n.d.	2
013H/10/Cr 001	CG04-243B	30	66	5	1210	91	1790	n.d.	n.d.	n.d.
013H/10/Cr 001	CG04-243C	29	85	4	1007	90	2084	n.d.	n.d.	n.d.
013H/10/Cr 002	CG04-245C	349	48	14	162	30	186	n.d.	n.d.	9
013H/10/Cr 003	CG04-247	526	62	5	1188	85	1447	n.d.	0.2.	199
013H/10/Cr 004	CG04-248A	687	53	6	1483	90	855	n.d.	0.2.	32
013H/10/Cr 004	CG04-248B	271	92	8	29	40	21	n.d.	n.d	2

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	V ppm
013H/10/Cr 001	CG04-266	115	102	4	26	82	9	n.d.	n.d.	1037

Note: n.d., not detected

Plate 6. *Ultramafic rocks containing anomalous Cr values. Southeast of Cartwright (mineral occurrence 013H/10/Cr 001).*

Plate 7. *Ultramafic–mafic rocks containing anomalous V values. Southeast of Cartwright (mineral occurrence 013H/10/V 001).*

east Labrador coast, a distance of 150 km. Gower *et al.* (1987) subdivided rock types in the White Bear Arm complex into two broad groups, namely: i) those having primary igneous mineralogies and textures, and ii) those that are recrystallized and hydrated metamorphic derivatives. The first group includes fine- to extremely coarse-grained gabbronorite (having leucocratic and melanocratic variants), olivine gabbronorite, anorthosite, monzogabbronorite, monzonite, syenite (including quartz bearing types) and granite. The second group includes amphibolitic and dioritic gneiss associated with lesser tonalitic, monzonitic and granitic gneiss. The body was emplaced between 1640 and 1630 Ma (Kamo *et al.*, 1996).

For its size, remarkably little mineralization has been found in the White Bear Arm complex. Nevertheless, it cannot be claimed that the body has been completely neglected by explorationists. It featured strongly in Brinex's exploration activities in the 1960s and was extensively staked during the post-Voisey's Bay Ni–Cu–Co rush in the 1990s, at which time high-resolution airborne geophysical surveys were completed over sizable segments of the body. Of the little mineralization encountered, it is mostly sulphide (Figure 17).

Copper (± Ni)

Northwest Part of the White Bear Arm Complex

Exploration by Brinex in the 1950s and 1960s resulted in two, or possibly three, occurrences in the White Bear Arm complex, in its northwestern part.

One discovery (*013H/03/Ni 001*) was made during follow-up investigation of a Ni, Zn stream-sediment anomaly (Kranck, 1966; Bradley, 1966). It is reported that appreciable sulphide mineralization (chalcopyrite and Ni-bearing pyrrhotite according to Kranck, 1966) was found in a dark green very basic rock. Two samples assayed 0.13% Ni and 0.12% Cu (ELM-81-66) and 0.12% Ni (0.17% Ni according to Plate VII of the report) and 0.15% Cu (ELM-84-66) respectively.

Another discovery (*013H/05/Cu 001*) was reported earlier by Piloski (1955a) who wrote that chalcopyrite and pyrite mineralization was located by C.D. MacKenzie, C. Cameron and J. Michelin near Paradise River at a point approximately 3 miles east of camp C-138. He described the area as being underlain by 'paragneiss and granitic gneisses which are intruded by a small anorthosite mass of the white-face type, differentiated to very basic gabbro', and that parts of the intrusion exhibit reaction textures. The mineralization is in patchy segregations of mafic minerals, up to 1' in diameter, in anorthosite, and consists of specks of chalcopyrite and pyrrhotite with very little pyrite. Two points need to be addressed with respect to this occurrence. The first is that its exact location remains imprecise. Piloski only specifies that it is near Paradise River, 3 miles east of camp C-138 (the location of the camp was on the east side of Crooked Lake near its south end (Piloski, 1955a, Area E). The camp is not named in Piloski's report, but can be identified from other Brinex reports. The second is the host rock. Despite the reference to paragneiss and granitic gneiss, most information given by Piloski (especially the reaction textures) imply that the White Bear Arm complex is the host, although the author does not know what is meant by his designation 'anorthosite of the white-face type'. It should be recalled that there are numerous west-verging thrusts in this area, so it is suspected here that reference to finely banded anorthosite and to anorthosite forming bands intruding or replacing paragneiss should be reinterpreted as mylonite.

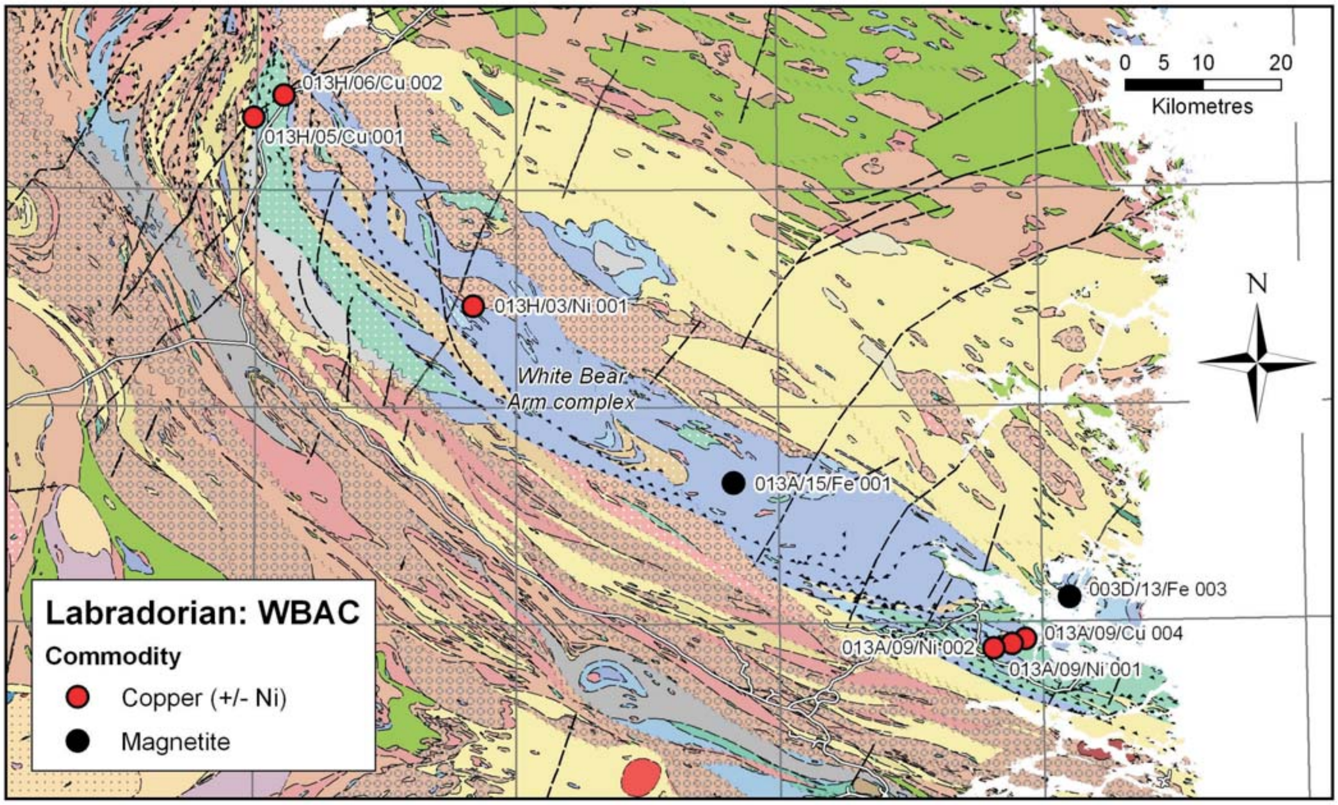


Figure 17. *Distribution of mineral occurrences in the Labradorian White Bear Arm complex (WBAC).*

The area was re-staked and the claims acquired by Consolidated Viscount Resources and investigated in 1995 (Connell and Brewer, 1996c). Reconnaissance prospecting identified three showings, but their exact location is not given in the report. Their Northeast Showing is believed by the author to be the occurrence previously documented as *013H/05/Cu 001*. Mineralized float found in the southeast part of the property was termed the Paradise River # 1 Showing (not sampled) and a second showing (Paradise River # 2) found in the southwest part of the claim block. The latter contained 3% pyrite with trace chalcopyrite, and/or bornite in orthogneiss near a contact with quartzite and metagreywacke. Seven samples were analyzed, but their locations are not given. The samples do not contain significantly anomalous values.

One other occurrence should possibly also be credited to Brinex (*013H/06/Cu 002*) but the original information source is unknown, beyond its listing in MODS.

Southeast Part of the White Bear Arm Complex

At the southeast end of the White Bear Arm complex, Anderson *et al.* (1996), reporting on behalf of Columbia Yukon Resources, obtained anomalous metal values from some samples, which are the basis for three designated occurrences (*013A/09/Cu 004*, *013A/09/Ni 001* and *013A/09/Ni 002*). No geological or mineralization details are given in the report. Analytical data for selected elements is given in Table 28.

Magnetite

Magnetite has been noted at two locations within the White Bear Arm complex (Figure 17). On Burnt Island, 11 km east of Charlottetown (both places located on Figure 12), van Nostrand (1996b), reporting on behalf of Consolidated Callinan Flin Flon Mines, noted 15–20% magnetite in a zone of rusty-weathering massive leucogabbro (*003D/13/Fe 003*), and, 36 km northeast of Charlottetown, magnetite forming 1-cm-diameter clusters in massive to weakly foliated, medium-

Table 28. Copper and nickel occurrences in the southeast part of the White Bear Arm complex, Hawke River terrane (Anderson *et al.*, 1996)

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	V ppm
013A/09/Cu 004	10836	829	7	2	194	56	68	-	0.3	11
013A/09/Ni 002	10833	67	11	2	471	41	88	-	0.2	3
013A/09/Ni 002	10834	38	21	2	671	93	54	-	0.2	1

Note: -, not analyzed

grained gabbronorite was recorded during 1:100 000-scale mapping (*013A/15/Fe 001*). Neither is likely ever to be of economic significance, but awareness of such features may have other merit – not the least of which is facilitating improved understanding of magnetic patterns, for example.

OTHER GABBRO, GABBRONORITE, TROCTOLITE BODIES

Historically, particularly when applied to gabbroic and metamorphically equivalent rocks of interpreted Labradorian age in the Groswater Bay terrane, the term 'Adlavik gabbronorite correlatives' was applied, as they were thought to be comparable in age and spectrum of lithological rock types to the 1649 Ma Adlavik Intrusive Suite in the Makkovik Province. Limited subsequent geochronological investigations have, so far, substantiated this interpretation. In addition to the 1640 Ma date for the White Bear Arm complex mentioned above, an age of 1662 ± 19 Ma from a meta-leuconorite in the Mealy Mountains terrane (Gower *et al.*, 2008a) and an age of 1644 ± 2 Ma from syenite (forming part of a layered gabbronorite–syenite unit) from Grady Island in the Groswater Bay terrane (Kamo *et al.*, 1996) have been obtained. It would be unwise, however, to accept that all rocks included here are necessarily of mid-Labradorian age. In particular, in the Groswater Bay terrane for example, there has been much confusion between the 1650 Ma mafic rocks and the younger 1426 Ma Michael gabbro. Distinction between the two groups was not recognized during 1:100 000-scale mapping, and had to be applied retroactively after it became clear, based on geochemical and geochronological evidence, that both groups exist in the same area. Discrimination was done using previously available hand samples, petrographic and whole-rock geochemical data and, where samples were not collected, field photographs/descriptions (*cf.* Murthy *et al.*, 1989; Park and Gower, 1996).

Mineral occurrences in these rocks can be grouped as copper (Au, Pd, Pt), nickel (Cu), pyrite, and magnetite/ ilmenite.

Copper (Au, Pd, Pt)

The association of Cu with Au, Pd, and Pt in mafic rocks in eastern Labrador represents the discovery of a mineralization type unknown in the region prior to the mid 1990s. Although Cu (and pyrite) mineralization was known, potential for Au and platinum group elements (PGE) was not. No follow-up investigations have been conducted since then, but certainly would have merit, based on the promising results obtained from the few sites examined. As the anomalous Au and PGE values occur at the same sites as those where Cu mineralization has been identified, all are considered collectively.

All discoveries, so far, of this mineralization type are in the Groswater Bay terrane (Figure 18). The first (*013J/09/Cu 001*) was made in 1955 at Lake Michael by C.D. MacKenzie and C. Cameron, prospecting for Brinex (Piloski, 1955a). The mineralization was noted to be in a dioritic contact phase of a gabbro sill. Further exploration of the property was carried out by Ace Developments (press release, Aug 21, 1995), who reported that geological mapping and prospecting had delineated several mineralized zones associated with troctolite gabbro. The mineralization consists of pyrrhotite, chalcopyrite and pentlandite occurring in veins, massive blebs and shears. Pickett (1996), reporting on behalf of Avalon Mines / Ace Developments, described the occurrence (termed the Southern Shore showing) as disseminated and coarse patches of chalcopyrite with pyrrhotite and/or pyrite that are confined mainly to very localized fractures and shears within the gabbro. The mineralized fractures form a 1–4 cm-wide anastomosing network enveloping 2–40 cm blocks of gabbro, which, itself, carries minor disseminated chalcopyrite and pyrrhotite. Analytical data reported by Piloski (1955a) and Pickett (1996) are given in Table 29. Note the significant Au and Pd values in addition to Cu.

Table 29. Copper, gold and platinum group element occurrences in mafic rocks of inferred Labradorian age in the Groswater Bay terrane

Mineral Occurrence	Source	Cu %	Ni %	Co %	Au ppb	Pd ppb	Pt ppb
013J/09/Cu 001	Piloski (1955)	1.40	0.11	0.02	-	-	-
013J/09/Cu 001	Pickett (1996a)	5.40	0.05	0.18	352	308	-
013J/09/Cu 002	Pickett (1996a)	0.53	-	-	-	-	-
013J/09/Cu 002[1]	Pickett (1996a)	-	-	-	-	1376	357
013J/09/Cu 003	Pickett (1996a)	0.90	0.03	-	-	286	216
013I/12/Cu 001	Kirwan (1960c)	1.40	0.50	-	-	-	-
013I/12/Cu 001[2]	Pickett (1996a)	0.92	0.06	0.01	329	28	46
013I/12/Cu 001[3]	Pickett (1996a)	0.48	0.05	<0.01	104	16	58
013I/12/Cu 001[4]	Pickett (1996a)	0.56	0.07	<0.01	247	79	275
013I/05/Cu 001	Kirwan (1960d)	0.25	0.03	-	-	-	-
013I/05/Cu 001	Kirwan (1960d)	0.30	0.02	-	-	-	-
013I/05/Au 001	Corbeil and Villeneuve (1995)	<0.01	0.01	<0.01	70	-	-

[1] Mineralized boulder 4 km east of *013J/09/Cu 002*
[2] Showing 1 at *013I/12/Cu 001*; average assay over 3 m
[3] Showing 2 at *013I/12/Cu 001*; average assay over 2 m
[4] Sample collected 280 m northwest of showings 1 & 2 at *013I/12/Cu 001*

Note: Some standardization to % from originally quoted ppm; values reported may be maximum values from several samples; -, not analyzed

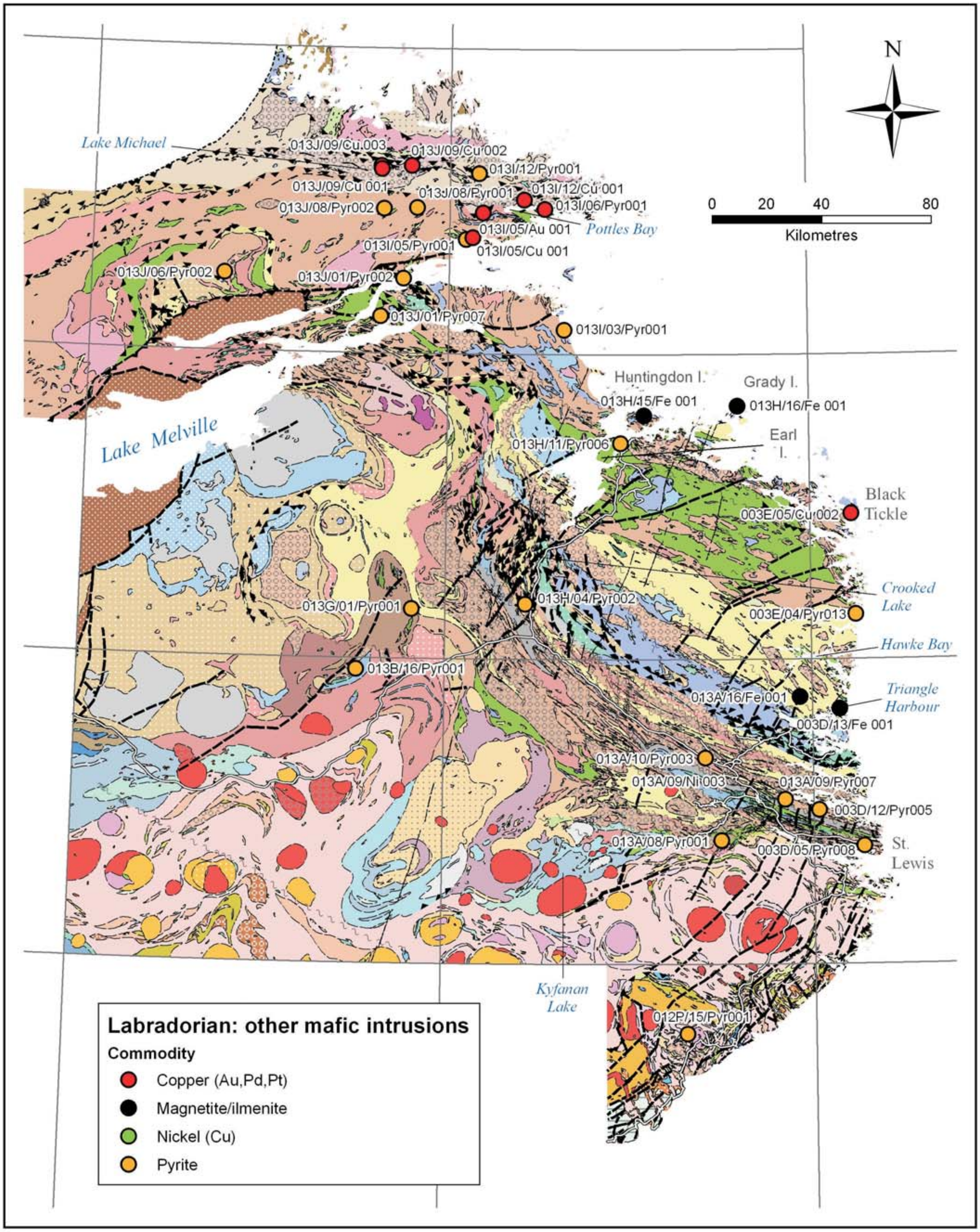


Figure 18. *Distribution of mineral occurrences in Labradorian mafic intrusive rocks, other than the White Bear Arm complex.*

Piloski (1955a) also reported disseminated pyrite and chalcopyrite mineralization in a small oxidized zone in gabbro about 10 km farther east (*013J/09/Cu 002*). This showing was re-investigated by Avalon Mines / Ace Developments and termed the Lake Michael East showing (Pickett, 1996). Samples were collected and found to be anomalous in Cu (Table 29). Pickett also reported follow-up work on a Cu occurrence indicated by Gower (1981), 4 km east of the Lake Michael East showing, in the process discovering a mineralized boulder analyzing 357 ppb Pt and 1376 ppb Pd. The author cannot recall the source of information for this Cu occurrence that is shown on his map; it is neither on the maps of Christie (1951), Douglas (1953) or Stevenson (1970), nor in the MODS database, and there is no indication from field notes that it was discovered during 1:100 000-scale mapping.

An additional discovery (*013J/09/Cu 003*) was made by Avalon Mines / Ace Developments about 1 km north of the Southern Shore showing, and termed the Michael Hill showing (Pickett, 1996). It consists of minor chalcopyrite and pyrrhotite within variably altered and fractured gabbro. The fracture zones are characterized by Fe oxides and carry disseminations and clusters of pyrrhotite–chalcopyrite mineralization (generally about 0.5%). In addition to Cu mineralization, samples are also anomalous in platinum group elements (Table 29).

Additional examples of this type of occurrence are found farther to the southeast in the Groswater Bay terrane. Perhaps the most noteworthy is the Clegg Lake showing north of Pottles Bay (*013I/12/Cu 001*), discovered by J. Meagher and H. Tough in June 1960, while prospecting for Gunnex (Kirwan, 1960b). The mineralization, consisting of pyrite and chalcopyrite, occurs at the contact between peridotitic/gabbroic rocks and granitic gneiss. It is exposed for a length of about 30' in one trench and 10' in a second trench, 100' east of the first. Ace Developments (press release, Aug 21, 1995) reported initial results, and more detail is given by Pickett (1996). Pickett confirmed that the mineralization was at the contact between gabbro and gneiss and recorded chalcopyrite-, pyrite- and pyrrhotite-bearing veins and shears over a width of 3 m. Analytical data is given in Table 29, taken from Kirwan (1960b) and Pickett (1996). Note that Labrex Resources staked, geologically mapped and prospected flanking claims to the east and west, but failed to find any additional mineralization.

Kirwan (1960c) also described a similar showing (*013I/05/Cu 001*), at Rocky Cove 23 km southwest of Clegg Lake, which was discovered by G. Bayley and D. Barrington in 1960. The mineralization is at the contact between gabbro and granitic gneiss. It consists of pyrite, pyrrhotite and minor chalcopyrite over a length of about 400' on the southwest end of the gabbro. The mineralization is generally sparse, but may reach 20% sulphides in 2- to 3-inch-wide fractures. Analytical data for samples collected during prospecting (Kirwan, 1960c) are given in Table 29.

Two other occurrences north of Groswater Bay are also included in this section. One is based on geochemical data reported by Corbeil and Villeneuve (1995), acting on behalf of Hebron Fjord Resources. Perhaps somewhat optimistically, this has been designated a Au occurrence (*013I/05/Au 001*) by the author, on the basis of anomalous Au in a sample of orthopyroxenite containing 1% pyrite. The other is a pyrite occurrence (*013I/06/Pyr001*), 6 km west-southwest of the south end of Abliuk Bight (located on Figure 7), which was reported by Stevenson (1970) and is shown on his map. No suggestion of Cu or PGE mineralization has ever been made for this locality and it is included here because, like many of those above, it is at the boundary between a mafic intrusion of probable Labradorian age and quartzofeldspathic gneiss. Field notes record mylonitized greenstone at the contact, which is presumably a shear zone, rather than being intrusive.

Mention of one other locality (*003E/05/Cu 002*) is made here, although there is currently no indication of associated PGEs. The occurrence is situated near Black Tickle and was designated in MODS as a molybdenite occurrence. It is better regarded as two occurrences in close proximity, one being in mafic intrusive rocks and described here, and the other being in quartz veins and/or pegmatite (containing molybdenite). The molybdenite occurrence is detailed in the section 'Grenville Province–Late Proterozoic to Recent, Quartz veins, Minor quartz veins with sulphide', and the MODS label *003E/05/Mo 001* retained. The occurrence described here is in mafic intrusive rocks and was first identified by Douglas (1953), who recorded an amphibolite containing a heavy band that is 66' wide containing magnetite and showing malachite and azurite staining. The area was visited during 1:100 000-scale mapping, although perhaps not exactly the same site as described by Douglas (1953). The vicinity is underlain by layered mafic intrusive rocks, in contact with gneissic megacrystic biotite granodiorite on their western side. Malachite and a brownish cuprous-looking mineral were noted in the mafic rocks. Vulcan Minerals carried out exploration at the locality in 1996 (Hodge, 1996c). A highly magnetic amphibolite unit containing fine-grained disseminated pyrite (<1%) containing both azurite and malachite was sampled 50 m southeast of the headland. The outcrop is 30–35 m long and extends under wetland. Two of six samples yielded anomalous results for Cu as shown in Table 30.

Vulcan Minerals also carried out exploration on neighbouring Spotted Island to the north (Hodge, 1996d), much of which is also underlain by a layered mafic intrusion. Only one sample collected was deemed worthwhile assaying and that failed to yield any economically significant values for either base or precious metals.

Nickel (Cu)

Despite extensive effort since the mid 1990s, there has been a general dearth of exploration success for Ni and related metals in eastern Labrador. One new, seemingly promising, indication was discovered by the author during examination of road cuts in 2003 (*013A/09/Ni 003*; Figure 18). At this site, the contact between metagabbro and grey quartzofeldspathic gneiss (psammitic?) is marked by a 2-m-wide gossan. A sample from the locality gave the results shown in Table 31 (somewhat belatedly delivered partly due to analytical delays).

Claim maps for the area show a pattern that was initiated in this area in 2007 and has been progressively expanded along strike since then in both a northwest and southeast direction. The earliest claims staked, by Capella Resources, do not include this occurrence, indicating that it was not the initial target, although the area was included in a claim block staked a few months later. Apart from some small claim blocks owned by individual prospectors, most of the staking has been carried out by Eagleridge Resources.

Pyrite

Several pyrite occurrences associated with mafic rocks have been detected in eastern Labrador. They are hosted by a wide variety of mafic rocks, many of which are metamorphic derivatives of their protoliths (Figure 18).

Groswater Bay Terrane

Five pyrite mineral localities are included in this group. Note that although these are addressed separately from the Cu (Au, Pd, Pt) mineralization type reviewed earlier, this does not mean they could not also belong to that group.

Four of these localities are based on mapping by Stevenson (1970) and information can be located in his field notes. Despite Stevenson indicating a gossan on his map at *013J/08/Pyr002* and pyrite at *013J/08/Pyr001* (Figure 18), he specifically states in his field notes that, for each locality, it is 'not a gossan', despite suspecting chalcopyrite at the former and noting a sulphurous smell at the latter. The host rock at both is metagabbro. These two occurrences were evaluated by Labrex Resources (Dawson, 1996a, b), but no significant finds were made. The occurrence at *013I/12/Pyr001* consists of pyrite cubes in a sheared epidote-bearing amphibolite. At the fourth site *013I/03/Pyr001*, numerous veinlets of (unidentified) sulphide were seen in 'dense, massive trap rocks' intruding hornblende-rich rocks.

The fifth occurrence in this group (*013I/05/Pyr001*) is based on 1:100 000-scale mapping and consists of nothing more than pyrite-bearing gabbro associated with folded and well-banded hornblende biotite tonalite to granodiorite.

Hawke River Terrane

Two pyrite occurrences in mafic rocks in the Hawke River terrane are included here. One (*013H/11/Pyr006*) is located on the northeast tip of Earl Island, 1 km west of Cartwright and was found during 1:100 000-scale mapping by Cherry (1978a, b), and is shown on his map as a pyrite and pyrrhotite occurrence. Both minerals were seen in minor amounts in a gabbroic rock. The gabbro extends for about 250 yards along the shoreline and is flanked by granitic gneiss to the north and south. The other (*003E/04/Pyr013*) is 15 km north of the entrance to Hawke Bay, in an area underlain predominantly by pelitic gneiss. Although recognizing the pelitic gneisses in the vicinity, the mineralization was described as being in a rusty zone made of troctolitic gneiss (Hodge, 1996b). The zone is 2–3 m wide and has a 20-m exposed length. Mineralization consists of 1–2% fine-grained disseminated pyrite. A sample analyzed from the site gave the results shown in Table 32.

Table 30. Copper occurrences in mafic rocks of inferred Labradorian age near Black Tickle, Groswater Bay terrane

Mineral Occurrence	Reference	Sample	Cu ppm	Zn ppm	Co ppm	Ni ppm	Mo ppm	Ag ppm	Au ppb
003E/05/Cu 002	003E/05/0007	537403	2420	35	46	96	1	1.1	5
003E/05/Cu 002	003E/05/0007	537403 (dup.)	1320	44	43	66	1	0.5	5
003E/05/Cu 002	003E/05/0007	537405	941	5	20	17	1	0.5	5

Table 31. Copper and nickel occurrence in mafic rocks of inferred Labradorian age near Shinney's Waters, Lake Melville terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppm
013A/09/Ni 003	CG03-243B	1637	866	24	2607	175	107	3	0.3	7

Table 32. Pyrite occurrence in mafic rocks of inferred Labradorian age north of Hawke Bay, Hawke Bay terrane

Mineral Occurrence	Reference	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Ag ppm	Au ppb
003E/04/Pyr013	003E/04/0006	537416	46	22	5	7	11	0.5	5

Mafic rocks (especially troctolite) are not common in the Paradise metasedimentary gneiss belt, but they were seen in places during 1:100 000-scale mapping. In field notes, metagabbro and metapyroxenite were recorded in the vicinity, but thin sections of samples from the area have entirely metamorphic, amphibole-bearing assemblages, without either pyroxene or olivine.

Table 33. Pyrite occurrence in mafic rocks of inferred Labradorian age, south-southeast of Rigolet, Lake Melville terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013J/01/Pyr007	RG80-107	57	83	n.d.	54	-	170	5	-	-

Note: n.d., not detected; -, not analyzed

Lake Melville Terrane

All the pyrite occurrences associated with Labradorian mafic rocks in the Lake Melville terrane were found during 1:100 000-scale mapping and most appear to be minor. Starting north of Lake Melville, these are as follows:

i) At a locality about 55 km west-northwest of Rigolet (*013J/06/Pyr002*), pyritic bands occur in medium- to coarse-grained pink and black-weathering amphibolitic gneiss with pink microgranite layering. The amphibolitic gneiss could be an attenuated sliver of a larger body of metagabbro/metaleucogabbronorite that is situated 3 km to the southwest. It should be noted that this area is separated from the rest of the Lake Melville terrane by the Lake Melville rift system, so there is some interpretational uncertainty in linking the two regions.

ii) About 11.5 km east-northeast of Rigolet, pyritic layers (*013J/01/Pyr002*) were seen in a variable series of well-layered granulite facies mylonitic rocks, all of which contain abundant garnet. A stained slab and thin section of a sample from the locality indicate a leucogabbronoritic protolith.

iii) An occurrence situated 7.5 km south-southeast of Rigolet (*013J/01/Pyr007*; Table 33) consists of a few quartz stringers containing pyrite within a mixture of banded garnetiferous amphibolite and gabbro. This locality is very close to a brittle fault belonging to the Lake Melville rift system, which may have an equal or greater genetic role than the nominal host rock for the mineralization.

iv) At a locality 14 km south of the south end of Crooked Lake (*013H/04/Pyr002*), pyrite was recorded in highly deformed fine- to medium-grained metagabbro and amphibolite that appears to be a tectonic sliver within a complex imbricate zone of thrusts and strike-slip faults.

v) At a road cut on Highway 510, 7 km northwest of the Charlottetown road junction, pyritic amphibolite associated with granitic gneiss and fault breccia was seen (*013A/10/Pyr003*). Note that this occurrence is on strike with a promising nickel–copper occurrence (*013A/09/Ni 003*) 12 km to the southeast.

vi) During its regional evaluation of the Kyfanan Lake layered mafic intrusion (*see* below), 73 samples were collected by Cartaway Resources over a wide area and 42 assayed for Cu, Co, Ni and Au (Eveleigh, 1997). At an outcrop about 20 km southwest of Port Hope (*013A/08/Pyr001*), which was identified as 'ultramafic (gabbroic)' and serpentinite, gossanous patches containing 1% sulphide were found. Four samples were analyzed and yielded the results indicated in Table 34.

Table 34. Pyrite occurrence in mafic rocks of inferred Labradorian age, southwest of Port Hope Simpson, Lake Melville terrane

Mineral Occurrence	Reference	Sample	Cu ppm	Co ppm	Ni ppm	Au ppb
013A/08/Pyr001	013A/0036	3-09	109	75	248	<5
013A/08/Pyr001	013A/0036	3-10	176	64	250	<5
013A/08/Pyr001	013A/0036	3-11	133	33	175	<5
013A/08/Pyr001	013A/0036	3-12	230	78	319	<5

vii) About 10 km east of Port Hope Simpson, very minor sulphide was seen in deformed, strongly foliated garnetiferous amphibolite intruded by quartz-feldspar veins (*013A/09/Pyr007*).

viii) Roughly 23 km east-southeast of Port Hope Simpson, foliated amphibolite was recorded as rusty-brown weathering (*003D/12/Pyr005*). Although this locality and the previous one are closely geographically aligned with the Ni locality, they are probably separated by intervening strike-slip structural slices.

ix) In a road cut, about 4 km west of St Lewis, minor sulphide was seen on joint surfaces in schistose amphibolite (*003D/05/Pyr008*; Plate 8).

Plate 8. *Minor sulphide on a joint surface in schistose amphibolite. West of St. Lewis (mineral occurrence 003D/05/Pyr008).*

Mealy Mountains Terrane

In the Mealy Mountains terrane, two pyrite occurrences associated with mafic rocks were recorded during 1:100 000-scale mapping at spots along the upper Eagle River (which provides almost all the outcrop in that area). The most northerly occurrence (*013G/01/Pyr001*) consists of a rusty-weathering zone having a 1- to 2-m-long exposed length (full length unknown) hosted by amphibolite concordantly interlayered with medium-grained, well-banded, biotite granodiorite to quartz diorite gneiss. The second locality is located 20 km upstream (*013B/16/Pyr001*). The host rock is tectonized and metamorphosed layered mafic intrusion comprising ultramafic layers, gabbronorite and anorthosite (Gower, 1998). The mineralization comprises sulphide- and oxide-rich layers 1 to 50 cm in leucogabbronorite. The rock was noted as containing 5–10% disseminated sulphide (pyrite, pyrrhotite and chalcopyrite) in grains up to 3 mm across. A sample yielded the results shown in Table 35. A third locality, located 10 km to the southwest, and not shown on Figure 18 (*013B/15/Pyr001*) is hosted by a fault breccia, and is described in more detail in the section 'Grenville Province–Late Proterozoic to Recent; fault breccia'. As mapped, the occurrence is at the contact between the tectonized layered mafic intrusion and K-feldspar megacrystic granitoid rock, so the host rock affiliation is somewhat uncertain. A sample from the site shows elevated levels for Cu, Zn, Pb, Ag and Au (Table 35). Elevated Zn is uncommon in eastern Labrador (but *see* 'Grenville Province–Late Proterozoic to Recent; fault breccia').

Table 35. Pyrite occurrence in mafic rocks of inferred Labradorian age, middle Eagle River, Mealy Mountains terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013B/15/Pyr001	CG97-075B	282	1085	265	230	27	20	11	1.2	20
013B/16/Pyr001	CG97-090	894	47	n.d.	124	72	52	n.d.	0.2	n.d

Note: n.d., not detected

Pinware Terrane

Only one pyrite occurrence associated with mafic rock that might be of Labradorian age is recognized (during 1:100 000-scale mapping) in the Pinware terrane (*012P/15/Pyr001*). It is, by no means, established that the rock is Labradorian; it could be Pinwarian or even younger. In any case, the mineralization is trivial, associated with plagioclase-rich segregations in an amphibolite.

Magnetite/Ilmenite

Groswater Bay Terrane

Two Fe occurrences associated with probable Labradorian gabbronoritic rocks are included in the MODS database. One locality is 12.5 km northeast of Cartwright on Huntingdon Island (*013H/15/Fe 001*) and the other site is 43 km east-northeast of Cartwright on Grady Island (*013H/16/Fe 001*; Figure 18). They were reported by Christie (1951) who carried out qualitative spectroscopic analysis of mineral concentrates prepared from samples collected, demonstrating, not surprisingly, that the rocks contain abundant Fe and moderate Ti. From the Grady Island sample, appreciable Cu was also detected, but no Cu minerals were seen when the sample was examined microscopically. It should be noted that the locations indicated for both of these occurrences are imprecise as Christie merely specified the islands from which the samples were taken.

Hawke River Terrane

Two further Fe occurrences associated with probable Labradorian gabbronoritic rocks are found in the Hawke River terrane. Both are within the Paradise metasedimentary gneiss belt. One (*003D/13/Fe 001*) was described by Christie (1951) from the Triangle Harbour area and, like those from the Groswater Bay terrane, is based on qualitative spectroscopic analysis of mineral concentrates prepared from samples of gabbroic rocks. Analysis showed that the samples contain abundant Fe, moderate Ti and appreciable Cu, but no Cu minerals were detected under the microscope. No Co, Ni or Cr was detected in the concentrates. The other occurrence (*013A/16/Fe 001*) was reported by Squires *et al.* (1997) who recorded 1–12% magnetite in a fine-grained gabbronorite (note that, according to estimated mineral percentages given in the report, the rock is ultramafic).

ALEXIS RIVER ANORTHOSITE

The name 'Alexis River anorthosite' was introduced by Gower *et al.* (1987) for a body of anorthosite–leucogabbronorite and associated metamorphic derivatives that extends for at least 160 km along strike within the Lake Melville terrane. It rarely exceeds 10 km in width and is commonly less than 5 km wide. The extremely elongate shape of the body is interpreted to be mostly a consequence of deformation related to a Grenvillian, dextral-strike-slip, lateral ramp (Gower *et al.*, 2008b), although earlier Labradorian and Pinwarian deformation may have played a role in the origin of the structure. The unit consists mostly of anorthosite and leucogabbronorite, but also includes some gabbronorite, amphibolite, and diorite/quartz diorite gneiss (the latter interpreted to be derived from leucogabbronorite). The unit has not been dated, but it is assumed to be *ca.* 1650–1640 Ma, similar to that of other Labradorian AMCG (anorthosite–monzonite/mangerite–charnockite–granite) suites. Mineralization in the body can be grouped as 'pyrite, copper (± Ni)', ilmenite and garnet occurrences (Figure 19).

Pyrite, Copper (± Ni)

Southwest of Crooked Lake

Three sulphide occurrences (*013H/04/Cu 001*, *013H/05/Pyr011* and *013H/05/Pyr012*) have been identified southwest of Crooked Lake in areas that have been mapped as underlain by the Alexis River anorthosite. The copper occurrence is based on anomalous whole-rock analytical results for a rock sample collected by Anderson *et al.* (1996) on behalf of Columbia Yukon Resources. Results for selected elements are given in Table 36.

The two pyrite occurrences were reported during 1:100 000-scale mapping, but no information, beyond noting gossan zones, is given in field notes. The gossans are hosted by rock types that were termed amphibolitic migmatitic

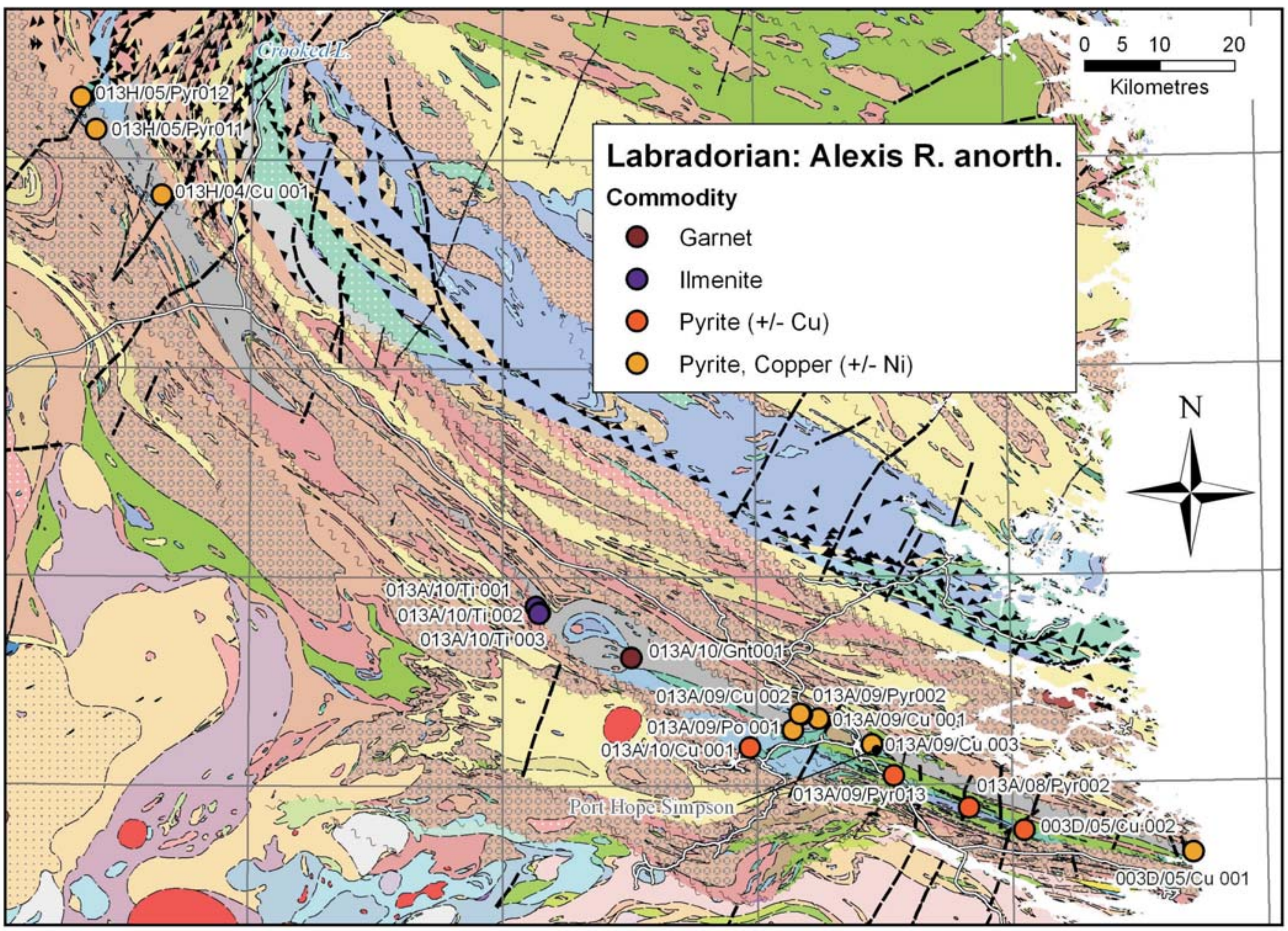


Figure 19. *Distribution of mineral occurrences in the Alexis River anorthosite, assumed to be of Labradorian age.*

Table 36. Copper occurrence in Alexis River anorthosite, southwest of Crooked Lake, Lake Melville terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013H/04/Cu 001	10818	537	30	3	151	29	302	0.3	-	390

Note: -, not analyzed

gneiss, tonalitic gneiss, garnetiferous quartzofeldspathic gneiss and calc-silicate rocks. The author has not seen the outcrops and the conclusion that these rocks belong to the Alexis River body favours field photographs and petrographic thin section evidence over the original field notes.

Port Hope Simpson

The initial discovery in the Port Hope Simpson area (*013A/09/Cu 001*) was described by Piloski (1955a) as consisting of massive to nearly massive pyrite and pyrrhotite with chalcopyrite in mafic sections of an anorthosite–pyroxenite mass. Local patches of massive blue magnetite, crystals of tourmaline and specks of molybdenite were also seen. The best samples were obtained from an exposure (thought to be outcrop) in the river that was partly covered by sand. A 4' length of massive sulphide of unknown width was located. Two samples of similar material gave the results shown in Table 37.

Further exploration was carried out in 1966, but failed to confirm satisfactorily the existence of the occurrence (Bradley, 1966). However, pyrite (sample ELM-66-115) was found in a schist almost due north across Alexis River from the Bowater depot (which was situated about 6 km west-northwest of Port Hope Simpson, on the south side of Alexis River). Molybdenite was found a few thousand feet upstream (sample ELM-66-113). Several pieces of mineralized float were found along the shore. These included paragneiss directly across from the mouth of Bobby's Brook that contained appreciable chalcopyrite and from which a sample assayed 1.00% Cu. During 1966 fieldwork, fragments of drill core and four drillhole collars were found. The locality was visited by the author in 1984 and evidence of prospecting seen around outcrops about 200 m from the shoreline. It was not revisited during 1986 1:100 000 mapping of the area.

In a press release dated May 29th, 1996, Greenshields Resources announced that it had commenced exploration in the area, involving detailed mapping, prospecting and lithogeochemical sampling of ten electromagnetic-magnetic anomalies. On July 10th, 1996, this was followed up with a press release expressing intention to drill a minimum of 8 holes on the property to test selected electromagnetic conductors. On August 21st, 1996, a press release announced that 7 holes totaling 2572 ft had been drilled and that anomalous copper–nickel–cobalt values were encountered, but no economically significant results were returned. In their 1996 Annual Report, Greenshields Resources mentioned that the anomalous metal values were in the form of disseminated sulphides.

Following airborne geophysical surveys, Greenshields Resources laid out a grid over a magnetic anomaly 2 km to the west-northwest, on strike with the original occurrence (Jolliffe, 1997). This is designated as occurrence *013A/09/Cu 002*. Several small sulphide patches and magnetite (± ilmenite)-rich bands were observed, particularly in layers and pods rich in amphibolite ± pyroxene. Pyrite (± pyrrhotite) is the main sulphide, with minor chalcopyrite and rare pentlandite. Twenty-seven samples were collected and values for selected elements/samples are given in Table 38 (samples 535101–535103). Sample 535103 also assayed 6.39% Ti. In addition, a nearby melagabbro (535014) was found containing up to 15% pyrite (± rare chalcopyrite and possible pentlandite). This is designated a separate occurrence (*013A/09/Pyr002*; Table 38).

In the same area, minor pyrite and chalcopyrite mineralization (*013A/09/Cu 003*) was found on the shoreline of the Alexis River across from Port Hope Simpson during 1:100 000-scale mapping. The host rock was described as rusty, medium- to coarse-grained melanocratic diorite to gabbronorite.

Table 37. Copper, nickel and cobalt occurrence in Alexis River anorthosite, Port Hope Simpson area, Lake Melville terrane, reported by Brinex (Bradley, 1966)

Mineral Occurrence	Sample	Cu (%)	Ni (%)	Co (%)
013A/09/Cu 001	L-20	0.85	0.397	0.381
013A/09/Cu 001	L-20-A	0.55	0.422	0.822

Table 38. Copper and pyrite occurrence in Alexis River anorthosite, Port Hope Simpson area, Lake Melville terrane (Jolliffe, 1997)

Mineral Occurrence	Reference	Sample	Cu ppm	Ni ppm	Co ppm	Cr ppm	Au ppb	Pt ppb	Pd ppb
013A/09/Cu 002	LAB/1205	535101	2097	594	123	61	5	<5	9
013A/09/Cu 002	LAB/1205	535102	1121	477	135	100	5	<5	46
013A/09/Cu 002	LAB/1205	535103	1147	377	97	62	<1	<5	13
013A/09/Pyr002	LAB/1205	535014	292	110	42	137	<1	<5	<1

No information source, beyond being listed in MODS, could be found regarding the remaining sulphide occurrence (*013A/09/Po 001*) within the Alexis River anorthosite in the Port Hope Simpson area.

St Lewis River Area

Only one 'pyrite, Cu' mineral occurrence (*003D/05/Cu 001*) has been reported from the southeast end of the Alexis River anorthosite and is based on information recorded during 1:100 000-scale mapping. It comprises nothing more than malachite staining seen high in a cliff, close to the contact between schistose biotitic amphibolite and meta- anorthosite-leucogabbronorite.

Ilmenite

A massive black, non-magnetic mineral was found in pyroxene-bearing meta-anorthosite during 1:100 000-scale mapping in 1986 (*013A/10/Ti 001*, *013A/10/Ti 002* and *013A/10/Ti 003*). The largest pod recorded during a very cursory examination measured roughly 3 by 2 m. The area was revisited by the author in 2001. Five samples collected at that time gave the results indicated in Table 39.

Note that potential for this type of mineralization exists elsewhere in the Alexis River anorthosite, as is demonstrated by a 6.39% Ti (10.67% TiO_2) value obtained by Greenshields Resources from a sample at a mineral occurrence near Port Hope Simpson (*013A/09/Cu 002*). Elevated values for V are also of interest.

Garnet

Garnet is a common accessory mineral in the Alexis River anorthosite and related rocks. One locality (*013A/10/ Gnt001*; Figure 19), found 32 km west-northwest of Port Hope Simpson during 1:100 000-scale mapping, is singled out, however, because of the size of garnet, which was noted to be 60 by 40 cm (Plate 9). The host rock is mylonitic anorthosite.

Table 39. Ilmenite occurrence in Alexis River anorthosite, Port Hope Simpson area, Lake Melville terrane (oxides in percent)

Sample	SiO_2	TiO_2	Fe_2O_3t	MgO	Cu ppm	Ni ppm	Co ppm	Cr ppm	Ag ppm	Au ppb	V ppm
CG01-001A	11.41	16.63	58.58	7.92	54	81	84	862	0.1	n.d.	930
CG01-001B	13.46	14.75	57.72	10.45	26	87	103	696	0.1	n.d.	905
CG01-001C	18.18	12.39	53.52	12.39	507	262	194	581	0.2	11	658
CG01-001D	0.86	22.16	66.50	2.27	n.d.	87	113	1829	n.d.	n.d.	1265
CG01-001E	23.01	8.24	51.09	15.73	400	215	181	430	0.3	n.d.	517

Note: n.d., not detected

Plate 9. *Large garnet in Alexis River anorthosite. West of Port Hope Simpson (mineral occurrence 013A/10/Gnt001).*

TECTONIZED LEUCOGABBRONORITE AND RELATED ROCKS, SOUTH OF ALEXIS RIVER ANORTHOSITE

A series of tectonic lozenges of leucogabbronorite, amphibolitic and dioritic gneiss were outlined during 1:100 000-scale mapping along the southern flank of the Alexis River anorthosite, extending from about 20 km west of Port Hope Simpson to the coast north of St Lewis, within the Lake Melville terrane. The dioritic gneisses are regarded as having a leucogabbronorite protolith. The rocks are internally sliced by strike-slip faults and also separated from the Alexis River anorthosite by major strike-slip faults, thus, although they are probably mutually genetically related, this has not been demonstrated. Mineralization in these rocks is mostly pyrite, but with a hint of Cu (Figure 19).

Pyrite (± Cu)

For the most westerly occurrence (*013A/10/Cu 001*), about 15 km west of Port Hope Simpson, no information is available beyond its listing in the MODS database. The other designated Cu occurrence (*003D/05/Cu 002*) is based on anomalous Cu (475 ppm; Table 40) in a sample of epidote-altered gabbro that contains common pyrite and minor chalcopyrite (Jolliffe, 1997), reporting on behalf of Greenshields Resources.

Two pyrite occurrences are on strike with the second Cu occurrence. One (*013A/09/Pyr013*) was identified during 1:100 000-scale mapping and comprises a 4-m-wide rusty zone containing disseminated sulphide (mainly pyrite) hosted by straight-banded dioritic to amphibolitic gneiss and minor concordant granitic material. The other (*013A*

Table 40. Copper and pyrite occurrence in tectonized leucogabbronorite, Lake Melville terrane

Mineral Occurrence	Reference	Sample	Cu ppm	Ni ppm	Co ppm	Cr ppm	Au ppb	Pt ppm	Pd ppm
003D/05/Cu 002	LAB/1205	535113	475	60	56	90	10	<5	4
013A/08/Pyr002	LAB/1205	535114	136	53	25	179	<1	<5	<1
013A/08/Pyr002	LAB/1205	535115	163	29	22	103	<1	<5	<1
013A/08/Pyr002	LAB/1205	535116	103	45	32	160	<1	<5	<1
013A/08/Pyr002	LAB/1205	535117	297	77	58	445	2	<5	2

/08/Pyr002) is based on exploration by Greenshield Resources (Jolliffe, 1997) and consists of pyritic zones within gabbro and amphibolitic gneiss containing 2–3% pyrite (± pyrrhotite?). Partial analytical data for samples analyzed is given in Table 40.

MEALY MOUNTAINS INTRUSIVE SUITE (ANORTHOSITE)

Ilmenite

In the Mealy Mountains AMCG suite, two areas have been investigated for their ilmenite potential. One is situated in the southwest part of the Mealy Mountains Intrusive Suite within the map region, and the other about 10 km south of Etagaulet Bay (Figure 20).

In the southwest area, there is a cluster of three occurrences (*013B/13/Ti 001*, *013B/13/Ti 002* and *013B/13/Ti 003*). The earliest investigations in the area were carried out by Nalco. A magnetic anomaly, consisting of two magnetic highs trending northeast and northwest and separated by a magnetic low, was described by Scharon (1952a). In follow-up work, MacDougall (1953) identifies 4 separate anomaly peaks, all of which were examined during geological traverse and ground magnetometer surveys. The rocks in the vicinity were reported to be medium-grained anorthosite. The most important mineralized zone was found in the southernmost portion of the anomaly area. In this area, a zone of massive to near-massive titaniferous magnetite and/or ilmenite over 1000 m long by 125 m wide was located; it was stated in the report that it could be much larger. Other outcrops of anorthosite containing 25–40% mineralization were also noted in the same general area by MacDougall (1953). Assays of samples were disappointing (Nalco, 1953).

The site was re-examined by Vulcan Minerals (Laracy *et al.*, 1997a, b; Laracy, 1998a). In a press release dated August 19th, 1996, Vulcan Minerals reported that field observations indicated a body at least 600-m wide (east–west) and open, thus greatly expanding the width from that originally reported. The deposit was sampled for a length of 850 m. From 20 grab samples of disseminated to semi-massive and gossanous magnetite/ilmenite, one whole-rock geochemical analysis indicated 26.76% Fe_2O_3t and 3.91% TiO_2, and assays on all twenty samples gave results ranging from 0.57–3.55% Ti. On August 29th, Vulcan Minerals announced that it had staked an additional 240 claims in the area. On September 5th, Vulcan Minerals announced further assay results for 19 samples ranging between 1.14 and 8.67% TiO_2 and 5.44 to 41.53% total Fe oxides. In a press release dated March 26th, 1997, Vulcan Minerals announced that it had acquired 480 line kilometres of airborne electromagnetic and magnetic data over its property and on November 17th, 1997 reported that several conductors had been identified, having copper–nickel–cobalt potential, in addition to the titanium–iron potential. The claims were later dropped.

Mapping at 1:100 000-scale in the area showed that the occurrences are situated in a narrow neck joining two parts of an anorthosite body and are very close to the contact between the anorthosite and its monzonite envelop. If further exploration for this type of occurrence is deemed worthwhile, this might be a useful criterion to keep in mind.

In the area south of Etagaulet Bay, two ilmenite occurrences, about 8 km apart, have been reported (*013G/11/Ti 001* and *013G/11/Ti 002*). Initial work was done by Frobisher (Evans, 1951) and involved an airborne magnetic survey and ground follow-up of specific anomalies. Ground investigation of the two localities, labelled anomalies 2 and 3 in the magnetic survey, resulted in the discovery of several small veinlets and patches of ilmenite in both cases. Locality *013G/11/Ti 001* is in an area mapped by Emslie (1976) as leuconorite, but, because of its east-northeast trend, the magnetic anomaly is more likely related to the Mealy dykes or brittle faults at the flank of the Lake Melville rift system, rather than to the leuconorite. In the case of the locality *013G/11/Ti 002*, the anomaly is parallel to the eastern margin of a body of leucotroctolite, so the two might well be linked.

Magnetite

Within anorthositic rocks, discovery of economic Ti deposits, in the form of ilmenite, is a far greater probability than ever finding economic Fe deposits in the form of magnetite, but as the two minerals generally co-exist and share a common magmatic genesis, magnetite occurrences require review.

MODS records indicate several Fe occurrences (magnetite, in fact) in the northwest part of the Mealy Mountains AMCG suite. The source of the information is investigations carried out for Nalco in the early 1950s by Scharon (1952a,

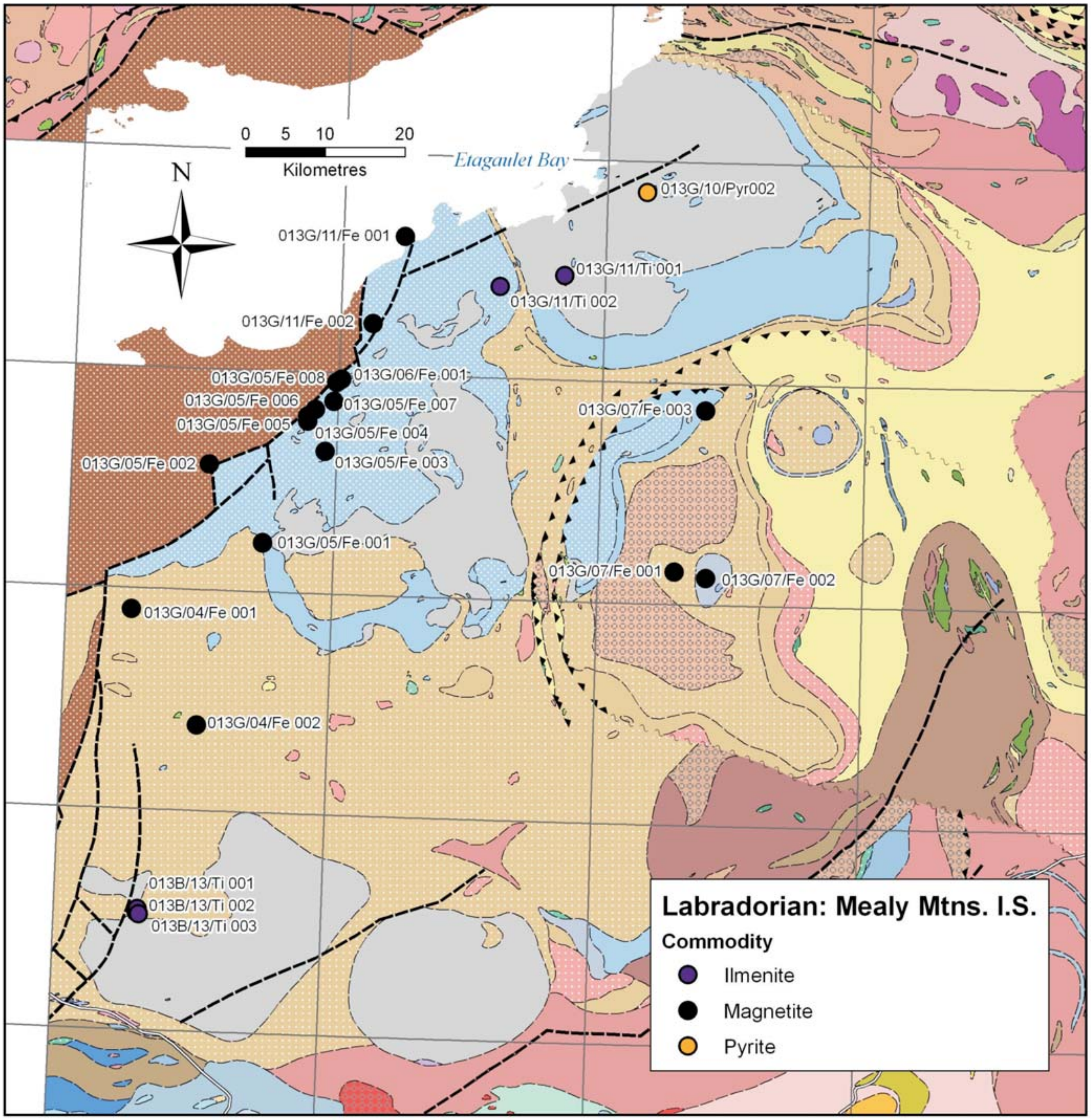


Figure 20. *Distribution of mineral occurrences in the Labradorian Mealy Mountains Intrusive suite.*

b) and MacDougall (1953, 1954). One large anomaly resulted in the discovery of an area of more significant mineralization and more extensive exploration. Many occurrences represent minor mineralization discovered during ground follow-up of magnetic anomalies. None of these occurrences is likely to be of any economic significance for Fe, but perhaps some heed should be paid to mention (admittedly rare) of other commodities as a signpost for future exploration.

More Significant Mineralization

Although three occurrences are identified in this category (*013G/05/Fe 007*, *013G/05/Fe 008* and *013G/06/Fe 001*) they can be grouped under a single description. There is much confusion regarding their location, mainly due to poor geographic referencing in the original material. Most of the magnetic anomaly is in NTS map area 13G/11, but the southwest end of it extends into 13G/05 and 13G/06, where the mineralization was investigated. Scharon (1952b) described the magnetic anomaly as approximately 13 km long and 3 km wide, trending northeast, and negative, having a maximum of 2500 and a minimum of 2000 gammas. The anomaly was interpreted as either a dyke-like body, or an edge-effect produced by anorthosite adjacent to the Lake Melville lowlands. The mineralization, within anorthosite, comprises 8 bodies of massive to near-massive titaniferous magnetite. Small patches of massive magnetite occur on the higher hills in the area. Some patches are highly irregular and appear to be segregations within the anorthosite, while others have the appearance of intrusive veins or dykes.

Detailed (1:12 000-scale) ground magnetometer (MacDougall, 1954) and geological mapping (Anderson, 1954) were conducted in the area. Anderson's map shows the specific mineralized locations and well as outcrops of anorthosite and mafic dykes. The sites mentioned by the two authors are cross-referenced in Table 41.

Table 41. Cross-referencing between prospect names used by MacDougall (1954) and Anderson (1954), Mealy Mountains terrane

ID	Easting	Northing	MacDougall (1954)	Anderson (1954)
013G/05/Fe 007	333500	5927000	M-13, M-14, M22b	Prospects 1, 1A, 2
013G/05/Fe 008	333900	5929400	M-15, M16	Not on map
013G/06/Fe 001	331200	5926000	M-24	Prospect 5

MacDougall (1954) estimated that the area mapped collectively contains approximately 300 000 tons of titaniferous magnetite with traces of chalcopyrite and pyrrhotite. Further details of this occurrence, including whole-rock geochemical data, are given by Scharon (1952a, b), MacDougall (1953) and Turta (1956).

Minor Mineralization

This category includes occurrences *013G/05/Fe 001*, *013G/05/Fe 002*, *013G/05/Fe 003*, *013G/05/Fe 004*, *013G/05/Fe 005*, *013G/05/Fe 006*, *013G/11/Fe 001* and *013G/11/Fe 002*. At *013G/05/Fe 001* the magnetic anomaly corresponds with the border between 'normal' anorthosite and 'fine-grained, brown, transitional' anorthosite. A dioritic rock was found at the contact in places and reported to contain 30–50% disseminated magnetite. During 1:100 000-scale mapping, Nunn and van Nostrand (1996a, b) also identified a boundary in this area, mapping anorthosite–leucotroctolite to the east and pyroxene monzonite to the west. Occurrence *013G/05/Fe 002* corresponds with coarse-grained anorthosite on the ground according to Scharon (1952b), who noted mineralization to be disseminated magnetite and some titaniferous magnetite. MacDougall (1953), however, claimed magnetite concentrations up to 15% to be present, including a small band of massive magnetite 4–6' wide that was traced for 20'. The author has visited this site, not specifically to search for the reported mineralization, but to verify the existence of a trapezoidal, fault-bounded block of bedrock 10 km long immediately to the east. This block is evident from aerial photographs, but was not shown on any existing geological map for the area. The bedrock block does exist and is now shown on the 1:100 000-scale map for the area (Gower, 2010). The outcrop to which Scharon refers must lie within it, as only wetland is present at the specified coordinates (which are too far to the west). At *013G/05/Fe 003* the bedrock comprises coarse-grained anorthosite intruded by fine-grained mafic dykes. Disseminated magnetite, up to 10%, occurs throughout the anorthosite (MacDougall, 1953, 1954). The location is imprecise, being originally referenced as 'at the headwaters of Big River approximately 12 miles from Lake Melville'. The next two occurrences (*013G/05/Fe 004* and *013G/05/Fe 005*) are about 700 m apart where Big River enters the Lake Melville lowlands and are very similar. The bedrock is anorthosite and the mineralization described as titaniferous magnetite, occurring as a vein 2 by 35' at the first, and in patches a few feet across in an area roughly '50 by 100 feet' at the second. Another occurrence, *013G/05/Fe 006*, is given an identical description to the previous locality by Douglas and Hsu (1976). However, only one '50 by 100 feet' description could be found in the original report, possibly implying accidental duplication of an occurrence in MODS. The last two occurrences in this category (*013G/11/Fe 001* and *013G/11/Fe 002*) are farther to the northeast. The first is at Eskimo Paps, at which site anorthosite is intruded by mafic dykes. Magnetite crystals, up to roughly 1.5 inches across, were seen disseminated throughout the rock. The second is 12 km to the southwest. The source of the information for the latter site appears to be a map by MacDougall (1953), who noted in one place 'patches of 10–15% magnetite' and, about 2500' to the southeast, 'small patches of 5–10% magnetite'.

Pyrite

Only one site has been designated a sulphide occurrence within anorthosite of the Mealy Mountains AMCG suite (*013G/10/Pyr002*). The only information of it is provided by Emslie (1976) who wrote that "several gossan areas, some nearly 100 m across, contain small amounts of disseminated pyrrhotite and chalcopyrite. The largest gossan observed is on a ridge about 7.5 km due east of the mouth of the Etagaulet River". The co-ordinates for the specific locality were provided to the author by Emslie (personal communication, 1998). This site has not been visited by the author, but other gossanous areas within the Mealy Mountains Intrusive Suite that he has seen have proved to be underlain by metasedimentary gneiss.

MEALY MOUNTAINS INTRUSIVE SUITE (MONZOGABBRO/MONZONITE)

Magnetite

Magnetite is the only mineral commodity having association with monzonitic rocks in AMCG suites in the region. The occurrences are trivial and it is very unlikely that they will ever be of any economic significance. Two of the five sites included here are located in the southwest part of the Mealy Mountains Intrusive Suite and result from industry investigations. The other three are in the southeast Mealy Mountains and were found during 1:100 000-scale mapping in that area.

The two sites based on industry evaluation (*013G/04/Fe 001* and *013G/04/Fe 002*) were initially located by airborne magnetic survey carried out by Nalco (Scharon, 1952a, b) (MacDougall, 1953, 1954). The rock type at the first site was termed anorthosite with enclaves of gneiss and syenite, and contains 10–30% magnetite. At the second site, the area was reported as underlain by syenite or granite, with granite and granite gneiss noted in one place, and to contain up to 25% magnetite. Both areas were mapped as underlain by monzonite during 1:100 000-scale mapping, hence their inclusion in this section.

Information on the occurrences in the southeast identified during 1:100 000-scale mapping is scanty. At two of the localities (*013G/07/Fe 001* and *013G/07/Fe 003*) the host rock is creamy-buff, coarse-grained monzonite and the magnetite occurs as small pods and clusters. At the third locality (*013G/07/Fe 002*) the rock is buff-brown, coarse-grained monzogabbro and the magnetite occurs in clusters.

GRANITOID UNITS

Granitoid rocks addressed in this section are interpreted to be Labradorian. They can be divided into two main groups, namely: i) calc-alkaline intrusions emplaced between 1680 and 1655 Ma and ii) a later alkali-calcic group emplaced between 1654 and 1646 Ma. The latter group is temporally linked to the emplacement of the Trans-Labrador batholith. Mineral occurrences are located on Figure 21.

Pyrite (± Cu)

Groswater Bay Terrane

Three mineral occurrences associated with granitoid rocks have been identified in the Groswater Bay terrane. All were noted during 1:100 000-scale mapping. One (*013J/04/Pyr002*), 30 km northwest of the western end of Double Mer, consists of traces of malachite in biotitic schlieren hosted by medium-grained, muscovite-bearing granite. The granite is spatially associated with pelitic metasedimentary gneiss, which may be the earlier source of the mineralization (Gower, 1986). Farther east, 24 km north of Rigolet, traces of malachite and abundant opaque minerals were noted on shear planes transecting coarse-grained K-feldspar megacrystic biotite granodiorite (*013J/08/Cu 001*). The Cu mineralization was not specifically sampled but metal values for the host rock are shown in Table 42. On the coast, 41 km east of Rigolet, pyritic horizons were recorded within well-banded and intensely folded tonalitic and granitic gneiss (*013I/04/Pyr002*).

Hawke River Terrane

Six mineral occurrences in granitoid rocks have been recorded in the Hawke River terrane. All were noted during 1:100 000-scale mapping and all are very minor. Three of the occurrences are hosted by hornblende–biotite diorite to quartz diorite, at two of which minor pyrite is present (*003E/05/Pyr002* and *013H/07/Pyr001*), and at the other malachite (*013H/01/Cu 001*). From field notes, there is some doubt that the mineral is even sulphide at *013H/07/Pyr001* as it is described as having a tarnished blue/purple colour, which might be magnetite. Two of the occurrences are hosted by biotite granodiorite – one manifest as fine-grained pyrite (*003E/05/Pyr001*), and the other as traces of chalcopyrite on a foliation plane in a mixed biotite granodiorite to granite gneiss (*003E/05/Cu 001*). One occurrence, which consists of minor malachite staining, has been reported from K-feldspar megacrystic granitoid rocks intruding the Paradise metasedimentary gneiss belt (*013H/01/Cu 002*).

Table 42. Copper occurrence in Labradorian K-feldspar megacrystic granodiorite host rock, Groswater Bay terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013J/08/Cu 001	CG79-670	50	43	17	5	-	39	6	-	-

Note: -, not analyzed

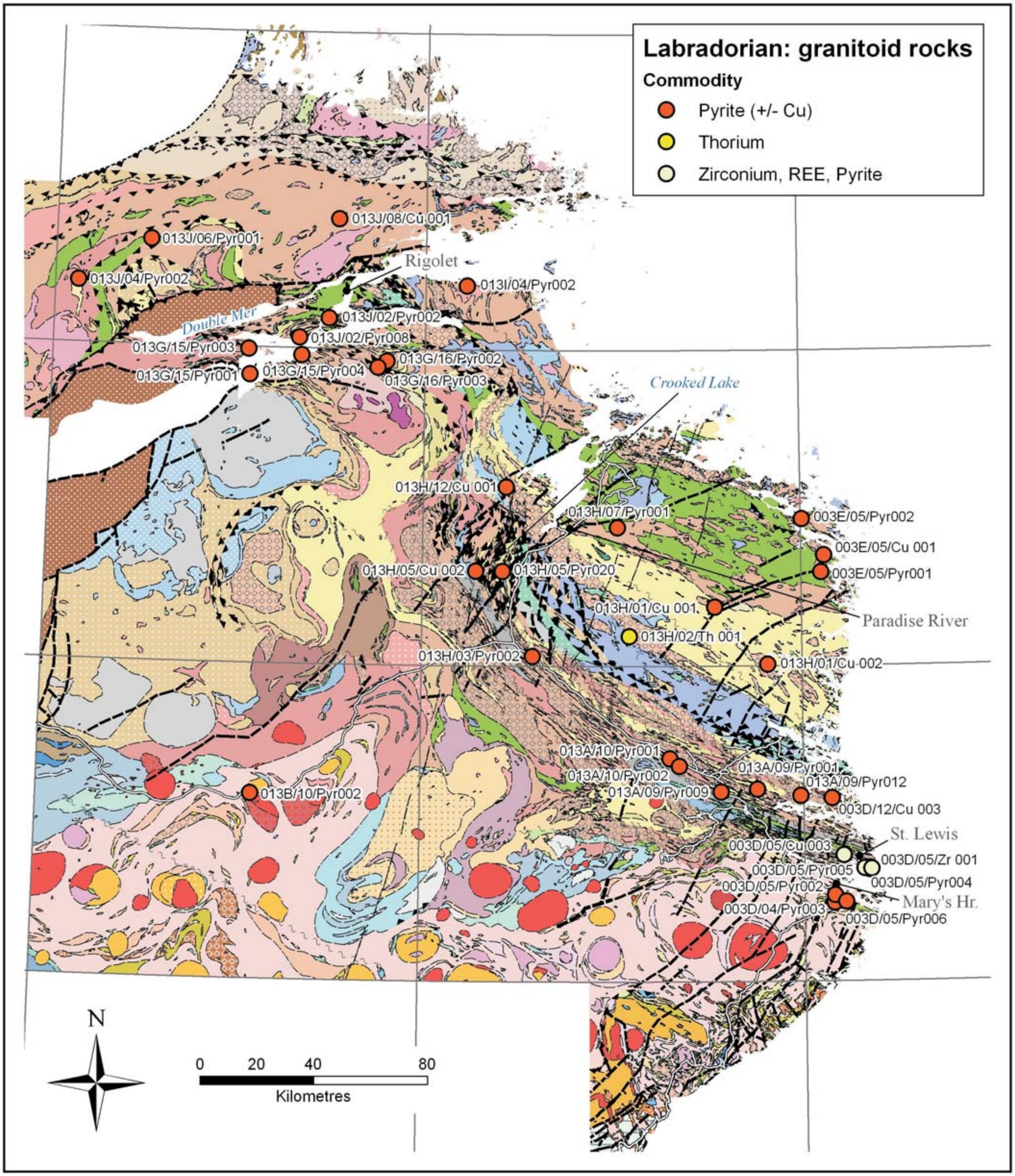


Figure 21. *Distribution of mineral occurrences in Labradorian granitoid intrusive rocks.*

Lake Melville Terrane

Apart from three, all mineral occurrences in granitoid rocks in the Lake Melville terrane were found during 1:100 000-scale mapping, and all are trivial. They are hosted by a wide range of rock types. Analytical results from three of the occurrences are given in Table 43.

One occurrence, in monzodiorite (*013A/09/Pyr009*), is based on a field description that the rock is very rusty-weathering and biotite rich. It could be contaminated by pelitic metasedimentary gneiss, lenses of which were mapped along strike both to the west-northwest and east-southeast.

Eight occurrences are hosted by tonalite to granodiorite gneiss, in places associated with amphibolite and/or microgranite. Claim of mineralization at these localities is also based on field description of the rock either being rusty-weathering (*013A/10/Pyr001* and *013A/10/Pyr002*), or that a small gossan is present (*013G/15/Pyr004*, *013J/02/Pyr002* and *013J/02/Pyr008*), or that minor sulphide was seen (*013G/15/Pyr001*, *013G/15/Pyr003* and *013J/06/Pyr001*).

Four occurrences in K-feldspar megacrystic granitoid rocks were recorded as minor gossans (*013G/16/Pyr002* and *013G/16/Pyr003*), malachite staining (*003D/12/Cu 003*), or, in the case of *013A/09/Pyr001*, not recorded at all (the latter occurrence is based on Eade's (1962) map, but does not correspond with one of his data stations, and the source of his information remains unknown). The host rock assumed here is based on regional correlation – the locality was not visited during 1:100 000-scale mapping. The nearest, along-strike data station is 3 km away.

Four occurrences are hosted by granite, one of which (*013H/05/Cu 002*) was reported during exploration by Brinex (Kranck, 1966). A sample from this locality yielded 0.02% Cu. The other three were noted during 1:100 000-scale mapping (*013A/09/Pyr012*, *013H/03/Pyr002* and *013H/05/Pyr020*). The occurrences are designated on the basis of field observation that the outcrops are either rusty weathering, or that pyrite was seen.

One other mineral occurrence in the Lake Melville terrane (*013H/12/Cu 001*) is included here, simply because its given location is within rocks mapped as granitoid gneiss. It is given in MODS, having its basis in the compilation of Douglas and Hsu (1976). Eade (1962) is cited as the source for the location, but it is not shown on his map.

Pinware Terrane

Mineral occurrences in granitoid rocks in the Pinware terrane are mostly associated with rocks mapped as dioritic gneiss. Normally, one would accept dioritic rocks as having a calc-alkaline magmatic source, but that is not necessarily the case for these rocks, some of which could have been derived from some other protolith, such as leucogabbronorite or even a calcareous psammitic rock – which is something to keep in mind when evaluating the significance of the mineral occurrences reviewed following.

Three of the localities are south, and within 7 km, of Mary's Harbour. Occurrence *003D/05/Pyr002* was recorded during 1:100 000-scale mapping as disseminated pyrite in granodiorite grading into quartz diorite, which is interlayered with amphibolite to diorite. The locality was investigated by Rockhopper Corporation (Andrews, 1995d) and chalcopyrite, pyrite and pyrrhotite were claimed to be present. At occurrence *003D/04/Pyr003*, 2.6 km farther south, pyrite was recorded during 1:100 000-scale mapping in quartz diorite. Rockhopper Corporation (Andrews, 1995c) claimed the presence of abundant polymetallic sulphide mineralization associated with a biotite-rich granodiorite orthogneiss. At occurrence *003D/05/Pyr006*, fine-grained disseminated sulphides were reported in felsic country rock by Rockhopper Corporation (Andrews, 1995e). Samples analyzed from these occurrences show mildly anomalous Cu values (Table 44). The reader is cautioned that sample labels and locations are poorly documented in the original reports and care should be exercised in using the data.

Table 43. Pyrite occurrences in Labradorian granitoid rocks, Lake Melville terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013G/15/Pyr001	NN80-215	48	122	3	19	-	123	3	-	-
013J /06/Pyr001	CG83-025A	18	74	7	8	-	26	17	-	-
013A/09/Pyr012	SN86-225	25	25	21	3	4	3	n.d.	0.1	1

Note: n.d., not detected; -, not analyzed

Table 44. Pyrite occurrences in granitoid rocks, Pinware terrane

Mineral Occurrence	Reference	Sample	Cu ppm	Zn ppm	Pb ppm	Co ppm	Ni ppm	Ag ppm
003D/05/Pyr002	003D/05/0013	RH-102	132	158	5	27	29	0.5
003D/05/Pyr002	003D/05/0013	RH-104	133	97	5	20	10	0.5
003D/04/Pyr003	003D/05/0012	RH-102-2	545	86	8	36	102	0.7
003D/05/Pyr006	003D/05/0014	RH-301	273	16	7	5	5	0.5
003D/05/Pyr006	003D/05/0014	RHSB 1010R	118	50	55	11	5	0.5
003D/05/Pyr006	003D/05/0014	RHSB 306R	261	34	9	11	11	0.5

The other occurrence in this group (*013B/10/Pyr002*) is from a road cut in the interior part of eastern Labrador, 35 km east-southeast of Crooks Lake. The mineralization consists of a 1-cm-wide Cu–Fe sulphide vein within a mid-grey, fairly homogeneous rock that might have a dioritic, psammitic or mafic intrusive protolith.

Thorium

There is only one designated Th mineral occurrence in eastern Labrador (*013H/02/Th 001*). It is based on prospecting by Brinex in the 1960s, during which material containing up to 0.5% of a radioactive mineral was found. Monazite was recognized and inferred to be the source of the Th (Bradley, 1966). He describes the rock as augen gneiss. The exact location is imprecise; Kranck (1966) gives it as "the high hill north of the headwaters of Mountain Brook". The rock, most likely, belongs to the Paradise Arm pluton, which (at a different location from the Th mineral occurrence) has a zircon age of 1639 ± 2 Ma. Monazite was also separated and dated, yielding ages of 1631 ± 2 Ma and 1621 ± 1 Ma (Kamo *et al.*, 1996).

Zirconium, REE, Pyrite

During investigation of a Pb–Cd–W–Cu lake-sediment geochemical anomaly 2 km east-southeast of St. Lewis (Meyer and Dean, 1988), a pale, orange-brown to purplish-brown fine- to medium-grained mylonite was noted to have anomalous radioactivity of 800–1000 counts/second. The rock consists of quartz, plagioclase, potassium feldspar, amphibole and 2–4% magnetite. A geochemical assay returned a value of 3.4% Zr with anomalously high values for Ce, Hf, La, Rb, Th, Sn, Yb, and U (results not given in report). The locality has been designated a zirconium occurrence in MODS (*003D/05/Zr 001*). The area was subsequently investigated by Vulcan Minerals (Hodge, 1996e), but a ground search failed to locate it. A rock collected during regional mapping (JS87-448) from within 100 m of the locality of Meyer and Dean and examined petrographically is anomalously alkalic compared to other rocks in the area. Two other similar rocks were found along strike to the northwest (JS87-511, within the community of St. Lewis, and VN87-461, 6 km west-northwest of St. Lewis). It seems likely that a genetic link exists between these rocks and the Zr mineralization (Figure 22).

Two other mineral occurrences (*003D/05/Pyr004* and *003D/05/Pyr005*; Figure 21) are found within 2.5 km of the zirconium locality and are mentioned here because it seems likely that they could be related to it. Both are pyrite- and muscovite-bearing 10–20-cm-thick gossanous layers intercalated with zones of mylonitic amphibolite, quartz diorite, granodiorite and granite.

A potentially correlative zirconium occurrence (*003D/05/Cu 003*) is located at a road cut about 8–9 km west of St. Lewis. The rocks at the locality comprise well-banded gneisses, forming a mixture of amphibolite, granite, granodiorite and, possibly, psammitic gneiss. A zone of amazonite-rich leucosome is present in granodiorite/psammitic gneiss marginal to amphibolite. Sulphides are present in a narrow band 20 cm thick; fluorite occurs on joint surface at the east end of the outcrop; epidote and chalcopyrite were seen on other side of the road. An unusual rock (CG03-288C), sampled on the north side of the road, is seen in thin section to consist of quartz, amphibole, titanite, allanite, hundreds of tiny zircons, and oxide and sulphide opaque minerals,. The protolith of this rock is uncertain. Some of the most anomalous elements are given in Table 45.

On April 14th, 2010, Search Minerals issued a press release (http://searchminerals.ca/newsreleases/NR4-14-10.pdf; 2010) reporting that it has outlined at least 80 REE targets, on the basis of an airborne radiometric and magnetic survey and preliminary prospecting and sampling, in a 4–10-km-wide belt, extending from St. Lewis for roughly 120 km northwest. The preliminary prospecting indicates that the region is highly prospective for Zr, Tm, Nb and U, in addition to REE. Three types of mineralization are suggested to exist, namely:

i. Type 1 heavy-REE-enriched, Nb–Y–U pegmatite,
ii. Type 2 REE–Zr–Y–Nb–U pegmatitic granite/pegmatite, and
iii. Light REE-enriched Zr–Nb–Y mineralization. Preliminary REE and Y values were reported by Search Minerals in their press release.

Search Minerals delivered further information in a press release dated July 27th, 2010, in which they reported the discovery of heavy REE mineralization at two sites in the Port Hope Simpson district. These are termed the 'Island prospect' and the 'Fox Harbour zone'. The Island prospect mineralization occurs in pegmatite-aplite dykes and is addressed in the section 'Grenville Province–Grenvillian; Pegmatite; Other Minerals.

The Fox Harbour zone is reported by Search Minerals to be an elongate belt 20 by 3 km and to include four linear units, from 1 to 100 m wide, of fine-grained granitic gneiss that is

Table 45. Copper, zirconium and rare-earth-element occurrence, west of St. Lewis, Lake Melville terrane

Mineral Occurrence	Sample	Cu ppm	La ppm	Ce ppm	Dy ppm	Nb ppm	Y ppm	Zr ppm
003D/05/Cu 003	CG03-288C	1270	1366	2170	213	555	1109	16089

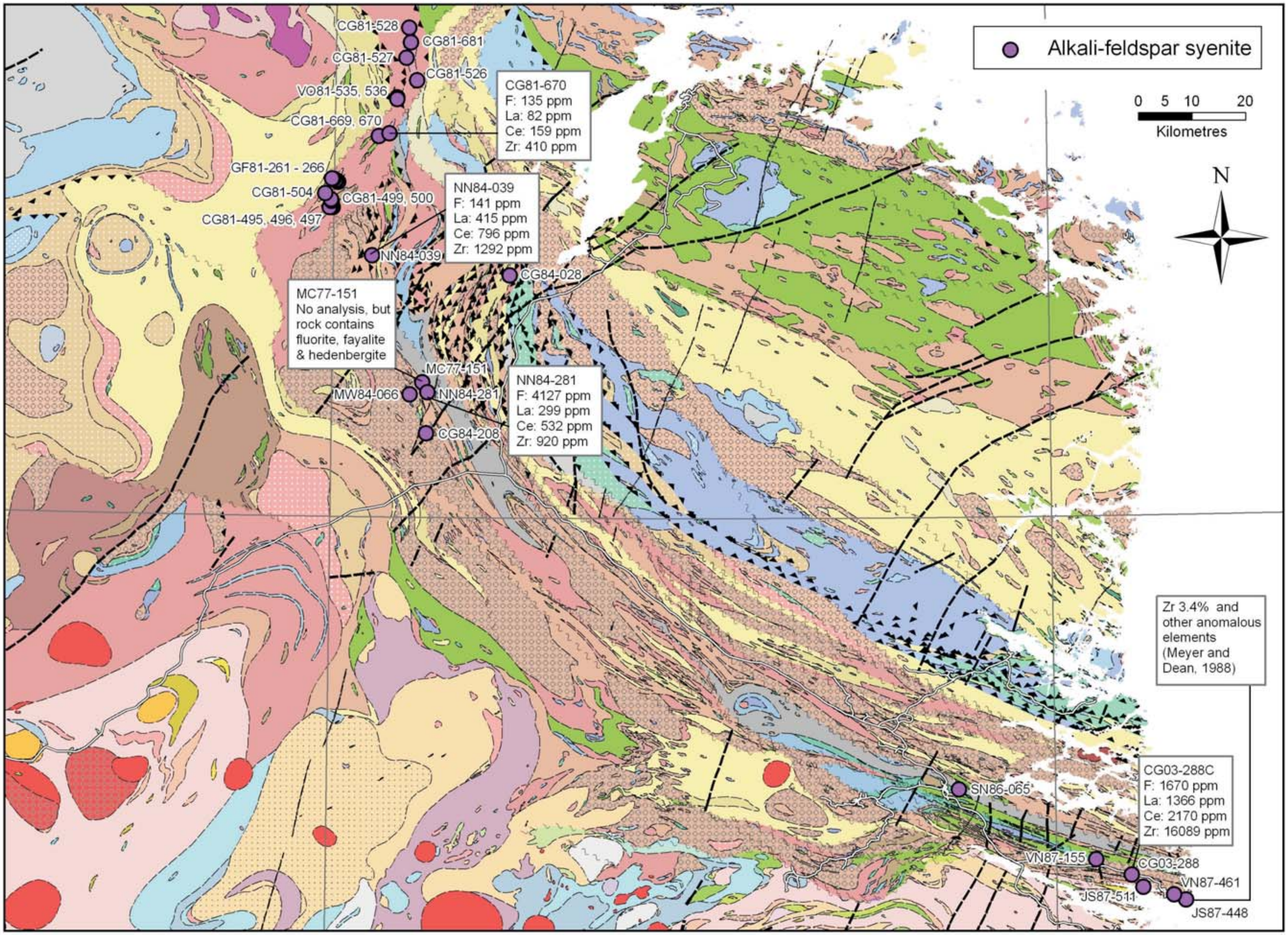


Figure 22. *Distribution of alkali-feldspar syenitic rocks that may correlate with zirconium and rare-earth-element enrichment.*

tentatively interpreted to have a peralkaline volcanic protolith. A summary of REE and Y values reported by Search Minerals is given in Table 46. The sample mentioned earlier in this section (CG03-288C) is close to, or within, the area designated as the Fox Harbour zone by Search Minerals.

Table 46. Rare-earth-element and Y values reported by Search Minerals from the Fox Harbour zone (ppm)

Sample	Total REE +Y	Total LREE	Total HREE
FH-009 (lithogeochemical)	4778	2756	772
FH-020 (lithogeochemical)	7585	6232	561
FH-023 (lithogeochemical)	9701	7623	837

Similar potential is anticipated to exist farther north, outside of areas currently staked (Figure 22). Following the regional structural trend to the northwest, other syenitic rocks were mapped and are potentially correlative. Two chemically anomalous syenitic rocks (MC77-151A and NN84-281) were identified in an area about 40 km southwest of the community of Paradise River (outside proposed national or provincial parks). The two localities are 2 km apart and interpreted to belong to a body aligned with the regional strike. Both are fluorite-bearing and one also contains hedenbergite and fayalite. A whole-rock analysis of sample NN84-281 showed anomalous values for F (4127 ppm), La (299 ppm), Ce (532 ppm) and Zr (920 ppm). This area displays anomalous lake-sediment heavy REE values (McConnell and Ricketts, 2010). Farther north, along strike a whole-rock analysis of another similar rock (NN84-039) is also enriched in La, Ce and Zr. Even farther to the north another series of alkalic rocks have been mapped, but, on the basis of much lower values for F, Ce, La and Zr, might belong to an unrelated suite. An obvious prospecting guide is that all the occurrences are situated on the southwest or west side of the Alexis River anorthosite.

PITTS HARBOUR GROUP

The Pitts Harbour Group is the name given by Gower *et al.* (1988b) to a package of supracrustal rocks found in the Pinware terrane, mostly between Red Bay and Henley Harbour. As Gower (2007) noted, despite the confidence implied by naming the rocks, considerable uncertainty existed at the time of naming as to which rocks should be included in the group. Perhaps is should be clarified that this uncertainty has by no means vanished, despite more information having been acquired. The supracrustal rocks mostly comprise quartzofeldspathic rocks thought to have a felsic volcanic/volcanoclastic and/or quartzofeldspathic clastic metasedimentary protolith. Other rock types include quartzite, quartz-rich meta-arkose, pelitic rocks, calc-silicate rocks and banded amphibolite (interpreted to have been derived from a mafic volcanic protolith). The high proportion of rocks potentially having a felsic volcanoclastic origin and the concomitant dearth of pelitic gneiss, are two criteria that distinguish these rocks from the metasedimentary gneisses addressed earlier. In addition, two U–Pb zircon ages of 1640 ± 7 Ma and 1637 ± 8 Ma, obtained from rocks interpreted to have been derived from a felsic volcanoclastic protolith (Tucker and Gower, 1994; Wasteneys *et al.*, 1997), provide strong evidence that these rocks are much younger than the 1810–1770 Ma best-age estimate for metasedimentary gneiss. The Pitts Harbour Group in the Henley Harbour district is at a lower metamorphic facies than the regional ambient grade, which Gower (2007) explained to be due to preservation in a down-faulted basin formed during the early stages of Iapetus-Ocean-related rifting.

The Pitts Harbour Group merits (and has received) special attention from explorationists because of its spatial association with Cu–U–Mo–Ag–Au–As lake-sediment anomalies (Gower *et al.*, 1995b). Mineral occurrences in the Pitts Harbour Group are subdivided into Cu, pyrite, Mo, U, and F (Figure 23).

Copper

Four localities are designated as Cu mineral occurrences (*003D/04/Cu 001*, *012P/16/Cu 001*, *012P/16/Cu 002* and *012P/16/Cu 003*). At the first two, found during 1:100 000-scale mapping, malachite staining was seen in coarse-grained, very well-banded quartzofeldspathic rock of probable supracrustal origin. At the remaining two sites, seen during examination of rock cuts created as a result of road construction, chalcopyrite is present in sillimanite- and muscovite-bearing pelitic gneiss at the third (Plate 10); and chalcopyrite was recorded in quartzofeldspathic rock at the fourth. Amphibolite and pegmatite are present at the second and fourth localities and may have played a role in generating the mineralization.

Pyrite

Most of the pyrite occurrences (*002M/13/Pyr002*, *003D/ 04/Pyr002*, *012P/10/Pyr001*, *012P/11/Pyr001*, *012P/16/ Pyr001*, *012P/16/Pyr002*, *012P/16/Pyr005*, *012P/16/Pyr006*, *012P/16/Pyr007*, *012P/16/Pyr008* and *012P/16/Pyr009*) are hosted by muscovite-rich schist, which also contains sillimanite or garnet in places. These may be intercalated with quartzite, psammitic schist, calc-silicate rocks, or banded amphibolite. At two of the occurrences, the host rock is quartzite interlayered with amphibolite

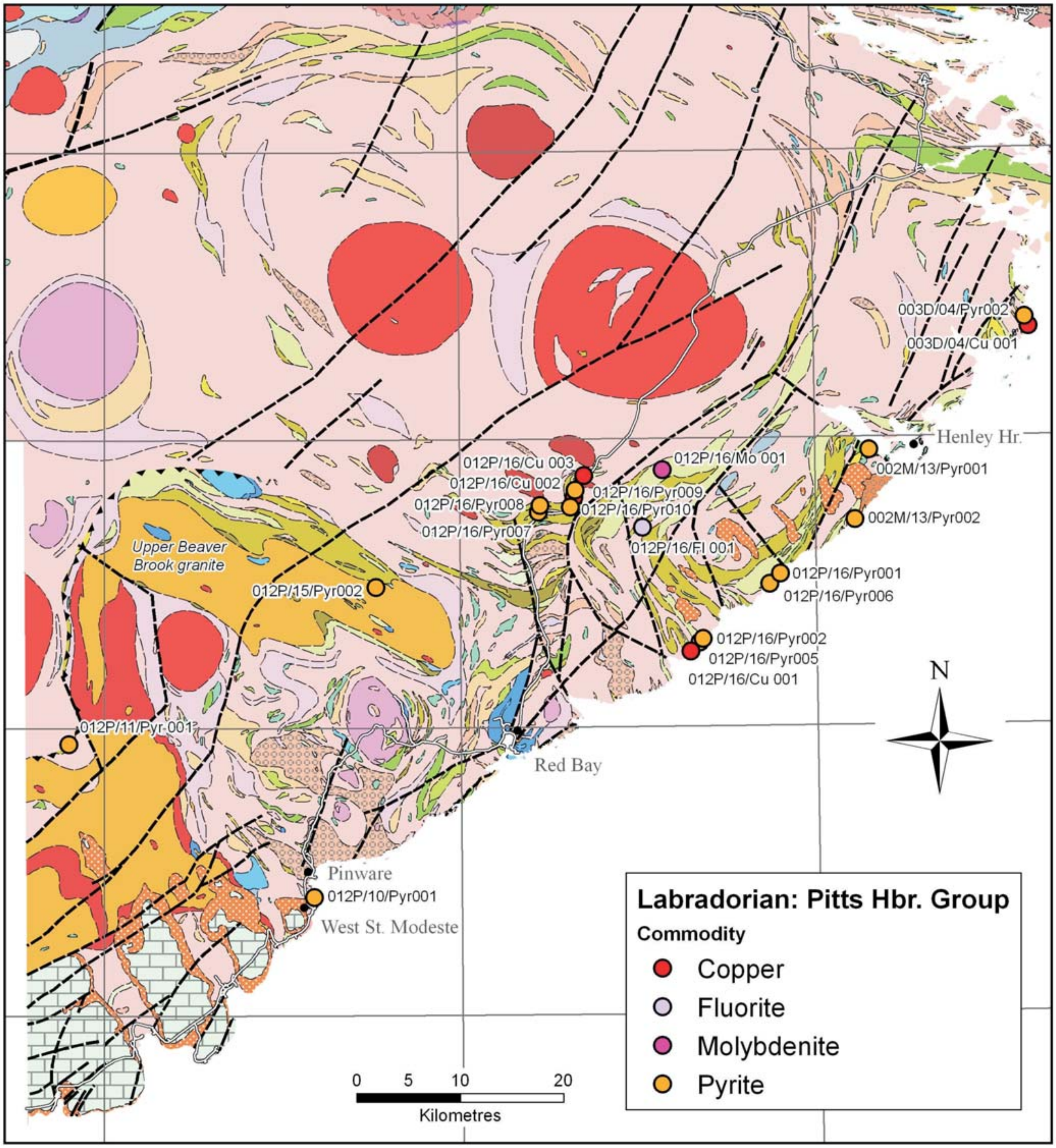


Figure 23. *Distribution of mineral occurrences in the Labradorian Pitts Harbour (supracrustal) Group.*

(*002M/13/Pyr001* and *012P/ 16/Pyr010*). Typically, granite, mafic dykes and pegmatite may be present, and, in the case of *012P/16/Pyr005*, the supracrustal rocks are preserved as enclaves in granitoid rocks. Pyritic zones are generally less than 1 m wide, although a 10- to 20-m-wide zone was recorded at *012P/16/Pyr001*. Arsenopyrite was tentatively identified at *002M/13/Pyr002*. Note that occurrence *012P/11/Pyr001*, being 26 km northwest of the community of Pinware, is widely separated from the other occurrences, but linkage between them is provided by the train of supracrustal remnants that arches around the northwest side of the Upper Beaver Brook granite.

Plate 10. *Chalcopyrite in leucosome of a quartzofeldspathic gneiss derived from a pelitic-psammitic protolith, Pitts Harbour Group. Outside Big Pond area, west of Henley Harbour (mineral occurrence 012P/16/Cu 002).*

All, except one, of the occurrences were found during 1:100 000-scale mapping. The exception is *012P/10/Pyr001*, at West St. Modeste. This was first described by Penstone and Schwellnus (1953), who recorded finely disseminated pyrite throughout highly sheared gneisses. The 2–4'-wide shear zones, which could be traced for 0.5 mile, contain lenticular quartz veins that are also slightly mineralized. In conjunction with the pyrite, minor amounts of arsenopyrite, chalcopyrite and molybdenite were seen in hand specimens. A gossan in gneiss from 'Pinware Bay' was reported as containing 0.23% Cu (Beavan, 1954, p. 43). No details are given of the occurrence, or its exact location, but, as no obvious alternatives are known, it may well be the same site. During 1:100 000-scale mapping, rusty-weathering pelitic schists containing sillimanite and associated with ferruginous quartzite, quartzite, and supracrustal amphibolite were recorded at the locality, and some of the fine-grained felsic rocks were considered to have been possibly derived from a felsic volcanic protolith.

One other occurrence (*012P/15/Pyr002*) is mentioned here, although it is very uncertain that the host rock is derived from a metasedimentary protolith. The outcrop was described during 1:100 000-scale mapping as 'rusty-weathering, very fine-grained orthopyroxene–pyrite anorthositic-looking rock associated with migmatitic amphibole-rich diorite/calc-silicate gneiss'. The rock occurs as an enclave within the Upper Beaver Brook granite, which has an age of 983 ± 3 Ma (Wasteneys *et al.*, 1997). Although the enclave description does not seem to promise a supracrustal protolith, it might be, given i) the granite is intrusive into supracrustal rocks less than 1 km to the north, and ii) many xenoliths, derived from a supracrustal protolith, were mapped within the granite at nearby data stations.

Molybdenum

Traces of molybdenite, with pyrite, were found during 1:100 000-scale mapping and designated as mineral occurrence *012P/16/Mo 001*. The host rock type is quartzite, associated with finely banded quartzofeldspathic rock and foliated diorite to amphibolite.

Fluorite

Fluorite has been reported as occurring in excess of 1% in calc-silicate rocks by Bostock (1983; field notes for locality BK71-527). This occurrence (*012P/16/Fl 001*) was searched for, but not seen during 1:100 000-scale investigations, but supracrustal rocks were mapped in the vicinity.

Uranium

Despite the spatial correlation of lake-sediment geochemical anomalies with the Pitts Harbour Group, the relationship between uranium mineralization and supracrustal rocks remains uncertain. Two U occurrences are known; one is hosted by pegmatite (*012P/16/U 001*) and the other has been described as boulders of orthogneiss/paragneiss showing uranophane staining (*012P/16/U 002*). Details of the occurrences are given in the section 'Uranium in Pegmatite and Diatexite'.

LABRADORIAN METALLOGENY AND POTENTIAL

Mineralization of known or presumed Labradorian age can be classified into three groups, all of magmatic origin, namely:

i. Ni, Cu, Cr, V and PGE in mafic and ultramafic rocks;
ii. Fe–Ti oxide in anorthositic rocks; and
iii. Cu, Au, U, REE, F, Th, Zr occurrences in felsic rocks.

These groups hark back to the trimodal magmatic classification (mafic, anorthositic and monzo-granitic) of Gower and Krogh (2003), which was applied specifically to post-collisional, mid- to late-Labradorian magmatic products.

Ni, Cu, Cr, V and PGE in Mafic and Ultramafic Rocks

In eastern Labrador, the Ni, Cr, V and PGE-bearing occurrences are associated with mafic intrusions in which some layering is generally evident, suggesting that gravity-related cumulate processes are important in their development. Metallogenic assemblages are poorly known and the reader could justifiably question whether they should all be lumped together. Their petrotectonic setting is inadequately known but they do have some features in common with mafic-ultramafic intrusive complexes formed during subduction-related tectonism (*cf.* Alaskan-type intrusive complexes). In such rocks, cumulates may have developed at deep levels and have been subsequently diapirically emplaced into upper crustal levels, or they may simply have formed in upper-crustal magma chambers in the first place. Rock types formed include dunite, wehrlite, clinopyroxenite, chromitite, magnetite, and lesser feldspar-bearing rock types such as gabbro/diorite, monzodiorite and syenite. The most prospective regions in eastern Labrador would seem to be in the Groswater Bay and northern Hawke River terranes.

Gauthier and Chartrand (2005) maintain that Cr and PGE-rich Ni–Cu occurrences are rare in the Grenville Province, but this can be challenged. In addition to the occurrences reported above, Cr and/or PGE-rich occurrences have been reported in mafic/ultramafic rocks by Thomas *et al.* (1994) and James *et al.* (2002) in central Labrador and from the Ossok Mountain Intrusive Suite in western Labrador (all rocks of known, or inferred, Labradorian age). Anomalous PGE values in the Ossok Mountain Intrusive Suite have mostly been obtained from pyroxenites, and there is also an association with elevated Cu levels (Kerr, 2007). Large bodies of pyroxenite have not been mapped in Labradorian mafic–ultramafic rocks, but, as pyroxenites have not been the target of specific search, small occurrences, at least, may be more abundant than currently appraised.

It has commonly been argued that, whereas the mafic magmas provide the source for the metals, sulphur was scavenged from the country rocks. Examples include the Tasiuyak pelitic gneiss in the case of the Ni–Cu–Co Voisey's Bay deposit (1340 Ma) in northern Labrador (*e.g.*, Ryan *et al.*, 1995), and the surrounding metasedimentary gneiss in the case of the Ni–Cu–Co–PGE Lac Volant prospect (1351 Ma) in the Grenville Province in eastern Quebec (Nabil *et al.*, 2004). In eastern Labrador, extensive areas of sulphur-rich metasedimentary gneiss existed prior to the emplacement of Labradorian mafic magmas and these, comparably, could have provided a sulphur source for mineralization. It should be mentioned that, although large portions of Labradorian mafic intrusive bodies in eastern Labrador were staked following the discovery of the Voisey's Bay deposit, very little of this ground was thoroughly explored at that time.

Fe–Ti in Anorthositic Rocks

Fe–Ti mineral occurrences in anorthositic and associated rocks are the product of residual liquids generated by the progressive fractionation and crystallization of plagioclase from anorthosite–norite magmas. The resultant rocks are typically late-stage intrusions, which have lensoid, tabular, sill- or dyke-like form, and whose emplacement might be structurally controlled. Crystal settling processes have resulted in enrichment in ilmenite, titaniferous magnetite and apatite. These may be present as disseminated or massive ore. Fe-sulphides, such as pyrrhotite, pentlandite and chalcopyrite may be minor associated minerals. Two world-class examples in 'Grenvillian' regions are the Lac Tio deposit in eastern Quebec and the Tellnes deposit in southwest Norway.

In eastern Labrador, the Mealy Mountains Intrusive Suite and the Alexis River anorthosite have both received some attention from explorationists for Fe–Ti mineralization. Other similar bodies in the region have not. To date, discovered occurrences have been either too low grade, too small, or too remote to merit continued investigation, but this type of deposit has not been a preferred target for explorationists in the region and much potential remains.

Cu, Au, REE, Fl, U, Th, Zr in Felsic Rocks

The elements listed in this group may be too diverse to be included under the umbrella of one metallogenic model, but one archetype that comes to mind is the Olympic Dam or Iron Ore–Copper–Gold (IOCG) class. The mineralization in these rocks is associated with breccia zones, veins, disseminations and massive bodies that form pipes and tabular bodies crosscutting or conformable with a wide variety of host rocks. A particular association with A-type granitoid rocks has been invoked. Typical element enrichment is for Cu, Au, Ag, U, and REE. There are two easily identifiable possible analogues in eastern Labrador for such mineralization.

One is in the Lake Melville terrane and involves extrapolation of REE mineralization found in the St. Lewis area, coupled with indication of high REE, U, Fl and Cu farther to the northwest. An association with REE-enriched alkalic felsic magmatic rocks seems likely. Although known areas of potential mineralization are widely separated, it seems reasonable to anticipate other, similar rocks will be found in the (typically) poorly exposed intervening region. A key consideration is the possibility of structural control close to the Lake Melville–Mealy Mountains terrane boundary.

The other is in the Pinware terrane southwest of Henley Harbour, in a region characterized by marked Cu, U, Ag, As and Mo lake-sediment anomalies, and where Cu and U mineralization has been reported from areas underlain by the volcanoclastic(?) Pitts Harbour Group. Note that slivers of comparable rocks have been traced west then south to intersect the coast in the Baie de Brador area, west of Blanc Sablon. There, nodular sillimanite-bearing pelitic gneiss is spectacularly exposed and has been compared by Corriveau *et al.* (2007) to sericitic and argillic alteration zones present in the La Romaine Supracrustal Belt. As an aside, it is mentioned here that the protolith of some rock types in the Pitts Harbour Group remains uncertain. Gower *et al.* (1994) suggested that the rocks could include rocks derived from felsic volcanic sources, and Gower (2007) set out petrographic criteria to assist in distinguishing between quartzofeldspathic clastic and volcanic rocks.

Considerable interest has been generated in this class of mineralization in recent years in the Grenville Province, stimulated partly by the discovery of the Kwyjibo deposit and Marmont prospect in eastern Quebec (*cf.* Clark *et al.*, 2005) although these are Grenvillian rather than Labradorian in age. In truth, it is not clear that the mineralization in the eastern Labrador examples is necessarily Labradorian – it could be the product of younger remobilization and enrichment processes. Regardless of the specific orogeny to which this type of mineralization should be assigned, it seems that it is typically mid to late tectonic within that event.

GRENVILLE PROVINCE–PINWARIAN

MAFIC INTRUSIONS IN THE MEALY MOUNTAINS–PINWARE TERRANE BOUNDARY REGION

A string of layered mafic intrusive bodies is distributed along the boundary between the Mealy Mountains and Pinware terranes. Much of the area in which they occur is poorly exposed, so they could be much more (or much less) continuous than currently depicted. At its eastern end, the string of intrusions terminates against the southern boundary of the Lake Melville terrane. This is because the Mealy Mountains terrane and the northernmost part of the Pinware terrane have been over-ridden due to southeast-directed thrusting and dextral strike-slip faulting. Some mafic rocks north of the thrusts/ strike-slip faults might represent tectonic slices of the same rocks imbricated into the hanging-wall side of the structures. The main bodies identified are the Noname Lake intrusion in the west, the Upper St. Paul River body in the centre and the Kyfanan Lake intrusion in the east (Figure 24). The dominant rock types in all of the intrusions are gabbronorite and leucogabbronorite, but anorthositic rocks are extensive in places, and small occurrences of ultramafic rocks are found locally. The only quantitative time of emplacement constraint is an age of 1473 ± 19 Ma (Gower *et al.*, 2008a) from a gabbroic pegmatite within the Noname Lake intrusion. An attempt was made to date a sample from the Kyfanan Lake area, but it failed for want of datable minerals in the processed sample.

Mineralization is classified here into, i) pyrite (± Cu), and ii) magnetite/ilmenite (Figure 24).

Pyrite (± Cu)

In the Noname Lake body, at *013B/11/Cu 001*, pyrite and chalcopyrite were seen during examination of a road cut situated 14 km south of Noname Lake, at a site very close to the southern border of the intrusion. The sulphides coat fractures within medium- to coarse-grained, homogeneous gabbro to melagabbro. In a quarry 5 km to the northwest (*013B/11/ Pyr 001*), pyrite was seen in hornblende- and biotite-rich, schistose melanocratic rocks extensively invaded by pegmatite.

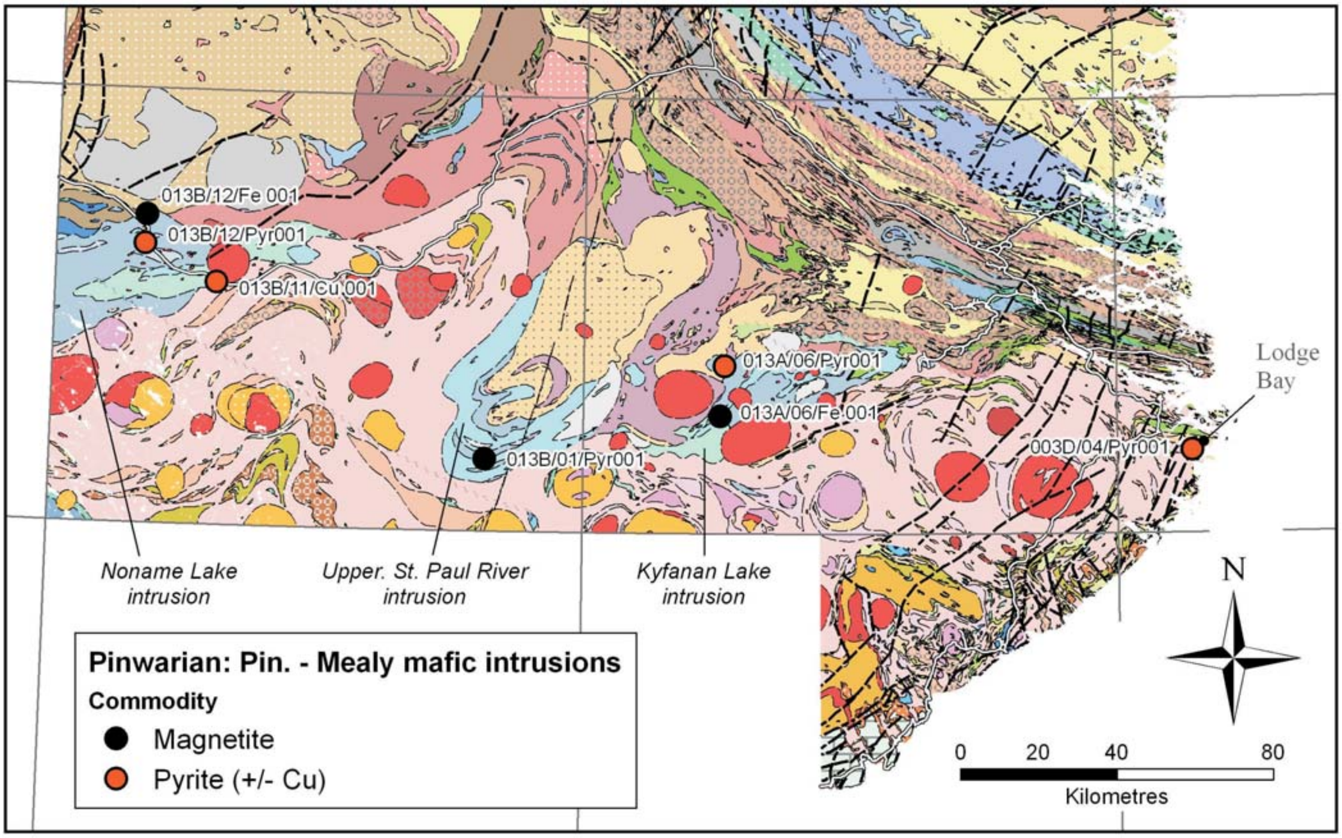


Figure 24. *Distribution of mineral occurrences in mafic intrusive rocks situated at the northern boundary of the Pinware terrane. Based on one U–Pb date these are Pinwarian in age.*

During 1:100 000-scale mapping of the Upper St. Paul River body, amphibolite lenses were noted to contain pyrite (and possibly a Cu-bearing mineral) at *013B/01/Pyr001*. The amphibolite is interpreted to belong to the layered mafic intrusion, but this is somewhat equivocal, as it is incorporated as a block within later microgranite/pegmatite.

Information regarding an occurrence in the Kyfanan Lake area (*013A/06/Pyr001*) is based on assessment by Kiex Consulting (Hutchings, 1995a) on behalf of the Kasner Group of Companies, Greater Lenora Resources Corporation and RJK Explorations. Exploration in this area was mounted in response to the recognition of a strong Ni–Co–V lake-sediment anomaly that correlates with the northwestern margin of the Kyfanan Lake layered mafic intrusion (Gower *et al.*, 1995b). Ground examination was restricted to a small area, at the centre of which is a small lake dubbed 'Stormy Lake', on account of adverse weather conditions at the time of Hutchings's visit. These involved hurricane-force winds and 7.63 cm of rain in a 48-hour period. No outcrop was observed. Float around the edge of the lake includes granitoid and mafic to ultramafic boulders, the latter including peridotite, troctolite and gabbro. A sample of manganese-coated gabbro was estimated to contain 2–3% coarse blebs of pyrite and a sample of peridotite was estimated to contain 3–5% very finely disseminated pyrite. Follow-up assays on eight samples did not yield significantly anomalous values for Cu, Zn, Pb, Co, Ni, Mo, Ag or Au. The author revisited the map area, after his preliminary Kyfanan Lake 1:100 000-scale geological map had been published (Gower, 1995). Additional outcrops discovered indicating that the western boundary of the Kyfanan Lake layered mafic intrusion in this area to be at least 1.5 km farther west than shown earlier. The cause of the lake-sediment anomaly remains unexplained.

One other pyrite occurrence (*003D/04/Pyr001*), situated 10 km east-southeast of Lodge Bay and found during 1:100 000-scale mapping, does not necessarily belong to this group of rocks, but is included here for want of better classification. The host rock was described as a rusty-weathered, fractured and faulted amphibolite, but a thin section of a sample is ultramafic (*ca.* 6% felsic minerals). The remainder of the rock is amphibole (75–80%) and opaque minerals (15%), the latter equally divided between sulphide and oxide. The sulphide was not specifically identified, but is thought to be pyrite. Two other similar outcrops were mapped in the vicinity, so, given the relatively high sulphide content in the investigated sample, some exploration might be warranted.

Magnetite

Two magnetite occurrences are included here. The westerly occurrence, 12.5 km west of Noname Lake (*013B/12/Fe 001*), was discovered during 1:100 000-scale mapping. The outcrop coincides with a pronounced localized magnetic anomaly. Although magnetite certainly constitutes the major portion of the mineralization (Plate 11), some sulphide is present and appears to be concentrated along anastomosing microfractures (at cm-scale spacing) within the rock. The sulphide mineral was not unequivocally identified, but judged to be pyrite. It is very weathered and shows a wide range of iridescent colours. Analytical results for two samples analyzed from the occurrence are given in Table 47.

Plate 11. *Massive Fe oxide associated with minor sulphide west of Crooks Lake (mineral occurrence 013B/12/Fe 001).*

The other magnetite occurrence (*013A/06/Fe 001*) is within the Kyfanan Lake intrusion and was discovered and drilled by Cartaway Resources (Eveleigh, 1996, 1997). In a press release dated February 7th, 1996, Cartaway Resources and Peruvian Gold in a 50:50 joint venture announced that it had completed a large airborne magnetic and electromagnetic survey totaling 4330 line kilometres over the Kyfanan Lake layered mafic intrusive complex. The area flown included claims optioned from Golden Tag Resources, Corsair Petroleum, Teryl Resources, Pandora Industries, Pacific Amber Resources, Royalstar Resources and Hawk Syndicate. In press releases dated April 1st, 1996 and April 24th, 1996, Cartaway Resources and Peruvian Gold further reported that the exploration program consisted of an airborne electromagnetic and magnetic survey and ground follow-up HLEM and proton magnetometer surveys. A four-hole diamond-drill hole program was carried out to test an airborne and ground electromagnetic target approximately 1 km long and up to 40 m wide. The drill holes intersected a 40-m-wide magnetite unit with 5–10% specular hematite and fine-grained metallic mineralization. In a press release dated June 20th, 1996, Cartaway Resources reported that results had been received from assaying and a polished thin-section study, concluding that the drilling had intersected a previously unreported succession of layered mafic intrusive rocks, including granophyric gabbro, anorthositic gabbro, hornblende pyroxenite and olivine pyroxenite, containing up to 30% combined ilmenite and magnetite. The mineralization was metallic and predominantly oxide, with only minor sulphide as pyrite. Values for Cu–Ni–Co and Au–Pt–Pd were background levels only.

The details of the drill program (carried out between April 1st and April 30th, 1996) are as follows. Four BQ-sized holes totaling 439.32 m were drilled. Hole KL-96-01 totalled 114.32 m and, from 36.6 m to 99.6 m encountered a magnetite-rich unit, consisting of 40% fine-grained magnetite, 20% plagioclase rimmed by biotite and/or hornblende and groundmass comprising talc (after olivine, pyroxene or amphibole) and local hematite. Hole KL-96-02 was drilled from the same location to a total depth of 130.8 m and the magnetite-rich unit encountered between 51.83 m and 130.76 m. Hole KL-96-03, a few 10s of metres to the west and above the conductor was vertical and reached a depth of 93.9 m, passing through the magnetite unit from the overburden-bedrock interface at 3.96 m to 76.61 m. Hole Kl-96-04, a few 10s of metres northwest of hole KL-96-03, reached a depth of 100.3 m, passing through the magnetite unit from 26.34 m onward, except for gabbro between 53.56 and 58.52 m. Other rocks encountered include gabbro, gneiss, granitic dykes, mafic dykes and fault gouge. Only traces of pyrite were present. No economic values for Ni, Cu, Co, Au or PGEs were found (Eveleigh, 1996).

PINWARIAN METALLOGENY AND POTENTIAL

Although grouped here separately from the Labradorian Ni, Cu, Cr, V and PGE-bearing deposit class associated with mafic and ultramafic rocks discussed earlier, it is not unequivocal that the mafic bodies at the Pinware–Mealy Mountains terrane boundary should be distinguished separately. The basis for doing so relies on one U–Pb date, which, although high-quality, could be challenged as necessarily being representative of these intrusions. Until more data are available, however, the interpretation favoured here is that these rocks

Table 47. Magnetite occurrence in Pinwarian(?) mafic rocks located at Pinware – Mealy Mountains terrane boundary

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013B/12/Fe 001	CG98-256A	414	81	7	22	105	85	n.d.	n.d.	n.d.
013B/12/Fe 001	CG98-256B	208	73	6	6	56	95	n.d.	n.d.	n.d.

Note: n.d., not detected

are Pinwarian rather than Labradorian. Whether or not it matters much from a metallogenic standpoint is a moot point as essentially the same deposit model applies, namely that of cumulate-process-related mafic magmatism. One additional point is possible structural control at the boundary between two terranes, which might be of significance. For example, although it would be unwise to draw comparison with the Thompson Nickel Belt, that region can be cited as one where a crustal boundary plays a pivotal role in controlling mineralization.

In eastern Labrador, this string of mafic intrusions remains under explored, despite some serious exploration effort having been expended in the Kyfanan Lake area. In fact, at the time of the post-Voisey's-Bay exploration boom, most of these bodies still remained undiscovered and unmapped. Furthermore, it was only as a result of a recent regional geochronological investigation (Gower *et al.*, 2008a) that it became evident that a crustal boundary of any sort might exist in the area.

It should be noted that no mention has been made in this report of the type of mineralization seen in Pinwarian mafic to felsic volcanic and pyroclastic rocks and coeval sediments of the 1.5 Ga Romaine Supracrustal Belt in eastern Quebec. Here, the rocks were subject to hydrothermal activity, including Fe-oxide alteration and Cu mineralization (Bonnet *et al.*, 2005). Supracrustal rocks (interpreted as having a quartz-rich clastic protolith) that might be comparable in age are found in the upper St. Augustin River area. No mineralization has been recognized in these rocks, beyond hematite alteration along a slickensided fault surface (K.E. Eade, unpublished field notes, station EA61-028). The vicinity is underlain by a strong U lake-sediment anomaly and, despite its remoteness, certainly deserves investigation.

GRENVILLE PROVINCE–POST-PINWARIAN–PRE-GRENVILLIAN

The post-Pinwarian–pre-Grenvillian period (*i.e.*, 1460–1085 Ma) was not geologically very active in eastern Labrador. Intrusive activity occurred at 1426 Ma (Michael gabbro), 1417 Ma (Mokami Hill quartz monzonite), 1296 Ma (Upper North River pluton), 1250 Ma (Mealy dykes) and 1132 Ma (Gilbert Bay pluton). Of these, only the Upper North River and Gilbert Bay plutons have any indication of mineralization, which is very minor in both cases (Figure 25).

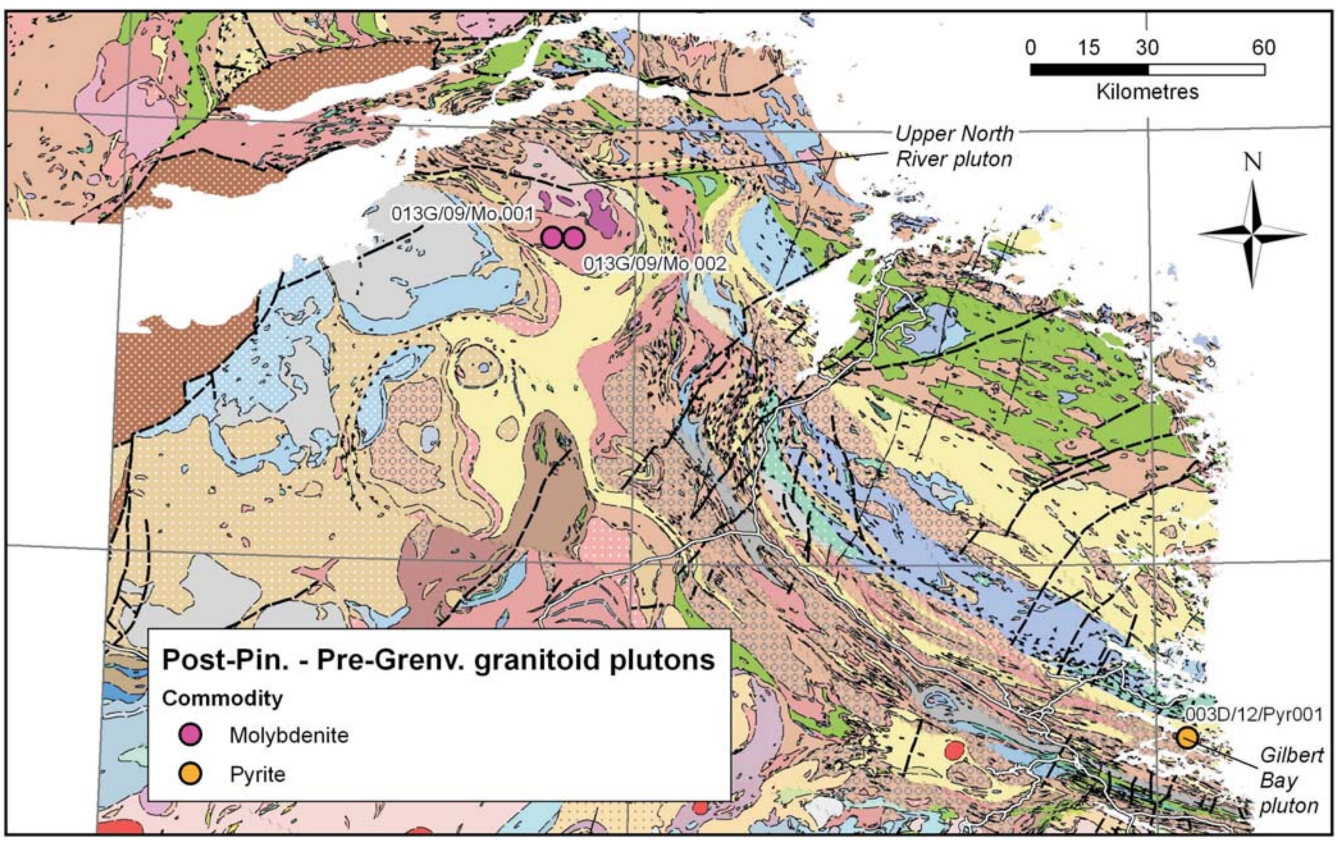


Figure 25. *Distribution of mineral occurrences in post-Pinwarian–pre-Grenvillian granitoid plutons.*

UPPER NORTH RIVER PLUTON

The Upper North River pluton is an irregular-shaped body in the northern part of the Lake Melville terrane. The rock is coarse-grained, homogeneous, moderately to strongly foliated and has a compositional range from quartz syenite to granite. A sample from the central part of the intrusion was dated to be 1296 +13/-12 Ma (Schärer *et al.*, 1986).

Molybdenum

Molybdenite was seen at two localities (*013G/09/Mo 001* and *013G/09/Mo 002*) within the area mapped as Upper North River pluton. Both occurrences are very minor and it is by no means certain that the host rocks should be assigned to the Upper North River pluton. They could be Labradorian, and the quartzofeldspathic segregations/neosome could be Grenvillian. The author has conceptually grouped them with Grenvillian pegmatitic intrusions (*see* later).

GILBERT BAY GRANITE

The Gilbert Bay granite forms an elliptical pluton which was roughly 4 by 3 km in size, prior to the northern and southern halves having been displaced 2.5 km dextrally along its west-northwest-trending long axis. The granite is leucocratic, medium- to coarse-grained, homogeneous, massive to weakly foliated, muscovite- and biotite-bearing, and commonly contains enclaves. The granite was dated to be 1132 +7/-6 Ma by Gower *et al.* (1991). In terms of time of emplacement, the granite appears to be unique in the Grenville Province in eastern Labrador. It seems unlikely to be of interest to explorationists.

Pyrite

Minor pyrite was noted in massive, even-textured Gilbert Bay granite, and, for the most part, the intrusion is devoid of sulphide. There are numerous enclaves of metasedimentary gneiss at site of the occurrence (*003D/12/Pyr001*), which could be the source of the sulphide.

POST-PINWARIAN–PRE-GRENVILLIAN METALLOGENY AND POTENTIAL

Known post-Pinwarian–pre-Grenvillian mineralization in eastern Labrador is trivial. Nevertheless, given the presence of REE mineralization related to alkalic intrusive and extrusive rocks in the Red Wine Intrusive suite and Letitia Lake Group farther west in Labrador, and the existence of compositionally similar rocks (Upper North River pluton) in eastern Labrador, the possibility of equivalent mineralization in eastern Labrador should not be dismissed. Indeed, it is possible that REE mineralization known in the St Lewis area could be of this age, rather than Labradorian and/or Grenvillian, as currently assigned.

GRENVILLE PROVINCE–GRENVILLIAN

NEPHELINE ALKALI-FELDSPAR SYENITE

Nepheline

A distinctive nepheline-bearing alkali-feldspar syenite (Figure 26), 10 km north-northeast of Red Bay (*012P/16/Fel001* and *012P/16/Fel002*) was discovered by the author during 1:100 000-scale mapping of the area (Gower *et al.*, 1994). The syenite was subsequently dated as having a syn- to late-Grenvillian age of 1015 ± 6 Ma (Heaman *et al.*, 2004). The intrusion is probably less than 200 m wide and of uncertain length. It was initially reported to be about 1 km long (Gower *et al.*, 1994), but Gower *et al.* (1995b) indicated that the body could be much larger, following examination of thin sections prepared for H. Bostock during his earlier investigation (Bostock, 1983). One of Bostock's thin sections contains a mineral that, in his accompanying description was listed as an 'unknown'. The 'unknown' was identified by the author as altered nepheline (*012P/16/Fel004*). The minimum strike length of the nepheline syenite was thus inferred to be at least 4.5 km, trending in a northeast direction.

The syenite is white weathering, medium to coarse grained, recrystallized and weakly to moderately foliated. Nepheline is easily recognizable as chalky-white or pink grains in hand sample (Plate 12a, b). From hand sample and thin section estimates, nepheline forms up to about 40% of the rock. Other minerals are well-twinned albite, microcline, zircon (2942 ppm Zr in sample CG93-561D from occurrence *012P/16/Fel001*). Magnetite, aegerine and garnet were provisionally identified in hand sample, but were not included in the thin sections cut. Whole-rock geochemical data are given in Table 48.

The eastern nepheline occurrences, and their potential extension to the southwest, were initially assessed by Hutchings (1995b) and investigated further by Triassic Properties (Laracy, 1996). An initial beneficiation feasibility study carried out by the Quebec Mineral Research Centre included whole-rock geochemical reanalysis of samples supplied by the author and showed that the Fe_2O_3 content could be reduced from 1.87 to 0.36% through magnetic separation. A research and marketing study carried out by Quantoum Consulting for Triassic Properties (Laracy, 1998b) made favourable comparisons (including geochemical data) with respect to nepheline syenite deposits elsewhere. A petrographic study of the nepheline syenite, also using samples supplied by the author, was carried out by Laracy and Wilton (1999), and further reference to the localities is made by Laracy (2001).

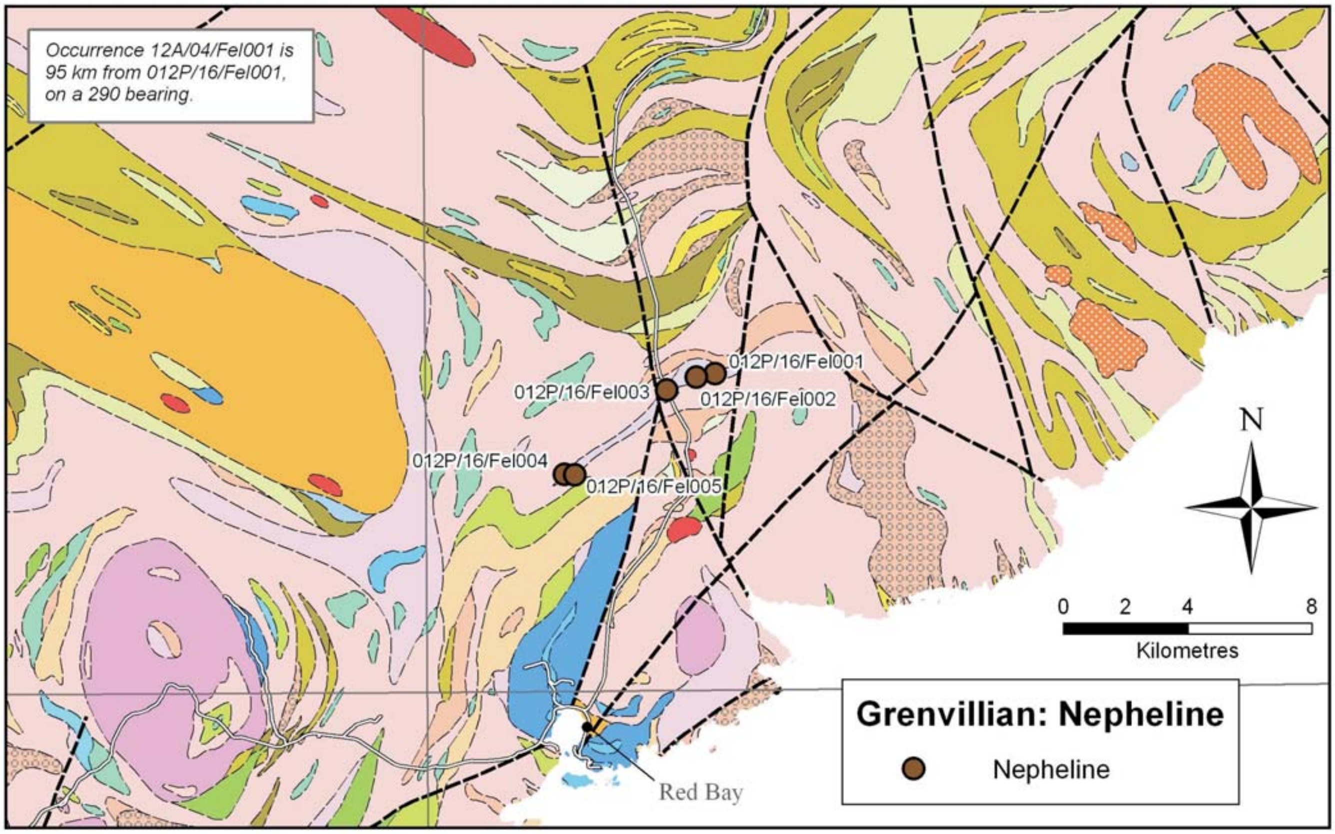


Figure 26. *Distribution of Grenvillian nepheline mineral occurrences north of Red Bay in the Pinware terrane. Note that one nepheline occurrence is outside the boundaries of the map.*

Table 48. Nepheline occurrences in syn- to late-Grenvillian alkali-feldspar syenite, Pinware terrane (oxides in percent)

Mineral Occurrence	Sample	SiO_2	TiO_2	Al_2O_3	Fe_2O_3t	MgO	CaO	Na_2O	K_2O
012P/16/Fe1001	CG93-561D	58.78	0.02	22.27	3.25	n.d.	0.13	10.10	4.26
012P/16/Fe1001	CG93-478	58.78	0.01	22.38	2.94	n.d.	0.18	10.53	4.80
		Reference		**Al_2O_3**	**Fe_2O_3**	**MgO**	**CaO**	**Na_2O**	**K_2O**
012P/16/Fel004/5	RB5847	012P/16/0084		22.7	0.062	0.008	0.21	10.2	4.6
012P/16/Fel004/5	RB5848	012P/16/0084		15.7	0.266	0.018	1.30	5.8	4.8
012P/16/Fel004/5	RB5849	012P/16/0084		16.5	0.228	0.011	0.39	7.0	5.7
012P/16/Fel004/5	RB5850	012P/16/0084		22.2	0.044	0.008	0.26	10.3	4.6
012P/16/Fel004/5	RB5851	012P/16/0084		18.4	0.190	0.057	2.40	7.8	4.1
012P/16/Fel004/5	RB5852	012P/16/0084		22.5	0.080	0.150	1.40	9.3	4.7

Note: n.d., not detected

Assessment of other nepheline-bearing rocks in this area has been carried out by Clark (1997). Clark discovered nepheline syenite very close to the Bostock locality mentioned above (possibly the same site). Clark (1997) also found another nepheline syenite occurrence 350 m to the east (*012P/16/Fel005*) and described the rock as muscovite bearing, light grey, and medium to coarse grained. Biotite, amphibole, zircon and apatite are reported to be present as accessory minerals. The two occurrences are small (less than 0.1 acre). Although contacts into adjacent pink syenite are emphasized to be gradational, the nepheline syenite is also claimed to crosscut the regional foliation at a high angle. Analytical results from Clark's sites are given in Table 48 (RB sample series, although the exact location of the samples is not clear from the report). Clark dismissed the nepheline as having any economic significance, and rejected Gower *et al.*'s (1994) interpretation that these occurrences link up with those to the northeast. Since then, Gower has found another nepheline occurrence (*012P/16/Fel003*) between the original sites and those of Clark. It is exposed in a road cut resulting from the construction of the highway between Red Bay and Mary's Harbour and within

Plate 12. *Nepheline in syenite. North of Red Bay. (left) Medium-grained white chalky nepheline (mineral occurrence 012P/16/Fel002), (right) Coarse-grained, light pinkish brown nepheline (mineral occurrence 012P/16/Fel003).*

100 m of where predicted on the basis of mapping by Gower *et al.* (1994).

Reading Clark's (1997) report, it appears that he found the terrain difficult. He noted: boulders up to 10' diameter forming 'an almost impassible barricade in some areas'; boulder piles up to 50' thick; difficult walking due to low juniper and spruce; lake informally named 'Blackfly Lake'. Given the boulder and vegetation cover in places, and the subsequent discovery of an additional nepheline occurrence, the author disputes Clark's conclusions, although accepting that the nepheline syenite might well be discontinuous along strike due to mode of intrusion, boudinage, faulting or other causes.

One other nepheline occurrence is known in eastern Labrador (*013A/04/Fel001*), and it also in the Pinware terrane (96 km from *012P/16/Fel001* on a 290° bearing). The rock type is a leucosyenite consisting of albite and K-feldspar with minor nepheline, and accessory opaque minerals (oxide and sulphide), muscovite, biotite and zircon. The nepheline was only seen in thin section. Despite this being a trivial occurrence on its own, and in a very poorly exposed, remote area, it is worth pointing out that alkali-feldspar syenitic rocks are common in that region (typically containing sodic clinopyroxene and/or amphibole, rather than nepheline), so there is good reason to suspect that other favourable host rocks may be present. A whole-rock analysis of a sample (VN92-241; 455319 5769610) of alkali-feldspar syenite collected 8 km south-southeast of the nepheline occurrence has 5425 ppm Zr, but is not significantly anomalous in REE or U. One of the aegerine-bearing syenites has a late-Grenvillian age of 991 ± 5 Ma (Wasteneys *et al.*, 1997). Whether alkali-feldspar intrusive activity was continuous between the times of the two dated alkali-feldspar syenites in the Pinware terrane (*i.e.*, 1015 to 991 Ma) is unknown.

PEGMATITE

Pegmatites are ubiquitous throughout eastern Labrador and have a broad age spectrum – from late Paleoproterozoic to late Mesoproterozoic – based on precise age determinations from a wide range of pegmatites. Nevertheless, for the most part, the age of any individual pegmatite remains unknown. Introducing them as this stage of the report (except those previously addressed in the Makkovik Province) carries the tacit implication that they are Grenvillian. This has been demonstrated by dating in many cases, but the likelihood for some is that they are older, especially those in the Groswater Bay and Hawke River terranes.

Pegmatites could be targeted by mineral explorationists for several commodities, which are grouped below as biotite, muscovite, amazonite feldspar, magnetite, F, U, Mo and 'others'. The commodities are not mutually exclusive.

Biotite

There are several occurrences where large biotite books have been found (Figure 27), but, at the outset, it must be stated that none of them can be regarded, on present knowledge, as having much economic significance, even though some of the biotite books are fairly sizable and many of the host pegmatites quite wide (5–10 m). The objective in providing information about them is better considered in the context of potentially associated commodities of economic interest, even if no such association has yet been identified.

Hawke River Terrane

A cluster of pegmatites hosting large biotite books is found in the St. Michael's Bay area, east of Charlottetown.

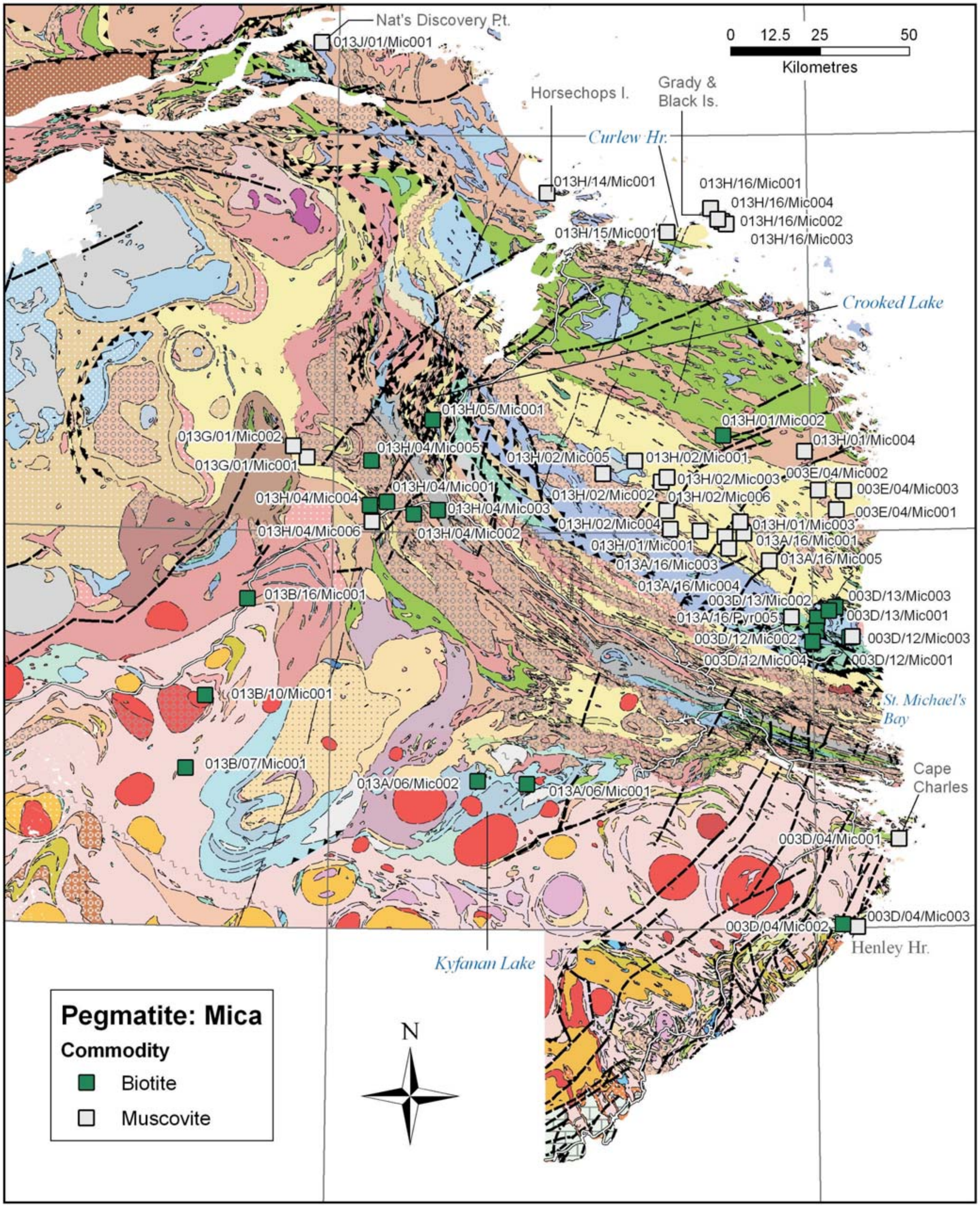


Figure 27. *Distribution of biotite and muscovite mineral occurrences in pegmatite. The pegmatites are probably of various ages (*see *text for comments).*

Two of the occurrences (*003D/13/Mic001* and *003D/13/Mic002*) were reported by Christie (1951). In one, the biotite is merely 2.5 cm across, but, in the other it is 2.5–15 cm in diameter. In another pegmatite in the same area (*003D/13/Mic003*), Meyer and Dean (1988) recorded biotite books up to 40 cm in diameter, although forming only 5% of the rock. An occurrence reported by Bradley (1966) on the south side of Square Island (*003D/12/Mic001*) is described as containing biotite books up to 12.5 cm across and several centimetres thick. No pegmatites were noted at the location specified, either during mapping by Wardle (1976) or during the 1:100 000-scale mapping of Gower *et al.* (1987). However, a pegmatite, containing large hornblende and biotite, was recorded a few hundred metres to the south, so this is the location now assigned to the occurrence. A pegmatite on the south side of St. Michaels Bay is recorded as containing large biotite, but the source of information is unknown, beyond its mention in MODS, from which the location is taken (*003D/12/Mic002*). Roughly 3 km south-southwest, a 3-m-wide pegmatite containing biotite books up to 20 cm across was recorded during mapping (*003D/12/Mic004*). As a general comment applied to the St. Michael's Bay area, the occurrences identified are merely examples of the many pegmatites present in the area, and it would not be difficult to find others containing equally large biotite.

Moving north, one isolated pegmatite containing large biotite books, up to 5 cm across, has been recorded from 55 km north-northwest of Charlottetown (*013H/01/Mic002*). It was noted during 1:100 000-scale mapping of the Sand Hill River map area, but no information is available from field records beyond mention that it is associated with pegmatitic material and quartz veins (Gower *et al.*, 1986).

Lake Melville Terrane

The most historic mica occurrence in southeast Labrador is an abandoned mica quarry located 2 km south of the south end of Crooked Lake (*013H/05/Mic001*). The quarry, according to Douglas (1953), was opened in 1910, but how long it was worked was unstated. It is quite small, measuring 20–25 m long, 8–10 m wide and is less than 4 m deep. The quarried material contains quartz, feldspar, biotite up to about 12 cm across and muscovite up to about 9 cm across (Plate 13). The micas make up to roughly 35% of the rock, biotite being more abundant than muscovite. The host rock to the pegmatite is pelitic metasedimentary gneiss. The site is further described by Kranck (1966), and the location, together with a detailed plan and cross-section sketch is given by Bradley (1966). The site has been visited by the author.

Between 20 and 30 km to the southwest of the quarry, pegmatites containing large books of biotite are particularly common. The host rocks are K-feldspar megacrystic granitoid

Plate 13. *Large biotite flakes from pegmatite in abandoned quarry. Southeast of Crooked Lake (mineral occurrence 013H/05/Mic001).*

rock, pelitic metasedimentary gneiss and anorthosite (*013H/04/Mic001*, *013H/04/Mic002*, *013H/04/Mic003*, *013H/04/Mic004* and *013H/04/Mic005*). Biotite ranges from 8 to 15 cm in diameter, although not especially abundant in any of the examples seen. Large magnetite crystals, up to 5 cm across, are a common associate, and locally muscovite and/or garnet are present.

Pinware Terrane

Farther south in the Pinware terrane, six pegmatites have been identified as having large biotite. In the Henley Harbour area, a 1.5-m-wide pegmatite containing biotite books up to 15 cm across was recorded intruding felsic metavolcanoclastic rocks (*003D/04/Mic003*). In this area, the pegmatites are also of interest for other commodities, especially amazonite (*see* below). To the west, in the Kyfanan Lake area, two pegmatites (*013A/06/Mic001* and *013A/06/Mic002*), containing mica books 6- and 5-cm across, respectively, were found. In both cases, the pegmatites occur in small, isolated exposures. Further investigation might well result in the discovery of additional occurrences, but scarce outcrops in vast wetlands provide little motivation for finding out. Farther west still, occurrences are, i) a 3-m-wide pegmatite intruding diabase/metagabbro and containing biotite books up to 10 cm across (*013B/16/Mic001*), ii) graphic-textured pegmatite and coarse-grained granite containing biotite up to 7 cm across and magnetite grains up to 1.5 cm across (*013B/10/Mic001*), and iii) microgranite and pegmatite layers containing biotite up to 6 cm across (*013B/07/Mic001*). The later two examples are associated with late- to post-Grenvillian granitoid plutons.

The only general observation made with respect to the distribution of the biotite occurrences is that they seem to be more common in the southern part of eastern Labrador. The author has a suspicion that this could mean nothing more than greater diligence in recording them during later phases of the multi-decade reconnaissance mapping project in eastern Labrador.

Muscovite

In contrast to biotite, the prospects for economic deposits of muscovite are promising, and the commodity is a much more amenable regional exploration target because most of the occurrences are found in one zone, namely the southern part of the Paradise Metasedimentary Gneiss Belt (Figure 27). It is clear that there is a strong spatial association between muscovite-bearing pegmatites and pelitic metasedimentary gneiss, especially where the metasedimentary gneiss itself is muscovite-bearing. If searching for muscovite deposits, this is a worthwhile criterion to observe. It is worth pointing out that, apart, from a few coastal localities, all the occurrences were encountered during routine reconnaissance geological mapping, including an example shortly to be described where 30-cm-diameter books were discovered. Given the 4–5 km mapping traverse spacing, it is extremely improbable that this occurrence represents the very best that exists, either by grade or tonnage.

Groswater Bay Terrane

At Nats Discovery Point, 24 km east of Rigolet (*013J/01/Mic001*) a 20-m-wide pegmatite, intruding gabbronorite, contains abundant muscovite in books up to 10 cm in diameter. Tourmaline up to 5 cm long is also present in this pegmatite.

Muscovite-bearing pegmatite is also found on the coast in the Curlew Harbour area, about 40 km east-northeast of Cartwright. Two occurrences were recorded by Gardner (1938), one on Grady Island (*013H/16/Mic001*) and the other on Black Island (*013H/16/Mic002*). Gardner refers to the occurrence on Grady Island as a mica mine although a photo in his report shows it to be no more than a small pit. Apart from muscovite, minerals present are quartz, microcline, tourmaline and garnet. Further, he observed that the pegmatite on Black Island had been blasted and noted that quartz crystals are quite abundant in the vicinity and translucent almost to the point of transparency, a point that might interest mineral collectors. Two other sites on Black Island have been designated as muscovite occurrences following 1:100 000-scale mapping (*013H/16/Mic003* and *013H/16/Mic004*). The muscovite books at these localities are 10 cm thick and 10–15 cm in diameter. Garnet and tourmaline (equivocally identified) are present in one of the pegmatites. All the pegmatites on Black Island are hosted by schlieric pelitic metasedimentary gneiss, whereas the host rock on Grady Island is metagabbronorite. On the mainland 14 km west-southwest of Black Island, quartz-feldspar veins containing muscovite, pyrite and purple fluorite were recorded during 1:100 000-scale mapping (*013H/15/Mic001*).

Information regarding the sixth occurrence (*013H/14/Mic001*), if it exists, is based on correspondence in Geological Survey of Newfoundland and Labrador files involving J. Strong, P. Beavan and D. Derry (Strong, 1953). Strong contacted Falconbridge informing the company of a mica occurrence in which the mica was 'as big as doors'. Derry received the letter from the Falconbridge office and passed the information to Beavan, who later received a letter directly from Strong, giving him the information that the mica occurrence was '2 miles NW of Horsechops' in Groswater Bay and that the local name was Partridge Harbour. The only Horsechops Island, of which the author is aware, is in Trunmore Bay rather than Groswater Bay, and appears to be the island adopted by Douglas and Hsu (1976), who show an occurrence 2 miles west of Horsechops Island (which would be northwest, as specified, if magnetic bearings were being used). Two miles west of Horsechops Island gets one to Woody Island, which is made of muscovite-bearing metasedimentary gneiss. The possibility of muscovite-bearing pegmatite intruding the gneiss is very likely, although, from the author's observations elsewhere and the lack of any confirming reports, the size of mica is likely to have been wildly exaggerated.

Hawke River Terrane

The only muscovite occurrence in eastern Labrador that has been seriously investigated by explorationists (*013H/02/Mic004*) is situated 42 km northwest of Charlottetown. It was discovered during 1:100 000-scale mapping in the Sand Hill River area jointly by T. van Nostrand and the author. The pegmatite dips 55°S, is up to 15 m wide, at least 65 m long, and rises 3 m above its surroundings. It contains 10–15% muscovite in books up to 30 cm across (Plate 14), along with quartz, plagioclase, K-feldspar and minor garnet. The location was first staked in 1989 by J. Maderic of Johnston, New York,

Plate 14. *Muscovite plates up to 30-cm wide from pegmatite intruding the Paradise metasedimentary gneiss belt. West of Hawke Bay (mineral occurrence 013H/02/Mic004).*

who carried out an examination of the mica in conjunction with Meyer (1990). Meyer noted muscovite books 30 cm across and 15 cm thick and commented that, within an hour, 15 kg of muscovite were collected using a hammer and chisel. Further evaluation of this mica occurrence was later carried out by Labrador Mica Ltd (Balakrishnan, 1995). In addition to the minerals listed above, Balakrishnan also reported aquamarine-beryl, as two crystals measuring 2 cm long and 1 cm wide in the core area of the pegmatite. The muscovite occurs as crystalline flakes in the core region (flake zone), increasing to sheets (sheet zone) near the contact with the host pelitic metasedimentary gneiss. The flake zone extends the entire length of the pegmatite and muscovite occurs as well-developed hexagonal crystals, 5 cm in diameter and 2 cm thick, and form about 5% of the rock. The sheet zone averages 3 m wide and has a length of 35 m, the eastern end having been eroded away. The mica sheets are noted to be well formed, some measuring in excess of 30 cm in diameter and 10 cm thick, and form 25% of the rock. They are generally aligned parallel to the contact, but some are randomly oriented. The mica is clear, colourless and lacks contaminants. An estimate of *in situ* reserves in the exposed part of the pegmatite gave 198 tonnes of mica in the sheet mica zone, 165 tonnes in the flake mica zone and 66 tonnes in the mica schist. About 30 kg of mica were collected for further study. Evaluation and analyses of muscovite from the showing were carried out by Hawley and Associates Ltd., Saranac, New York. The three samples evaluated all have fairly high Fe and Ti content, which leads them to be classified as green micas. Although sold commercially, green mica is generally thought not to be as good electrically as the ruby (low Fe and Ti) muscovite. The green micas are more brittle and do not split as well as ruby micas into large thin sheets, tending to break off into smaller pieces instead. The electrical characteristics of mica are a function of the content of conductive constituents, like Fe, which reduce the insulating characteristics. The dielectic constant and power factors of green micas can be more temperature sensitive than those of ruby micas.

Large muscovite books are found in pegmatites in other parts of the southern Paradise Metasedimentary Gneiss Belt and typically range in size from 5–10 cm (if below 5 cm diameter it has not been designated a mineral occurrence). Where margins of intrusions could be established, the pegmatites are commonly 5–10 m wide. They are of unknown length, although one was traced for over 80 m. They intrude schistose biotite–muscovite or, locally in southeast areas, cordierite–sillimanite gneiss. Occurrences found during 1:100 000-scale mapping are *013A/16/Mic003*, *013A/16/Mic004*, *13A/16/Mic005*, *013H/01/Mic001*, *013H/01/Mic003*, *013H/02/Mic001*, *013H/02/Mic002* and *013H/02/Mic003*. Two other pegmatites are included in this group (somewhat equivocally), and were reported by Donohoe (1966). Their mineralogy is described as orthoclase, albite(?) and quartz together with tourmaline and garnet in one (*013H/02/Mic005*) and muscovite and specular hematite in the other (*013H/02/Mic006*). One other occurrence (*013A/16/Mic001*), of uncertain validity, was described by Notman (1954) in a letter sent to Brinex, in which he mentioned high-grade mica in pegmatites "... about 10 miles inland from the coast in the vicinity of Hawke River." Given the abundance of mica-rich pegmatites in the area, there is no reason to doubt the veracity of the report, but vagueness of location marginalizes the value of the information. If searching for this occurrence, one should not expect to find it where currently specifically located.

A smaller group of pegmatites with large muscovite books (5–10 cm) occurs on the north side of the Paradise Metasedimentary Gneiss Belt at its eastern end (*003E/04/Mic001*, *003E/04/Mic00* and *003E/04/Mic003*). In these, the muscovite books are generally smaller than those already described and the pegmatites themselves also smaller. Vulcan Minerals examined the third occurrence in the list and concluded that nothing of economic value was present (Hodge, 1996b). A fourth occurrence (*013H/01/Mic004*) in this area is situated roughly 14 km to the northwest, and is within the Earl Island quartz diorite to granodiorite domain, rather than the Paradise Metasedimentary Gneiss Belt. The host rock to the pegmatite is metasedimentary gneiss, which is probably a raft within the granitoid rocks.

On a peninsula 2.5 km northeast of Charlottetown, a pegmatite was recorded during 1:100 000-scale mapping as having micas exceeding 5 cm diameter, and that both biotite and muscovite were present. The mica in a sample collected from the locality is mostly muscovite. This locality is recorded as a pyrite occurrence in MODS (*013A/16/Pyr005*), but no mention of pyrite is made in field notes. On Square Island, 18 km east-southeast of Charlottetown (*003D/12/Mic003*), a pegmatite was reported by Butler (1996) as having muscovite up to 3 cm across in a vein that was blasted 30–40 years ago.

Pinware Terrane

On the coast in the Pinware terrane, two occurrences have been documented and both were known prior to 1:100 000-scale mapping. One, situated in the Cape Charles area (*003D/04/Mic001*), was described by Piloski (1955a). The muscovite is found in simple pegmatites composed of quartz, orthoclase, plagioclase, muscovite and biotite, and occurs in books about 5 cm diameter with some up to 10 cm, although the larger ones are usually fractured and warped. Piloski reported that several pits were made, the largest being 40 m long, 1–4 m wide and 3 m deep. The material removed was apparently hand-cobbed for its mica. The exact location is not indicated by Piloski (1955a), so the occurrence has been sited where some pitting was seen during 1:100 000-scale mapping. The other occurrence (*003D/04/Mic002*) is north of Henley Harbour and was first described by Douglas (1953). The pegmatite is said to contain three varieties of mica – muscovite, biotite and brownish-coloured mica that was judged to be phlogopite. Quartz is abundant and greenish microcline is also present as well as pink orthoclase. In addition there are occasional grains of hematite, ilmenite and magnetite. The mica plates average 1 by 1.5 inches and the largest plate of phlogopite seen was 2 by 3 inches. The books of mica are very closely intergrown with the feldspar and quartz. The locality was visited during 1:100 000 mapping and described as a 2.5 m-wide pegmatite contains quartz, muscovite, green feldspar (amazonite) and white-pink feldspar. Muscovite up to 15 cm across was noted. Evidence of prospecting was seen. The site was staked in 1992 and field investigations and whole-rock geochemical analysis (no significant anomalous values) carried out by Butt (1993), who refers to the location as the Ragged Point area. The locality is more accurately shown on Douglas's sketch map than on the preliminary 1:100 000-scale geological map of Gower *et al.* (1988; Map 88-87), but the author's error has now been corrected (Gower, 2010).

Mealy Mountains Terrane

Two occurrences, located southeast of the Mealy Mountains (*013G/01/Mic001* and *013G/01/Mic002*), are minor. The muscovite in these is up to 5 cm across, but the pegmatites less than 2 m wide. Moving 26 km to the south, a 20-m-wide, graphic-textured pegmatite is exposed in a road cut and contains muscovite books up to 5 cm across and 1 cm thick, forming about 5% of the rock. It also contains biotite books of similar size (*013H/04/Mic006*).

Amazonite

Apart from the amazonite occurrences described below, a reminder is given that amazonite has been recorded at four other sites in the St. Lewis Sound area, either within the northern fringe of the Pinware terrane, or just north of it. They have all been assigned foremostly as sulphide or fluorite occurrences (*003D/05/Cu 003*, *003D/05/Fl 003*, *003D/05/Pyr007* and *013A/08/Pyr003*) so are addressed elsewhere in this report. Warren (1968), in an article on Gemstones of Newfoundland and Labrador mentions having received 'From the Port Hope Simpson area, some fine amazonite…'. The author had not seen amazonite as far north as Port Hope Simpson, the closest known to him being about 20 km to the southeast.

Pinware Terrane

Amazonite in the Grenville Province in eastern Labrador is found mostly within the Pinware terrane (Figure 28; but

Plate 15. *Amazonite in pegmatite. Southwest of Henley Harbour (mineral occurrence 002M/13/Amz003).*

the reader is reminded that one occurrence has been reported from the Makkovik Province; *013J/15/Gem001*). Amazonite is a Pb-enriched K-feldspar and is used mostly for ornamental purposes, including as jewelry if its blue-green colour has sufficient richness and depth (Plate 15). It should be kept in mind that, as a feldspar, it has well-developed cleavages, which tends to militate against its effective use as a semi-precious stone. If jewelry is the purpose, then outcrops should be blasted gently or not at all, as the material easily shatters.

The main concentration of amazonite-bearing pegmatites known is in the Henley Harbour area (*002M/13/Amz001*, *002M/13/Amz002*, *002M/13/Amz003*, *003D/04/Amz001* and *003D/04/Mic002*). The first three sites were found during 1:100 000-scale mapping. None of the pegmatites is very large (less than 1 m wide), but the potential for additional discoveries in the area is considered high. At the third locality on the list, minor fluorite and molybdenite were recorded. This occurrence was erroneously positioned 2 km too far to the northeast by Gower *et al.* (1995b). The fourth locality was reported by Butt (1993) who described a pegmatite 60 cm wide by 30 m long. Details of the fifth occurrence in the list are given as a muscovite locality and not repeated.

Farther northeast, amazonite has been found at several spots on and around Battle Island. Two sites have been designated as amazonite occurrences, but amazonite exists in other places in the vicinity, albeit in minor amounts. The two designated occurrences are on islands just to the northwest of Battle Island (*003D/05/Amz001* and *003D/05/Amz002*). At the first site, at which there has been minor blasting, the pegmatite occurs as boudinaged pods about 1 m across, in which amazonite occurs as crystals up to 25 cm long. Amazonite occurs in a similar manner at the second site, but the boudinage pods are smaller. Two amazonite-bearing pegmatites occur on the east side of Battle Island (Gower, 2009). They have

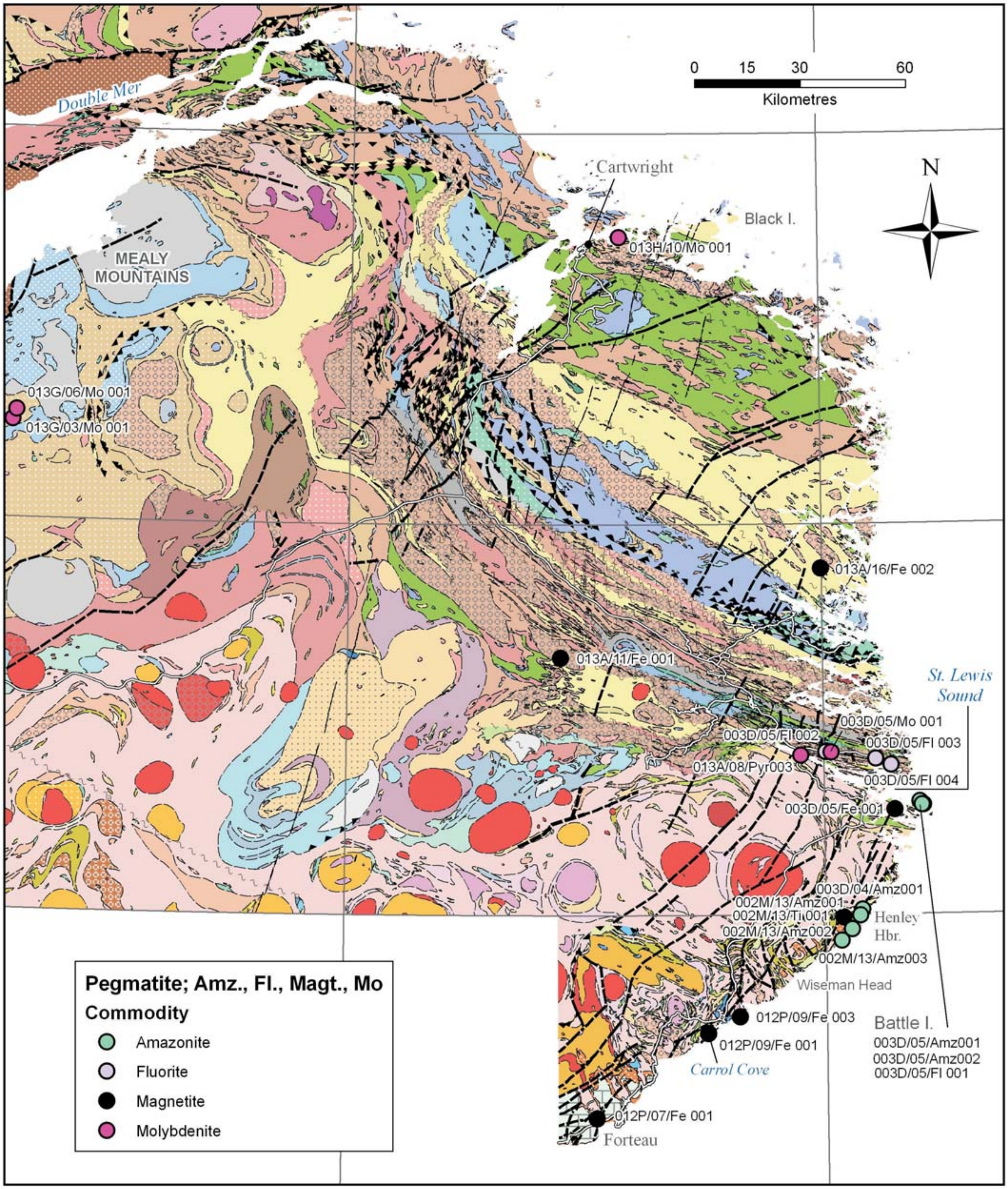


Figure 28. *Distribution of amazonite, fluorite, magnetite and molybdenite mineral occurrences in pegmatite.*

not been designated as mineral occurrences as the amount of amazonite carried is small and of low quality. One of these pegmatites has been dated by U–Pb methods to be 1024 ± 3 Ma (Kamo *et al.*, in press). A whole-rock analysis of this pegmatite shows it to have anomalous Nb and Ta (Gower, 2009), encouraging thoughts regarding possible colombite–tantalite mineralization in the region.

The key geological observation to be made regarding the Pinware terrane amazonite occurrences is that there is a close association between the pegmatites and gneissic rocks derived from a psammitic and/or volcanoclastic protolith. The fact that all occurrences are coastal is merely an artifact of quality of exposure. It seems likely that amazonite will be found inland in areas of psammitic/volcanoclastic rocks, although it might be difficult to spot because of lichen cover and colour leaching.

Magnetite

Magnetite is a common phase in most pegmatites and, for the most part, does not merit mineral-occurrence recognition. Occurrences are included here either, i) because they have been previously reported and/or some explanatory context is required, ii) because they represent pegmatites seen during 1:100 000-scale mapping that have abnormally abundant magnetite, or iii) because the magnetite occurs as unusually large crystals. None can be considered of economic interest for its Fe content, although some might attract the attention of mineral collectors, or be enriched in other elements of economic interest (Figure 28).

As an aside, from XRD analysis of six samples from eastern Labrador, it has been determined that a non-magnetic opaque oxide found in some pegmatites, and suspected at the time to be ilmenite, is hematite (*see* Appendix 2).

Hawke River Terrane

At a locality 15 km northeast of Charlottetown (013A/16/Fe 002), Squires *et al.* (1997) reported coarse-grained to pegmatitic granite containing 10% magnetite.

Pinware Terrane

There are three known localities in the southern Pinware terrane where magnetite in pegmatite is abnormally abundant – at Carrol Cove, Wiseman Head and Forteau. Note that another magnetite locality in the vicinity, designated as mineral occurrence 012P/09/Fe 002, is not associated with pegmatite and has been addressed elsewhere in this report.

The locality at Carrol Cove (012P/09/Fe 001) was the first identified by Hawley (1944), who was working as a temporary geologist for the Newfoundland Geological Survey, but later completed an M.Sc. at Northwestern University on the magnetite-bearing pegmatites that he had mapped at Carrol Cove. He noted that the pegmatites were generally short (less than 30 m), but mapped one having a strike length of about 300 m. Two types of pegmatites were distinguished, namely: i) irregular and lens-like early bodies having gradational contacts that range from less than 1 m up to 6 m in width, and ii) planar late bodies having sharp contacts with their host rocks. These descriptions suggest that the pegmatites are syn- to late-Grenvillian, by analogy with other pegmatites in the region. The dominant constituents (orthoclase, quartz, and magnetite) show a tendency to form clusters 1.5–3.0 m in diameter and clumps of magnetite 1 m across were noted. Minor tourmaline, zircon, biotite, apatite and chlorite were also reported. All of the various country rocks (described as granite, migmatite and gneiss) are intruded by the pegmatites. Hawley included analyses of two samples and concluded that the deposits were uneconomic. Further reference to this occurrence is made by Douglas (1953) and Fetzer (1953), neither of whom make reference to Hawley and were presumably unaware of his work. Douglas (1953) reported minor concentrations of magnetite associated with pegmatite dykes intruding gneiss. Fetzer (1953) investigated claims staked by the Atlantic Iron Ore Corporation, describing the property as consisting of granite and injection gneiss intruded by pegmatites ranging in width from stringers to 6 m in width, and, like Hawley, noted tourmaline and apatite, in addition to the more commonplace minerals. Both Douglas and Fetzer endorsed the conclusion that the magnetite was uneconomic.

The Wiseman Head occurrence (012P/09/Fe 003) is described by Schwellnus (1953) and Penstone and Schwellnus (1953) as magnetite in quartz veins and pegmatite (Plate 16) associated with anorthosite and biotite–quartz–plagioclase–microcline gneiss. Gower *et al.* (1994) did not map anor-

Plate 16. *Magnetite in pegmatite. Wiseman Head, northeast of Red Bay (mineral occurrence 012P/09/Fe 003).*

thosite in the vicinity, but the description of Penstone and Schwellnus (1953) allows for this being the Red Bay gabbronorite, which is nearby and, in places, is quite leucocratic, making the term anorthosite not unreasonable. The site is described as being 6.5 km northeast of the Red Bay lighthouse in MODS. This position is very close to where Gower *et al.* (1994) found a magnetite-rich (10%) pegmatite intruding quartzofeldspathic gneisses associated with K-feldspar megacrystic rocks and amphibolite. It is believed to be the same site and is now the locality adopted.

Few details are available for the Forteau occurrence (*012P/07/Fe 001*), which was only casually noted during 1:100 000-scale mapping. The pegmatite is recorded as containing abundant magnetite, but, interestingly, the host chloritized hornblende-bearing granite was described as 'volatile-rich', containing abundant pegmatite, microgranite and quartz-rich veins, implying that the surrounding area might be worth a search for other commodities.

Magnetite in pegmatite was noted for its size at two inland sites. Both are within the Mealy Mountains terrane close to its border with the Lake Melville terrane and regionally on strike with each other. In one (*013A/11/Fe 001*), magnetite occurs as 6-cm-diameter crystals in pegmatite intruding gabbro, whereas in the other (*013H/04/Mic002*, considered a biotite occurrence), contains magnetite up to 5 cm across.

Three other localities are mentioned here for completeness. The first is in the Temple Bay area, where a pegmatite containing rounded enclaves of very unusual composition was recorded (*002M/13/Ti 001*). The enclaves consist of a non-magnetic opaque mineral (ilmenite or hematite?) together with magnetite, garnet, possibly pyroxene and minor feldspar. No source rock for the enclave is known anywhere in the region, and, indeed, it is difficult to imagine from what rock type the enclave might have been derived. The second is situated east of Mary's Harbour, on Assizes Island (*003D/05/Fe 001*), where Christie (1951) described gneisses and pegmatites as being rich in crystals of iron oxide minerals, about 0.5 inches or more in diameter, concluding, from qualitative spectroscopic analysis that the mineral was probably titaniferous magnetite. The exact location is not given by Christie (1951) and the position is taken from MODS records. It is close to the central high point of the island, which appears to have been arbitrarily chosen by the mineral occurrence compiler. Identifying this site as a mineral occurrence is both trivial and artificial, as magnetite is very common in the granitoid rocks in the area.

Fluorite

Apart from the fluorite occurrences detailed below and shown on Figure 28, recall that fluorite has already been mentioned in two other pegmatites designated muscovite and amazonite occurrences (*013H/15/Mic001* on Black Island and *002M/13/Amz003* at Henley Harbour, respectively), and that it has also been reported in association with uranium mineralization in the Double Mer area (*013G/14/U 001*).

Lake Melville Terrane

On Highway 513 at a road cut 8 km west-northwest of St. Lewis (*003D/05/Fl 003*), deep purple fluorite is found in irregular pegmatitic segregations (Plate 17) within a mixed association of rocks that include psammitic and granitic gneiss. Two other fluorite occurrences were noted on the same stretch of highway, roughly 4 km and 24 km west of St. Lewis (*003D/05/Fl 002* and *003D/05/Fl 004*). In the first case, narrow veins of fluorite associated with specular hematite were seen within K-feldspar megacrystic granite. In the second case, the fluorite is confined to joint surfaces within granodiorite and amphibolite gneiss. Although neither of the latter two occurrences can be considered, strictly, to be pegmatite hosted, they are clearly part of the same mineralizing environment.

Plate 17. *Deep purple fluorite in irregular pegmatitic segregation. West of St. Lewis (mineral occurrence 003D/05/Fl 003).*

Pinware Terrane

Pale lilac fluorite is found on Battle Island in an elliptical boudinaged 20 by 10 cm pegmatitic pod within psammitic gneiss (*003D/05/Fl 001*).

Molybdenum

Groswater Bay Terrane

Molybdenite was claimed to be present in an aplite intruding diorite and quartz monzonite at a locality 11.5 km east of Cartwright (*013H/10/Mo 001*; Figure 28). The observation was made during 1:100 000-scale mapping and a field photograph taken. To the author, the supposed molybdenite in the photograph looks like magnetite, but he has not seen the outcrop.

Lake Melville Terrane

Molybdenite has been identified in pegmatitic neosome segregations at two localities in the Upper North River area (Figure 25). In one (*013G/09/Mo 001*), the host rock is a leucocratic, white-weathering biotite gneiss, also characterized by coarse-grained quartzofeldspathic segregations and biotitic schlieren. In the other (*013G/09/Mo 002*), the host rock is a fine- to medium-grained biotite granite containing common pegmatoid lenses and layers (with biotite selvedges) that appear to be leucosome/neosome. Molybdenite specks were seen in the leucosome, and garnet is present in the paleosome. Specks of molybdenite were also found associated with uranium mineralization in diatexite, more-or-less along strike, at occurrences *013G/14/U 001* and *013G/14/U 002* (*see* 'Uranium in diatexite').

One other molybdenite locality is included here (*003D/05/Mo 001*). The molybdenite occurs on joint surfaces in quartz diorite / leucoamphibolite gneiss in a road cut, 20 km west-northwest of St. Lewis. It is in the same area as several minor fluorite occurrences (*e.g.*, *003D/05/Fl 002* and *003D/05/Fl 004*), and may be related to the same fluid activity.

Mealy Mountains Terrane

A Mo occurrence (*013G/06/Mo 001*) (if it exists) was reported on a small island in the western part of Cache Lake in the southwest Mealy Mountains (Kents, 1980), and to consist of two examples of molybdenite in a plagioclase–hornblende rock (pegmatitic diorite). A radioactive mineral from the same area that was unidentified by Kents, had been previously claimed by MacDougall (1954) to be allanite in a pegmatite associated with syenodiorite. The island in Cache Lake can be easily located on the map provided by Kents, and was visited by the author in 2009, but no molybdenite was found. Some shiny opaque oxide (*cf.* ilmenomagnetite) was seen; this may have been mistaken for molybdenite.

Another Mo occurrence (*013G/03/Mo 001*) in the same area was reported by Hegler (1982). He mentions rosettes of molybdenite up to 1.5 cm in diameter in coarse-grained syenite, but does not precisely locate it on his map, other than stating that it is in the northwest part of the claim block, where a pegmatite is indicated. The location corresponds with aerial spectrometric U anomalies, the locations of which are shown by Hegler (1979).

Pinware Terrane

At the northern fringe of the Pinware terrane, on Wood Island in St. Lewis Sound, a pegmatite designated as a pyrite occurrence contains amazonite and minor molybdenite (*013A/08/Pyr003*).

Uranium (in Pegmatite)

Anomalous radioactivity and secondary uranium mineral staining has been found in several places in eastern Labrador (Figure 29). In some cases, it appears to be associated with irregular white-weathering diatexite within metasedimentary gneiss, whereas in others it is clearly associated with discordant pegmatite. All occurrences are interpreted to be related to syn-Grenvillian granitoid activity, thus are discussed here, but with the caveat that some could be older. A review of areas having potential for U mineralization was presented orally by the author (Gower, 2006). U mineralization has been subsequently discovered in two of the four targets suggested.

Lake Melville Terrane

Four other U occurrences are addressed in this section. One is situated on the west shore of Crooked Lake, but has been designated primarily a sulphide occurrence (*013H/05/Pyr006*) (Figure 11). At this site, Cherry (1978a, b) described the outcrop as comprising 90% pegmatite containing blocks of well-banded, biotite–garnet–quartz–feldspar, medium-grained gneiss. At the contact between two, a fine-grained, grey, massive, quartz-rich rock rich in pyrite, possibly also containing pyrrhotite and chalcopyrite, is present. The author visited the locality in 1984, recording garnet-bearing pegmatite yielding high scintillometer readings associated with rusty-weathering, garnet-rich psammitic gneiss, a sample of which yielded 4.2 ppm U – well above background levels in these rocks. The second, which might be associated with a minor granitoid intrusion, albeit not specifically pegmatite, is situated 20 km farther to the northwest (*013H/05/U 001*). At this site, anomalous radioactivity was detected during 1:100 000-scale mapping within very coarse-grained alkali feldspar granite, although a sample of the granite is not anomalously enriched in U (Table 49).

Table 49. Anomalously radioactive pegmatite, Crooked Lake, Lake Melville terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013H/05/U 001 (0.8 ppm U)	NN84-395B	2	6	39	2	-	141	2	-	-

Note: -, not analyzed

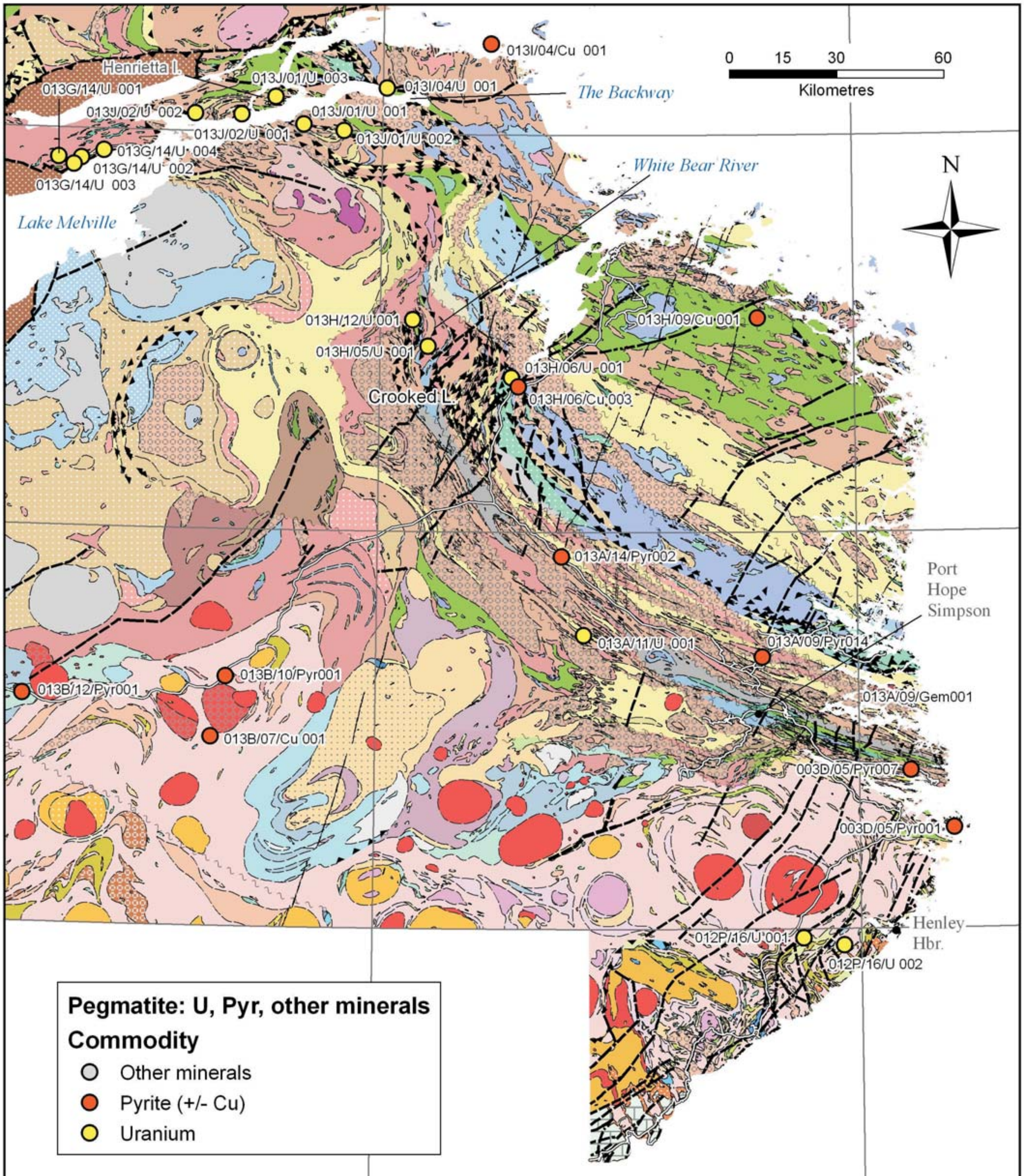


Figure 29. *Distribution of uranium, pyrite and 'other minerals' mineral occurrences in pegmatite.*

Note that this locality is very close to a geochronology site where similar coarse-grained granite was dated to be 1079 ± 6 Ma, *i.e.*, early Grenvillian. Rather than being a discrete pluton, it seems more likely that the Grenvillian rocks in this area form an agmatitic network of small irregular bodies and dykes that may well represent the roof of a pluton that exists at depth. This being the case, then other U-mineralization in the area is likely. At the third site (*013H/12/U 001*), 8.5 km farther northwest, Piloski (1955a) reported radioactivity 2–3 times background, along a fracture in a pegmatite intruding paragneiss. The mineralization was traceable for about 10'. The exact location of this site remains uncertain. Piloski noted that the outcrop is on the White Bear River, but the co-ordinates he gives are for a site 300 m west of the river. No outcrop was seen at that location during 1:100 000-scale mapping, although outcrops were examined 0.5 km to the east and south. The site is suspected to be at 1:100 000-scale mapping data station GF81-196 (UTM NAD27, Zone 21 443386 5931565), using, as evidence, similar structural measurements reported by Piloski and during 1:100 000-scale mapping. The fourth site, 11 km northeast of the first and located during 1:100 000-scale mapping (*13H/06/U 001*), was described as anomalous radioactivity in a tonalitic melt within a banded sequence of amphibolitic rocks, some of which may have been derived from a metasedimentary protolith.

Mealy Mountains Terrane

Sixty kilometres northwest of Port Hope Simpson, staking by Altius Resources and exploration by their joint venture partner Monroe Minerals (now Kirrin Resources Incorporated) led to the discovery of U mineralization at 'Anomaly Lake'. The site (*013A/11/U 001*) is so named because a lake-sediment sample from a GSC survey returned a value of 926 ppm U (fluorimetric analysis) and 1030 ppm (INAA analysis) – the highest lake-sediment sample in Labrador. The locality was visited by Altius Resources (Churchill and Butler, 2006) who obtained scintillometer readings in excess of 1500 counts per second from three samples. Rock samples collected during claim assessment by Monroe Minerals ranged from 91 to 2370 ppm uranium, with two samples having values of 1080 ppm and 2030 ppm uranium (www.kirrinresources.com/s/AlexisRiver.asp, 2009). The latter two results are from the core of a radioactive pegmatite near the southeastern edge of the claim block. In 2008, five holes were drilled for a total length of 1294.5 m. Values from two holes are given in Table 50.

Table 50. Analytical results from drill-hole samples for uranium in pegmatite, 'Anomaly Lake', Mealy Mountains terrane

Hole	U_3O_8(%)	Core length (m)
AL0802	0.754	58.90 - 59.10
AL0802	0.044	80.00 - 85.00
AL0802	0.069	83.00 - 85.00
AL0805	0.073	20.45 - 20.70
AL0805	0.065	76.00 - 77.00
AL0805	0.188	197.70 -198.55

A locality situated 25 km to the northwest of Anomaly Lake and directly along strike, has potential relevance to U exploration in the region. At this locality, a whole-rock analysis was obtained for a sample from a biotite granodiorite dyke selected for dating (yielding an age of 1047 ± 3 Ma). A value of 4.6 ppm U was obtained from the dyke, far higher than values obtained from most granitoid rocks in eastern Labrador. It is neither arrestingly anomalous nor designated a 'mineral occurrence', but it does suggest that there is potential for other U mineralization in the area, especially along strike, and that Grenvillian minor granitic intrusions are the specific target to be sought. Incidentally, some pegmatites described earlier displaying large biotite books and/or large magnetite crystals also fall along the same regional structural trend.

Pinware Terrane

U mineralization in pegmatite has been discovered in an area southwest of Henley Harbour by Silver Spruce. This area is characterized by multi-element lake-sediment anomalies. They cover a fairly large area for U and Cu, but are more localized for Ag, As and Mo (Gower *et al.*, 1995b). At their 'LP' showing (*012P/16/U 001*), Silver Spruce reported an irregular pegmatite dyke system, which can be traced for a few hundred metres, that gave U_3O_8 values from 10 samples ranging from 38 pm to 2650 ppm (0.26% or 5.2 lbs/ton). Six samples exceeded 100 ppm and two exceeded 0.2% U_3O_8. A second discovery was made 11.5 km to the east-southeast – the 'WD' showing (*012P/16/U 002*). Although not specified to be in pegmatite, it is otherwise logically included here. At the site, a cluster of large boulders of orthogneiss/paragneiss showing strong uranophane staining within a radiometric anomaly 600 to 800 m long gave values of 92–1391 ppm (0.14% or 2.8 lbs/ton) U_3O_8, with three or four samples >400 ppm. In another part of the area, a radiometric anomaly of 800–1000 m in length gave values of 439 ppm and 384 ppm U_3O_8 from two rock samples and in the western portion of the area, a linear, north–south-trending zone gives values from 10.6 to 125 ppm U_3O_8. Host rocks are aplites, mafic intrusives (gabbros), gneisses and pegmatites.

In a press release, dated July 6th, 2010, Silver Spruce announced further analytical results from samples previously targeted for U. Highlights are data for REE, Zr, Y and Nb. Values were obtained up to 2.38% total REE and 0.1% Y in one sample, 0.17% Y, 2.21% Zr and 0.06% Nb in others (values rounded off).

Uranium (in Diatexite)

Lake Melville Terrane

Ten U occurrences fall into this category and define an arcuate, convex-to-the-north, overall east to east-southeast trending zone within the Lake Melville terrane, following the regional structural trend (passing through Henrietta Island, 10 km south of Rigolet). Two other localities are included here, also in the Lake Melville terrane, although it is somewhat less certain that they belong to the group (*013I/04/U 001* and *013H/06/U 001*). Most of the occurrences are associated with pegmatitic material, termed diatexite, within metasedimentary gneiss. The pegmatitic material is white-weathering, forms irregular masses and shows very variable grain size. Two of the mineralized sites were discovered during early exploration by Brinex; three more were found during a follow-up investigation of lake-sediment geochemical anomalies; one more site was found in the same area during later company exploration; and four sites were discovered during 1:100 000-scale mapping.

The two earliest discoveries were reported by Piloski (1955a). At one (*013J/01/U 002*), which is not known to be shown on any map, Piloski reported radioactivity 3 times above background. The location is described as an inland lake approximately 12 miles from another mineral occurrence 8 miles from the eastern end of The Backway. As the location of the second-mentioned site is fairly certain, the position of first-mentioned locality can be inferred, putting it at 1:100 000-scale mapping data station RG80-512 (UTM NAD27, Zone 21 423681 5984709) , at which site the field description agrees with the information given by Piloski. Nevertheless, the exact site position remains unknown. The mineralization occurs in hematite-filled fractures in granitic gneiss. At the other site, on the north shore of The Backway (*013I/04/U 001*), radioactivity of about 5 times background was detected in a pegmatitic phase of a granite having an abnormal mafic mineral content. The granite is described as a medium- to fine-grained, pink, feldspar porphyry intruding paragneiss. It was noted that the rocks are strongly fractured and that hematite alteration is abundant. Follow-up exploration by Senlac Resources (Beavan, 1980) was carried out in 1980. Anomalous radioactivity was found in several places, but no *in situ* U mineralization was located. The fractures and hematite-stained character of the rocks were interpreted during 1:100 000-scale mapping to be related to brittle fracturing associated with the Lake Melville rift system; the pegmatitic material is considered Grenvillian or older.

The three sites discovered as a result of a follow-up detailed lake-sediment geochemical survey are all situated on the north side of Lake Melville (Kerswill and McConnell, 1979). The site that formed prime focus of the investigation was termed Zone A (*013G/14/U 001*), at which a 1-km^2 grid was cut and spectrometer surveying and sampling carried out. The outcrops and boulders within the grid area are principally foliated quartz monzonite to granite, and range from coarse grained to pegmatitic. The uranium mineralization is confined to particular layers, which were noted to be more siliceous and garnetiferous than typical for the area. Within the garnetiferous zones, the radioactivity is intimately associated with biotite and chlorite. The radioactive mineral was petrographically identified to be uraninite. It occurs as disseminated grains commonly enclosed by biotite, chlorite and garnet. Bailey (1980) mapping in the area, reported minor molybdenite in a radioactive boulder and noted that fluorite had also been recognized. Gower and Erdmer (1984), summarizing information from McConnell, 1979) also mentioned that molybdenite had been found, occurring as specks less than 0.5 cm across associated with uraninite and pyrite. A sample that gave a U analysis of 2932 g/tonne had a corresponding value of 464 g/tonne Mo. Further information and summaries are given by McConnell (1978, 1979, 1982) and Kerswill and McConnell (1982).

Exploration was carried out in the same area by Northgate Exploration in joint venture with Whim Creek Consolidated (Snow and Parker, 1979a). The explored area included the 1-km^2 grid of Kerswill and McConnell. Snow and Parker described the rocks as:

i. Leucogranite bands separated by subordinate biotite amphibolite gneiss and quartzose banded gneiss;
ii. Well-banded, fine-grained biotite amphibolite gneiss with subordinate bands of leucogranite;
iii. Leucogranite gneiss with subordinate bands of migmatitic and schlieric rock; and,
iv. Irregular, elongated lenses of medium- to coarse-grained leucogranite (author comment; *cf.* diatexite).

The leucogranite intrudes all of the above rocks and is the unit with which U mineralization is associated, especially near marginal areas where more biotite-rich compositions occur. Numerous radioactive boulders were found across the area. Nearly all are leucogranite, with the more anomalous ones having a higher melanocratic mineral content. Some boulders exceeded 5000 counts/second, but most are near 2000 counts/second. The occurrence was re-staked by Christopher Terry in 2006 and acquired by Ucore Uranium in the same year (Reid and Penney, 2007). It is currently part of Silver Spruce's holdings. Note that the position adopted for the locality is about 100 m east of where indicated by Erdmer (1984) as a U occurrence.

In the vicinity of the occurrence designated as 'B' (*013G/14/U 002*) by Kerswill and McConnell (1979), exploration was reported by Northgate Exploration in joint venture with Whim Creek Consolidated in three areas (Snow and Parker (1979b, c, e). Uranium mineralization was traced by detailed prospecting and trenching over a strike length of 600 m. The trenching revealed uranophane staining on joints and fractures, with the highest radioactivity being associated with areas of abundant mafic minerals in leucogranite, and, occasionally, with quartzose lenses. Minor molybdenite, chalcopyrite, pyrite and magnetite are associated with the mineralization. The mean uranium grade for the entire zone was determined to be 0.98 lbs/short ton across a width of 5 m. During follow-up exploration in 1980, 8 holes were drilled. Three of these were on claim block 1554 for a combined length of 201 m, from which twenty metres of core were assayed, yielding a maximum value of 0.02% U_3O_8. The other five holes were on claim block 1556 for a combined length of 410 m, from which 20 m of core were assayed, yielding a maximum value of 0.072% U_3O_8. It was concluded that uranium bodies of significant size were not present and that exploration should be terminated (Snow, 1980a, b). Occurrence 'B' is 0.7 km west-southwest of where indicated by Erdmer (1984) as a U mineral occurrence. Bailey (1980) noted large black crystals of tourmaline in this area.

At the locality designated as occurrence 'C' (*013G/14/U 003*) by Kerswill and McConnell (1979), radioactivity was found to be associated with garnetiferous siliceous granitic gneisses interbanded with darker-coloured gneisses. Black tourmaline was noted in the area of greatest radioactivity. At the remaining U occurrence in this area (*013G/14/U 004*), which was not identified by Kerswill and McConnell and is not shown on the map of Erdmer (1984), scanty mineralization was seen. It was identified as uranophane by Snow and Parker (1979d).

The author visited the Lake Melville U-mineralized area in 1980 and identified sillimanite in thin section made from a sample of drill core obtained from occurrence 'B'. The thin section also contains abundant graphite, quartz, microcline feldspar, biotite and zircon. Erdmer (1984) discussed the origin of the leucogranite, noting that Gower *et al.* (1981) correlated its distribution with high-grade metasedimentary gneiss. Gower and Erdmer (1984) also emphasized the association between the leucogranite (diatexite) and pelitic/psammitic gneisses and accepted the two-stage model of Kerswill and McConnell, whereby U was initially concentrated in metasedimentary strata during one or more pre-Grenvillian events, then uraninite-bearing diatexite was produced during a partial melting event, perhaps during Grenvillian orogenesis. With additional information now available, it can be reasonably claimed that the uranium mineralization in the diatexites in the north and pegmatites farther south are mutually related. Both are concentrated in the Lake Melville terrane. The change in character of the mode of occurrence of uranium mineralization, from semi-discordant diatexite in the north to discordant pegmatite in the south, may simply reflect exposure of a deeper crustal level in the north than south. This, in turn, can be linked to the Himalayan-analog, frontal-thrust and lateral-ramp tectonic model for Grenvillian orogenesis of Gower *et al.* (2008b).

At the four sites discovered during 1:100 000-scale mapping (*013J/01/U 001*, *013J/02/U 001*, *013J/02/U 002* and *013J/01/U 003*), the uranium mineralization was seen in outcrop in the form of pale to dark canary-yellow or greenish-yellow staining in pegmatitic material (Plate 18). The best example yielded a scintillometer reading of 5440 total counts/second (*013J/01/U 001*).

Plate 18. *Pale yellow uranophane staining on weathered surface of pegmatite. Scintillometer is giving a reading of 5200 total counts/second. South of Henrietta Island (mineral occurrence 013J/01/U 001).*

The remaining site (*13H/06/U 001*) is situated 19 km southwest of the community of Paradise River and does not easily fit into this group of occurrences, or elsewhere. It is based on anomalous radioactivity detected in granitic/tonalitic segregations in a banded (mylonitized) sequence of dominantly amphibolitic rocks, although some rocks at the locality were tentatively interpreted as derived from a sedimentary protolith. Commenting on the source of the radioactivity would be pure speculation; the locality needs to be re-examined.

Pyrite (± Cu)

Ten pegmatite mineral occurrences have been identified in which the primary commodity is sulphide. Some of these have already been mentioned in connection with other exploration targets. Six of the occurrences have been designated as having indications of Cu mineralization and four are for pyrite (assumed to be such, where merely recorded as sulphide in field notes). Five of six Cu occurrences were found during 1:100 000-scale mapping. None show correlation with regional geology, all are trivial, and they have little in common. None is of economic significance in isolation, but the pattern, when considered in conjunction with other signs of mineralization, is extremely relevant to exploration forays in the region.

Groswater Bay Terrane

One Cu occurrence (*013I/04/Cu 001*) is a pegmatite in the Groswater Bay terrane, and, apart from typical pegmatite-forming minerals, it also contains chalcopyrite, calcite and tourmaline. The host rock is garnet-bearing metagabbro.

Hawke River Terrane

The Cu occurrence in the Hawke River terrane is near its northeastern margin (*013H/09/Cu 001*) and is a 10-cm-wide pegmatitic vein containing traces of chalcopyrite intruding hornblende diorite. Also in the Hawke River terrane, but on its southwestern margin (*013H/06/Cu 003*) a pegmatite intruding amphibolite was described as containing metallic minerals. An analyzed sample gave 559 ppm Cu (Table 51).

Lake Melville Terrane

In the central part of the Lake Melville terrane, sulphide-rich pegmatite and some magnetite-sulphide pegmatite with greenish plagioclase was seen intruding garnet–sillimanite pelitic gneiss (*013A/14/Pyr002*). On the northeast side of the Lake Melville terrane, a 30-cm-wide pegmatite, containing abundant pyrite, allanite and trace chalcopyrite intruding K-feldspar megacrystic granodiorite was seen (*013A/09/Pyr014*). On the southwest side of the Lake Melville terrane, on Highway 513 (*003D/05/Pyr007*), pegmatite was noted to carry minor sulphide. This locality, however, is of greater interest in connection with of traces of mineralization in other rocks (fluorite, amazonite, chalcopyrite, zirconium and REE; *see* elsewhere in this report). Analytical results from two localities are given in Table 52.

Pinware Terrane

At the northern boundary of the Pinware terrane, on Wood Island, minor pyrite is found in pegmatite, associated with amazonite and molybdenite (*013A/08/Pyr003*), and, on strike to the southeast, at Cartridge Bight (*003D/05/Pyr001*), a sulphide-bearing pegmatite vein was seen intruding amphibolite–diorite.

An inland occurrence (*013B/10/Pyr001*) was described as concordant pegmatitic material containing minor sulphide within diorite, tonalite and granodiorite gneiss. Chalcopyrite mineralization in a 2-mm-wide veinlet was also noted. Farther west (*013B/12/Pyr001*), a 2-m-wide pegmatite, carrying both pyrite and chalcopyrite, intrudes a hornblende-rich melanocratic mafic rock.

At the most southerly example in the interior Pinware terrane (*013B/07/Cu 001*), malachite and azurite were seen, but the mineralization is only 1 cm long, so it can be questioned as to whether or not it should even be regarded as a mineral occurrence.

All five occurrences were found during 1:100 000-scale mapping.

Other Minerals

Exotic minerals in pegmatite in eastern Labrador are rare and many are likely only to be of interest to mineralogists or mineral collectors. Given the rather cursory attention that pegmatite, in general, received during 1:100 000-scale mapping, it is expected that, over time, there will be many additions to those named below.

Tourmaline has been reported from seven pegmatite localities (*012P/09/Fe 001*, *013A/09/Gem001*, *013H/02/Mic005*, *013H/16/Mic001*, *013H/16/Mic004*, *013J/01/Mic001* and *013I/04/Cu 001*), although in one or two cases the identification was equivocal. The crystals are black and small, and not likely even to attract the attention of mineral collectors. Except for *013A/09/Gem001*, all these occurrences are mentioned in connection with other commodities. In this occurrence, both tourmaline and magnetite were found in a coarse-grained granitic vein intruding pelitic metasedimentary gneiss. Note that tourmaline has also been reported from uranium-mineralized localities *013G/14/U 002* and *013G/14/U 004* although it is not entirely clear that the mineralization

Table 51. Copper occurrence in pegmatite, northeast Hawke River terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013H/06/Cu 003	CG04-201B	559	11	98	4	14	1	3	n.d.	2

Note: n.d., not detected

Table 52. Pyrite occurrences in pegmatite, central Lake Melville terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013A/14/Pyr002	CG03-354E	24	146	13	13	8	15	2	0.1	-
013A/09/Pyr014	CG04-051B	319	46	48	47	15	5	8	n.d.	3

Note: n.d., not detected; -, not analyzed

is associated with pegmatite material. Tourmaline (dravite) was also found during 1:100 000-scale mapping at CG86-132 (UTM NAD 27, Zone 21 562842 5863652; Appendix 2), but has not been designated as a mineral occurrence.

Aquamarine-beryl (*013H/02/Mic004*) has been identified at a single locality in the Hawke River terrane, associated with 30-cm-diameter muscovite plates (*see* earlier).

Topaz (*013J/15/Gem001*) has been reported from the Makkovik Province, associated with amazonite (*see* earlier).

Allanite, forming clumps at least 10 x 10 x 3 cm, has been collected by the author from pegmatite intruding the Alexis Bay anorthosite, in the Lake Melville terrane, at data station CG03-224 (UTM NAD 27, Zone 21 547414 58233482). One of the pegmatites at the same location is noteworthy because of its zeolite content (stilbite and scolecite; Appendix 2). Allanite is also noteworthy on Wood Island at the northern boundary of the Pinware terrane, at data station CG03-180 (UTM NAD27, Zone 21 341300 5774300). These localities have not (yet?) been formally designated as mineral occurrences, as allanite in granitoid rocks is common. Nevertheless, it is very unusual to find it as large or abundant as seen at these sites. Allanite, at pyrite occurrence *013A/09/Pyr014*, was also deemed worthy of mention in field notes because of its abundance. A whole-rock analysis of a sample from the locality does not show elevated REE.

In a press release dated July 27th, 2010 Search Minerals reported REE mineralization in pegmatite-aplite dykes and veins ranging from 2 cm to 1.5 m wide on Wood Island. The main mineralogical zone is 300 by 300 m and the mineralization includes heavy REE, Zr, Y, and Nb (Table 53).

Table 53. Rare-earth-element and Y values reported by Search Minerals from the Island prospect (ppm)

Sample	Total REE +Y	Total LREE	Total HREE
MH-068 (lithogeochemical)	50 833	19 920	11 433
MH-080 (11 cm channel)	38 192	16 931	7 811
MH-084 (13 cm channel)	45 409	12 106	11 393

RED BAY GABBRO

The Red Bay gabbro/gabbronorite belongs to a group of moderately to weakly deformed mafic, anorthositic and syenitic plutons emplaced between 980 and 966 Ma in the southern part of the Grenville Province in Labrador and adjacent Quebec. The emplacement age of the intrusion is 980 ± 3 Ma. The body appears to have potential for sulphide and oxide mineralization, based on pyrite (and chalcopyrite?) and magnetite/ilmenite occurrences (Figure 30).

Pyrite (± Cu)

The pyrite occurrence in the Red Bay gabbro (*012P/16/Pyr003*) is sourced on observations made during 1:100 000-scale mapping that massive, homogeneous leucogabbro at that locality has a pervasive rustiness (caused by disseminated pyrite seen in outcrop and confirmed in thin section), coupled with Bostock's (1983) mention that specimens of chalcopyrite and ilmenite, shown to him by local people, were claimed to have been found in the drift in the vicinity. Parts of the Red Bay intrusion were investigated by van Nostrand and Mark (1996). Mineralization was found as disseminated pyrite and pyrite lenses, disseminated pyrrhotite and very locally chalcopyrite associated with hematized gabbroic rocks. Minor disseminated pyrite is also present in unaltered, massive leucogabbro. Numerous samples were analyzed but no significantly anomalous metal values were obtained.

Magnetite/Ilmenite

The identification of a magnetite/ilmenite occurrence (*012P/09/Fe 002*) in the Red Bay gabbro is based reports by Schwellnus (1953) and Penstone and Schwellnus (1953) that several small magnetite and ilmenite lenses were found on a small island just east of the entrance to Red Bay, and that an anorthosite in the Red Bay area was noted as containing "disseminated magnetite and ilmenite together with a slightly higher proportion of a mineral that might be chromite". The anorthosite to which reference is made is undoubtedly the Red Bay intrusion, which is quite leucocratic in places.

LATE-TECTONIC ALKALIC MAFIC DYKES

The late-tectonic (with respect to Grenvillian orogenesis) mafic dykes are small, follow pre-existing brittle factures in outcrop, are fine grained, locally amygdaloidal, and commonly show quenched textures in thin section. Two dated dykes have ages of 985 ± 6 Ma and 975 ± 6 Ma (Wasteneys *et al.*, 1997). It is an assumption that the pyrite-bearing dyke addressed here belongs to this suite.

Pyrite

The dykes are not typically mineralized but one dyke, 17 km southwest of Henley Harbour (Figure 30), contains abundant plagioclase and pyrite phenocrysts (*012P/16/Pyr004*).

LATE- TO POST-TECTONIC GRENVILLIAN GRANITOID PLUTONS

Late- to post-tectonic (with respect to Grenvillian orogenesis) plutons are confined to the southern part of the region.

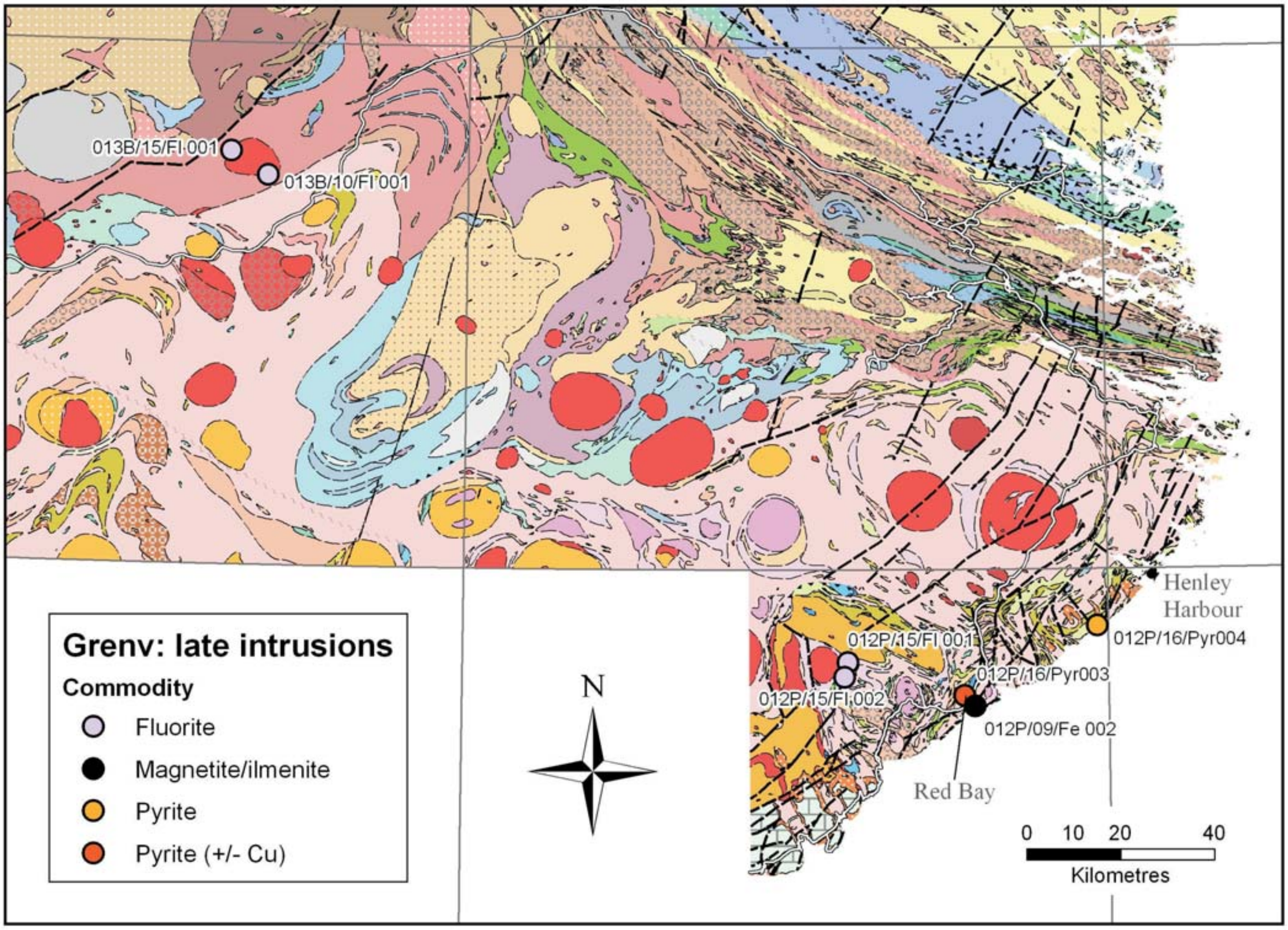


Figure 30. *Distribution of mineral occurrences in late-Grenvillian intrusions (both mafic and felsic).*

They occur mostly in the Pinware terrane, but also encroach into the southernmost parts of the Mealy Mountains terrane. The plutons are generally circular in plan, mostly have a diameter between 5 and 20 km and are typically characterized by distinct magnetic anomalies. Several high-precision geochronological ages have been obtained and indicate emplacement ages between 966 and 956 Ma, although one monzonite pluton is as young as 951 Ma. The rock types include monzonite, syenite (and quartz-prefixed variants) and granite. In general, these plutons do not seem to be very promising exploration targets, and the only commodity identified so far is fluorite.

Fluorite

Fluorite is known from two localities (*013B/10/Fl 001* and *013B/15/Fl 001*) within a single pluton (Figure 30), dated to be 964 ± 3 Ma (Gower *et al.*, 2008a). The host rock type is massive, coarse-grained, homogenous alkali-feldspar granite. The fluorite was seen in thin sections of samples collected during 1:100 000-scale mapping. It is interstitial and minor. Interestingly, this pluton is the most northerly of those mapped, situated where the northern limit of late- to post-Grenvillian plutons changes from northeast-trending (farther west) to southeast-trending (in the east). The significance of the change in trend in terms of frontal and lateral tectonic ramps is discussed by Gower *et al.* (2008b). Analytical results for the host rock containing fluorite are given in Table 54.

Table 54. Host-rock analytical data from a fluorite-bearing late- to post-tectonic Grenvillian pluton

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
013B/10/Fl 001 (1066 ppm F)	CG97-300	3	67	39	2	n.d.	2	1	n.d.	n.d.
013B/15/Fl 001 (1938 ppm F)	CG97-179	3	39	57	n.d.	n.d.	n.d.	2	n.d.	n.d.

Note: n.d., not detected

Fluorite was also reported in leucocratic hornblende granite at two localities 27 km west-northwest of Red Bay by

Bostock (1983) (*012P/15/Fl 001* and *012P/15/Fl 002*). A sample from the second locality was examined spectrochemically; tin and tungsten were found to be less that 0.0005% and 0.01%, respectively. Although included in this section, it is not known whether the host rock in either case is late- to post-tectonic Grenvillian granite. Both occurrences are within 2 km of the late- to post-tectonic Stokers Hill pluton and could be satellite intrusions related to it. Alternatively, the rocks could be Pinwarian or Labradorian, but, as fluorite does not seem to characterize those groups elsewhere, there is no particular reason to favour those options. High heavy REE lake-sediment values occur in the vicinity of the fluorite occurrences (McConnell and Ricketts, 2010).

GRENVILLIAN METALLOGENY AND POTENTIAL

Grenvillian metallogeny and potential can be considered in four groups, roughly in order of decreasing age, namely i) alkali-feldspar nepheline syenite, ii) mafic intrusions, iii) pegmatite, and iv) late- to post-tectonic granitoid plutons.

Alkali-feldspar Nepheline Syenite

Although currently mostly of interest from an industrial-mineral perspective, the possibility that these rocks and related non-nepheline-bearing alkali-feldspar syenite intrusions might host other commodities (most obviously, Zr) should not be dismissed. A similar-age example in the Grenville Province, where such is the case, is the 1033 Ma Kipawa syenite in southwest Quebec (van Breemen and Currie, 2004), which hosts Zr, Y and REE mineralization.

Mafic Intrusions

Mafic intrusions do not form a high proportion of Grenvillian rocks in eastern Labrador, but merit some attention. The potential for Cu mineralization in the Red Bay gabbro/gabbronorite is one example but several small bodies that are probably correlative exist elsewhere in the Pinware terrane and deserve investigation. The alkalic mafic dykes addressed earlier form part of this group of rocks, but are too small to be of economic interest in isolation.

Pegmatite

Pegmatite is ubiquitous throughout eastern Labrador. Although most are too trivial to be of economic significance, some are very large, exceeding 100 m width. In addition to their obvious industrial mineral potential for mica (especially muscovite) and amazonite, the pegmatites are highly prospective for U, Mo, Nb, Ta, F and REE, particularly in the Lake Melville and Pinware terranes.

There may be a genetic link between pegmatites in the southern Lake Melville terrane and the diatexites in the northern part of the Lake Melville terrane. Although the age of the diatexites is not known, a model favoured by the author is that they represent near *in situ* fluids derived from pelitic metasedimentary gneiss during Grenvillian orogenesis. The northern part of the Lake Melville terrane represents a deeper crustal level than its southern counterpart so they could be genetically related to discordant pegmatites in the south that represent fluids farther traveled from their source. Also, it appears, from current distribution of mineral occurrences, that the southern side of the lake Melville terrane is the most prospective region for this type of mineralization. From a tectonic viewpoint, it represents a major structural boundary, being the most active part of the Grenvillian lateral ramp mentioned earlier (Gower *et al.*, 2008b).

The most prospective part of the Pinware terrane is also structurally controlled, but in an entirely different way. Most mineral occurrences are found in a structurally down-faulted block that was formed during extension prior to the opening of the Iapetus Ocean (Gower, 2007), thus preserving lower grade, higher level crust, much of which is of felsic volcanoclastic origin.

It is also worth keeping in mind that mineral exploration in late-magmatic granitic/pegmatitic rocks elsewhere in the Grenville Province has proved very rewarding. Examples include 1.05 Ga U–Th–Nb–REE and Mo-enriched pegmatites and skarns in the Central Metasedimentary Belt in Ontario and IOCG mineralization in the Adirondack Highlands and at the Kwyjibo deposit in eastern Quebec (Corriveau *et al.*, 2007, and references therein).

Late- to Post-tectonic Granitoid Plutons

Currently, the late- to post-tectonic plutons do not have demonstrated mineralization, except for traces of fluorite. Lake-sediment samples from areas underlain by the plutons show distinct enrichment in Zn and Cd, and, in some cases, REE.

GRENVILLE PROVINCE–LATE PROTEROZOIC TO RECENT

Post-Grenvillian events in eastern Labrador are mainly linked to Late Proterozoic rift–drift tectonism that heralded the opening of the Iapetus Ocean. Tangible evidence of these events is provided by i) the Long Range dykes, ii) supracrustal rocks of the Bateau, Lighthouse Cove and Brador formations and Forteau Group, iii) the development of giant quartz veins and brittle-fault systems (Figure 31).

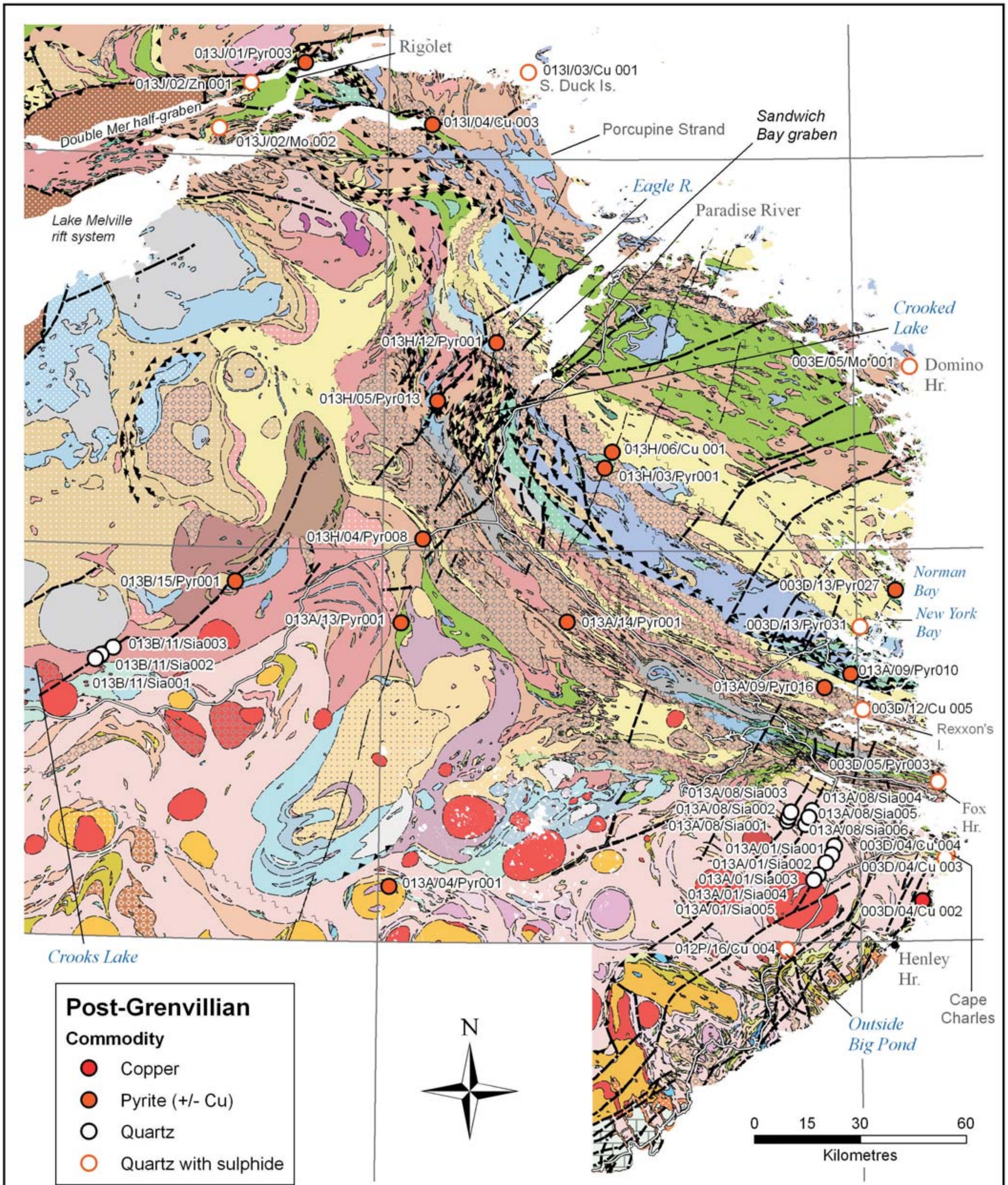


Figure 31. *Distribution of mineral occurrences in post-Grenvillian rocks.*

LONG RANGE DYKES

The term Long Range dykes was originally applied by Bostock (1983) to a swarm of northeast-trending mafic dykes that intrude Grenvillian rocks of the Long Range Inlier in northwest Newfoundland. Subsequently, the name was also adopted for dykes of similar trend and age that transect Grenvillian rocks in southeast Labrador. The time of emplacement of two dykes in Labrador has been precisely dated at 615 ± 2 Ma (Kamo *et al.*, 1989) and 614 +6/-4 Ma (Kamo and Gower, 1994).

The dykes in Labrador (Figure 31) show an average trend of about 20°, having a small but distinct contrast in orientation from those of the Long Range Inlier, which trend at about 40°. Unlike the numerous, closely spaced, narrow dykes in the Long Range Inlier, the dykes in southeast Labrador are sparse (6 major dykes) and very much wider, being, in some cases, well over 100 m wide. The Long Range dykes in Labrador also extend over long distances, albeit as a series of en echelon segments. The westernmost dyke, which can be traced from Porcupine Strand, north of Cartwright, to the north shore of the St. Lawrence, is over 200 km long. Some small dykes are also present, and, doubtless, more small dykes (and extensions to the larger ones) will be discovered during future mapping. The dykes are not well exposed away from coastal areas, although can be easily located on high-resolution magnetic maps, where such are available. Typically the rock type is a massive, brown-weathering, coarse-grained, ophitic-textured gabbro, and is characterized by common interstitial K-feldspar. In rare cases, the K-feldspar is sufficiently abundant for the name syenogabbro to apply.

Pyrite (± Cu)

It is the margins of the Long Range dykes that are of potential interest to mineral explorationists. In places, they are ocherous, sulphide bearing and have a rubbly, gossanous appearance, although the widest zone of such material recorded seen so far is only about 30 cm. From visual estimates, sulphide abundance is typically less than 2% and is dominantly pyrite, but, locally, there is some Cu mineralization. For the most part, it seems that the mineralization is in the host rock, rather than within the Long Range dyke itself, thus raising the issue of the relative roles of dyke versus country rock.

Most observations (*013A/04/Pyr001*, *013A/09/Pyr010*, *013A/13/Pyr001*, *013A/14/Pyr001*, *013H/03/Pyr001* and *013H/04/Pyr008*) were made during the course of mapping and would seem to be trivial from an economic standpoint. Occurrences in four areas hint otherwise, however. The first, and best-documented area is New York Bay, where van Nostrand (1996a, b) investigated on behalf of Consolidated Callinan Flin Flon Mines. It was recorded by van Nostrand that malachite alteration is most abundant within 1 to 10 m of a major Long Range dyke, and is found in a wide range of rock types (metasedimentary gneiss, late granite veins, monzonite, quartz veins). It is also locally found within the dyke margin itself (occurrences *003D/13/Cu002* and *003D/13/Cu003*; *see* Cu section on pelitic gneiss, Dead Islands area, and other relevant localities *003D/13/Cu004* and *003D/13/Cu005*). Note that pyrite was recorded at the edge of the same dyke in the Norman Bay area, 16 km to the north-northeast (*003D/13/Pyr027*), and on Highway 515 to Pinsent's Arm, 11 km to the south-southwest (*013A/09/Pyr016*; Table 55; Plate 19). It was concluded by van Nostrand (1996a, b) that alteration in rocks of various ages and lithologies in close proximity to the dyke indicated that it played a role in generating mineralization.

The second area is about 27 km southeast of the community of Paradise River. At this site (*013H/06/Cu 001*), considerable sulphide mineralization was found in gneisses (pyrrhotite, pyrite and chalcopyrite). A contact between augen

Plate 19. *Minor pyrite occurrence at margin of Long Range dykes. Two dykes are present and their borders outlined in the image to improve clarity. Pyrite is concentrated on the left-hand side of the wider dyke. East of Charlottetown (mineral occurrence 013A/09/Pyr016).*

Table 55. Pyrite occurrence at margin of Long Range dyke, Highway 515, west of Pinsent's Arm

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppm
013A/09/Pyr016	CG04-104C	14	79	6	74	41	49	2	0.6	n.d.
013A/09/Pyr016	CG04-104D	21	95	5	72	39	47	2	0.6	n.d.

Note: n.d., not detected

gneiss and banded gneiss is recorded. Of three samples assayed for Cu and Ni, one gave Cu content of 0.14% (Bradley, 1966). Kranck (1966) elaborated that a quartz–garnet gneiss associated with amphibolite and containing finely disseminated sulphides was found at a stream outcrop. Nearby, is an amphibolite mineralized with pyrite. It is pointed out that the gneisses in this area are of metasedimentary origin and are typically very rusty looking. The geochemical anomaly has a north-northeast orientation, and is parallel to a Long Range dyke at that location, which means the dyke could be the source of the geochemical anomaly and/or have played a role in the mineralization.

The third area is 10 km southwest of the mouth of Eagle River, where Sutton (1965), made reference to 'mineralized hills of mafic composition' and reported a sample having 0.07% Cu. From mapping by Gower (2010), the location (*013H/12/Pyr001*) coincides with the margin of the westernmost known Long Range dyke. The dominant rock type in the area is a K-feldspar megacrystic granitoid rock, containing remnants of both metasedimentary gneiss and meta-gabbro. The site has not been visited by the author, and it remains unknown whether the anomalous Cu is related to the Long Range dyke, the earlier meta-gabbro, or some other rock type.

The fourth area is 5.5 km west of the central part of Crooked Lake, where minor Cu and Ni mineralization (*013H/05/Ni 001*, *013H/05/Ni 002*, *013H/05/Ni 003* and *013H/05/Ni 004*) has been found. In the section on metasedimentary-gneiss-hosted Cu mineralization, the speculation was made that a small gabbro body mapped in the area could belong to the Long Range dyke swarm, as an unrecognized addition to those already known in the area.

Combining observations, namely i) that sulphide-rich margins to Long Range dykes are common in southeast Labrador, and ii) that malachite alteration in host rocks to a Long Range dykes correlates with proximity to the dyke, suggests these occurrences represent a previously unrecognized exploration target in southeast Labrador – particularly for Cu, but also other metals – Au, for example. Factors to be considered in exploration are certainly the size of the dyke and its host rocks, especially where the host rock is metasedimentary gneiss. Another aspect is potential linkage with northeast-trending quartz veins and fault breccias that are also part of Iapetus-Ocean-related rifting.

LOWER LABRADOR GROUP

The Lower Labrador Group comprises the Bateau and Lighthouse Cover formations. In southeastern Labrador, the Bateau Formation occurs as several small outliers, mostly north and south of Henley Harbour, where it comprises conglomeratic and feldspathic arenites up to 20 m thick. The Lighthouse Cove Formation conformably overlies the Bateau Formation, but also rests directly on Grenvillian basement in places. It is best exposed at Henley Harbour, where it consists of a single flow about 20 m thick divisible into a lower columnar part and an upper hackly part. Only minor Cu mineralization has been identified in these rocks.

Copper

Local malachite staining was noted in Bateau Formation rocks north of Henley Harbour during 1:100 000-scale mapping, and Meyer and Dean (1988) observed disseminated chalcopyrite in several chip samples of the overlying Lighthouse Cove Formation (*003D/04/Cu 002*).

QUARTZ VEINS

Quartz in Giant Veins

Attention is first focused on three, giant, parallel quartz veins (up to 400 m wide and, discontinuously, up to 20 km long) that transect the eastern Pinware terrane. The quartz veins are clearly due to brittle faulting and, because of a common north-northeast trend, can be related to the same fracture system as that utilized by the Long Range dykes and associated rifting, which foreshadowed the formation of the Iapetus Ocean.

The giant quartz veins were first recorded by Piloski (1955a), subsequently mapped by Eade (1962), investigated by Brinex in 1982, re-examined by Meyer and Dean (1986) and staked by Trinity Resources and Energy in 1996. Gower *et al.* (1988a, b) briefly inspected the quartz veins during mapping of the St. Lewis River area, and Gower (2007) suggested that the location of the quartz veins was cogenetic with the formation of an Iapetus-related rhomb-shaped rift basin south of Henley Harbour, both having developed because of a change in trend of systems of normal faults, which are northeast-trending south of Henley Harbour and north-northeast-trending farther north.

The objective of the re-examination by Meyer and Dean (1986) was to assess the veins for their silica potential. They devoted their attention to the easternmost of the three veins, describing it as consisting of a series of 5 northeast-trending ridges in a single alignment, spaced up to 2 km apart (*013A/01/Sia001*, *013A/01/Sia002*, *013A/01/Sia003*, *013A/01/Sia004* and *013A/01/Sia005*). The ridges are up to 1.5 km long, 0.4 km wide and 150 m high. The two largest were named the Sugarloaf and Big Pond North Ridge by Meyer and Dean (1986). They are composed of quartz and feldspar veins displaying abundant evidence of multiple intrusion and brecciation. The breccia fragments range from large and angular, to small and subrounded. Hematite-stained mylonites are also present. The feldspar veins exhibit pegmatitic to micrograinitic textures. Hematite and magnetite inclusions are common and many feldspar veinlets are bordered by a dark-red hematitic stain. Green epidote alteration is present in fractures within some of the feldspar fragments. Some of these features suggest that hydrothermal systems were operating. Clean, white, massive quartz veins were seen on the south-eastern side of Sugarloaf. The pure quartz zone grades northward across strike into massive quartz containing silicified fragments and/or bands, which, in turn, grades into a mixture of dominantly feldspar and minor quartz veining. Sugarloaf was deemed by Meyer and Dean (1986) to be the only site containing a wide enough zone of pure quartz to be considered a good silica prospect. They reported whole-rock analyses for 34 samples, 27 of which contain greater than 99% SiO_2, and the lowest 94.2% silica. The main impurity is Al_2O_3. Although untested, it was also noted that the quartz veins might have precious metal potential.

The quartz veins were re-evaluated by Mercer (1997) and Morrissey (1999) for Trinity Resources and Energy, although Mercer refers to a prior evaluation by Brinex in 1982 (D.G. Lobdell, unavailable private report), in which the Sugarloaf resource was estimated at 7.5 million tonnes. Mercer includes further analytical data, a feasibility report by Icelandic Alloys, and gives a more conservative resource estimate of 4.5 million tonnes. Sugarloaf was later systematically gridded, mapped and sampled (Morrissey, 1999). The only development since then has been completion of Highway 510 which reduces the access distance to Sugarloaf to 5 km from the road, versus the previous 20 km from Lodge Bay. It should be emphasized that the estimated size of the resource is a minimum, as it neither includes material from elsewhere on the easternmost vein nor additional resources from the other two veins farther west (*cf.* *013A/08/Sia001*, *013A/08/Sia002*, *013A/08/Sia003*, *013A/08/Sia004*, *013A/08/Sia005* and *013A/08/Sia006*).

Three other quartz vein localities have been designated as having silica potential (*013B/11/Sia001*, *013B/11/Sia002* and *013B/11/Sia003*). These are 16 km east-northeast of Crooks Lake. The occurrences were discovered during 1:100 000-scale mapping of the Crooks Lake area (Gower, 1999). The three localities are aligned along a 060° trend and are clearly associated with brittle faulting. The two southwesterly outcrops consist almost entirely of vein quartz, forming bodies of fairly massive-looking (but locally sheared) quartz, up to 100 m wide and 500 m long. The northernmost outcrop is somewhat different, in that it comprises green-, white- and red-weathering, fine-grained, sheared and brecciated rock that has been extensively silicified, hematized, chloritized and epidotized, and heavily injected by quartz veins (Plate 20). The pre-deformation protolith is unrecognizable at this site. Apart from their silica potential, these occurrences deserve prospecting for other commodities, especially Au.

Plate 20. *Brittle fault showing brecciation, quartz veining, silicification, chloritization, epidotization and hematization. Southeast of Crooks Lake (mineral occurrence 013B/11/Sia003).*

Quartz with Sulphide in Minor Veins

So far, all quartz veins mentioned are major features related to extensional, brittle-fault conditions clearly associated with late-Precambrian rifting. In the case of smaller veins, their genesis is less certain. Two sulphide-bearing examples are identified here as belonging to the Late Proterozoic event, five others are temporally unassigned, and two are close to quartz veins but not necessarily related to them.

Late Proterozoic

The first is a zone of intense potassic alteration containing associated quartz–carbonate veining and hydrothermal brecciation that occurs on the west side of New York Bay, northeast of Charlottetown (*003D/13/Pyr031*). The alteration zone was discovered and described by Meyer and Dean (1988), following up an As–Cd–Mo–Ag–Hg–Cu lake-sediment geochemical anomaly (at Salt Pond) defined by the Geological Survey of Canada (1984). Brecciation and quartz veining were also mentioned in field notes recorded during 1:100 000-scale mapping, but the information was not included in the post-mapping report of Gower *et al.* (1988b). Meyer and Dean (1988) describe the quartz veins as being up to 50 cm wide and commonly containing angular fragments of pervasively altered wall rock having up to 2% pyrite and chalcopyrite. The veins also include elongate fragments of commonly laminated, light- to dark-grey-green cryptocrystalline quartz. Networks of thin, crosscutting quartz veins are common in the red, potassic-altered country rock. The most intense alteration was seen along the shoreline, over a strike length of 500 m. Two other zones of potassic alteration occur along strike, 2 km to the north and 1 km to the south. Meyer and Dean (1988) reported that grab samples analyzed did not contain anomalous Au. Further work was done in the area by Vulcan Minerals (Hodge, 1996f), on the basis of the GSC lake-sediment anomalies and the report of Meyer and Dean

(1988). Hodge (1996f) iterates the description of Meyer and Dean (1988) regarding the zone of intense potassic alteration with associated quartz–carbonate veining, hydrothermal activity and brecciation, and 2% pyrite and chalcopyrite. At nearby Salt Pond, a gossan zone previously found by Meyer and Dean was located and reported as containing 3% pyrite. The gossan is 3 m wide and 15–20 m long and pinched out at the edge of Salt Pond. Four samples were analyzed, giving a high of 259 ppm Cu in one (sample 445; Hodge, 1996f).

The second example (*013J/02/Zn 001*) is some small, sulphide-bearing veins located 11 km west of Rigolet. Here, Halet (1946) described small fissure veins having an easterly trend, an average width of 15 cm and length up to 3.7 m. They consist of quartz and calcite with scattered crystals of galena and sphalerite. One hand-picked sample gave values of 0.36% Pb and 2.50% Zn.

Note that carbonate is present in both occurrences. Carbonate-bearing veins are not common in eastern Labrador, but they do occur sporadically and, where found, appear to be related to rifting that produced the Lake Melville rift system and the Sandwich Bay graben. The veins described by Halet (1946) are close to brittle faults that are an extension of the Double Mer half-graben, and the New York Bay occurrence is within 4 km of a major Long Range dyke. Note, also, that Pb and Zn mineralization is unknown in eastern Labrador, other than at the Halet site, so that this raises the possibility of a previously unrecognized Pb–Zn Late Proterozoic mineralization setting in the region. The reader is reminded of the earlier-mentioned high Zn value obtained from fault breccia on the Eagle River.

Temporally Unassigned Sulphide-bearing Quartz Veins

Six other sulphide-bearing quartz veins are mentioned here. No justification is known for considering them to be related to late-Proterozoic rifting, although perhaps they could be. They are as follows.

i. About 16 km to the southwest of Halet's occurrence (previous section), molybdenite was noted in a 3-10-cm-wide quartz vein intruding amphibolite (*013J/02/Mo 002*).

ii. On South Duck Islands, 66 km east of Rigolet, minor malachite staining was noted in a quartz vein intruding well-banded tonalitic gneiss (*013I/03/Cu 001*).

iii. At Domino Harbour, Douglas (1953) recorded pyrite in a quartz-rich pegmatite and molybdenite in another small pegmatite (*003E/05/Mo 001*). Note that this occurrence previously also included Cu mineralization 1 km to the north in the host layered mafic intrusion (*see* 'Grenville Province–Labradorian, Other Gabbro, Gabbronorite, Troctolite Bodies'), but that locality has now been assigned a separate occurrence label (*003E/05/Cu 002*). Vulcan Minerals carried out exploration in the area in 1996 (Hodge, 1996c) and recorded several quartz veins 125–150 feet long and 4 feet wide in a valley. The quartz veins lacked staining, inclusions or mineralization, but a silicified unit, 60 m long, 10 m wide and 25 m high, was recorded as containing fine-grained disseminated pyrite (<1%), with malachite and limonite along fractures. The likely protolith of the silicified unit is not specified. A sample collected from it yielded the results shown in Table 56. The location given for this occurrence is the sample site of Hodge (1996c) and may not coincide with wherever Douglas observed molybdenite in pegmatite.

iv. On Rexxon's Island, 22 km east-northeast of Port Hope Simpson, a 5-cm-wide pyrite and chalcopyrite-bearing, quartz-rich vein intruding coarse-grained biotite alkali-feldspar granite was found during 1:100 000-scale mapping (*003D/12/Cu 005*). Partial results from a whole-rock analysis of a sample are shown in Table 57.

v. At Petty Harbour, north of Fox Harbour, minor disseminated pyrite occurs in quartz veins within hornblende–biotite diorite to granodiorite gneiss (*003D/05/Pyr003*).

vi. At a road cut near Outside Big Pond, quartz-rich veins containing chalcopyrite were noted (*012P/16/Cu 004*) and disseminated sulphide recorded else-

Table 56. Molybdenite occurrence in quartz vein, Black Tickle, Groswater Bay terrane

Mineral Occurrence	Reference	Sample	Cu ppm	Zn ppm	Co ppm	Ni ppm	Mo ppm	Ag ppm	Au ppb
003E/05/Mo 001	003E/05/0007	537403	10	19	7	24	13	0.5	5

Table 57. Copper occurrence in quartz vein, east-northeast of Port Hope Simpson, Lake Melville terrane

Mineral Occurrence	Sample	Cu ppm	Zn ppm	Pb ppm	Ni ppm	Co ppm	Cr ppm	Mo ppm	Ag ppm	Au ppb
003D/12/Cu 005	SN86-221C	5486	51	52	4	11	4	1	23	24

where in an outcrop that comprises strongly foliated to gneissic granite, granodiorite and some amphibolite.

Mineral Occurrences Spatially (but not Genetically?) Related to Quartz Veins

In the Cape Charles area, two mineral occurrences (*003D/04/Cu 003* and *003D/04/Cu 004*) were discovered by Rockhopper. From one, the Cape showing (*003D/04/Cu 003*), values of 1.79% Cu, 0.47% Ni and 0.53% Co were reported from various samples (Andrews, 1995b), and at the other, the Soldier showing (*003D/04/Cu 004*), a value of 0.99% Cu was obtained (Andrews and DiCicco, 1995; Table 58). In a follow-up study by Cartaway Resources, Beesley (1996) reported more modest values of 0.68% Cu, 0.10% Ni and 0.04% Co from the Cape showing (Table 58). Rockhopper noted that the mineralization at the Cape showing is spatially, but not necessarily genetically, related to a large quartz vein having a strike length of 310 m. No mention is made of any quartz-vein association in regard to the Soldier showing. Beesley (1996) mentions quartz and pegmatite 'blows' at the lower contact of a gabbro sill, and it might well be that the gabbro is the more significant genetic factor with respect to these occurrences. Gower *et al.* (1988a, b) mapped the mafic-mineral-rich rocks in the area as dioritic gneiss, recognizing that, although the rock is mineralogically dioritic (plagioclase, amphibole, minor quartz and biotite), this name does not preclude the protolith from having been gabbroic or noritic (or their leucocratic analogues).

Other Quartz Veins

Small quartz veins were recorded from numerous outcrops in eastern Labrador. Most probably are of little or no economic significance. A few that attracted the author's attention are mentioned as having possible interest to the grassroots mineral explorationist.

i) The rock at data station JS87-107 (UTM NAD 27, Zone 21 07571 5793035) in the Pinware terrane exhibits a very unusual breccia texture, comprising fractured quartz and feldspar grains within a matrix of very small, angular fragments of the same material. The overall appearance is suggestive of a diatreme, rather than a typical fault breccia, although field notes mention a large quartz vein in the vicinity. The site is on line with an east-northeast-rending lineament that, farther to the southwest, is clearly a brittle fault.

ii) North-northeast-trending quartz veins were recorded by van Nostrand (1992) during 1:100 000 mapping of the Alexis River map area and reported in field notes to be 10-20 m wide (*e.g.*, VN91-404 and VN91-406; 453575 5870475 and 448910 5865110). The rocks are fine to very fine grained and associated with fault breccia and alteration zones containing chlorite, epidote and muscovite. They show the same trend as Long Range dykes, which are also found in the same region.

iii) Of uncertain exact nature is a site described as subcrop/outcrop (DD91-080; 485283 5852040) that consists of angular blocks of an extremely altered, brecciated rock, exhibiting randomly oriented quartz veins and stringers and showing chloritization, sericitization, silicification and hematization. Of special interest is close proximity (*ca.* 200 m) to a Long Range dyke mentioned in field notes as pyrite bearing.

iv) Two quartz veins of significant size in the Pinware terrane in the southeast part of the St. Lewis River map sheet may be worth examination. The westerly one (M61-099b; 562851 5769821) was recorded during mapping by Eade (1962) and is reported to be roughly 7 m wide and trending 055°. The easterly one (CC87-100 567548 5772196) coincides with a

Table 58. Mineral occurrences possibly related to quartz veins, Cape Charles area, Pinware terrane

Mineral Occurrence	Reference	Sample	Cu ppm	Zn ppm	Pb ppm	Ag ppm	Au ppb	Co ppm	Ni ppm
Cape showing									
003D/04/Cu 003	003D/04/0011	RA-01	2100	41	14	0.5	5	-	-
003D/04/Cu 003	003D/04/0011	RA-02	5100	34	12	1.5	40	-	-
003D/04/Cu 003	003D/04/0015	RH 201V	5690	170	5	0.5	-	2530	780
003D/04/Cu 003	003D/04/0015	RH 201-A-FGC	11200	810	5	0.5	-	5260	4700
003D/04/Cu 003	003D/04/0015	RH 2212R	11700	40	5	0.5	-	1000	1500
003D/04/Cu 003	003D/04/0015	RH 0206R	2682	26	12	0.5	-	68	145
003D/04/Cu 003	003D/04/0015	RH 2209R	17900	2	5	0.5	-	960	646
003D/04/Cu 003	003D/04/0015	RH 2203R	9564	35	46	3.8	-	1490	343
003D/04/Cu 003	003D/04/0016	JK005	6802	-	-	-	-	441	1009
003D/04/Cu 003	003D/04/0016	JK005	3024	-	-	-	-	430	516
The Soldier showing									
003D/04/Cu 004	003D/04/0011	RA-03	9900	201	n.d.	1.7	5	-	-
003D/04/Cu 004	003D/04/0011	RA-04	2500	n.d.	n.d.	1.5	5	-	-

Note: n.d., not detected, -, not analyzed strong north-northeast-trending lineament and comprises angular fragments of quartz and some microcline having a wide size range, and criss-crossed by quartz veins in all directions. Its width was not recorded.

v) A quartz vein containing acicular apatite was mentioned at locality 013A/09/Cu 006, a locality at which Cu mineralization was reported in the host pelitic gneiss.

vi) A garnet-bearing quartz vein intruding pyritic metasedimentary gneiss was recorded at locality 013H/05/Pyr009.

FAULT BRECCIA

Brittle faults and associated fault breccias are found throughout southeastern Labrador and can be related to Late Proterozoic rifting. Minor pyritic mineralization with traces of Cu has been found in the breccias.

Pyrite (± Cu)

Four examples of brittle-fault-related sulphide mineralization are detailed here. All were found during 1:100 000-scale mapping. No special examination was made of the brittle faults during mapping, so considerable untested potential remains, if a search is ever deemed worthwhile. None of the occurrences described here can be regarded as significant.

The first (013J/01/Pyr003) is seen at shoreline outcrops about 8 km northeast of Rigolet. The location is in line with the eastward extension of a major east-trending brittle fault that defines both the north side of the Double Mer half graben and the Lake Melville rift system. At the site, minor pyrite (and, perhaps, trace chalcopyrite) was noted during 1:100 000-scale mapping, lining surfaces of intensely fractured and jointed rocks and associated with abundant epidote and chlorite. The host rock is very fine grained, pink weathering, siliceous, and possibly derived from microgranite. The second (013I/04/Cu 003), at the east end of The Backway, is located in an east-trending fault that marks the south side of the Lake Melville rift. The occurrence consists of minor Cu mineralization associated with quartz–calcite stringers in shear zones cutting massive to foliated diorite/gabbro. Note that a pyrite occurrence (013J/01/Pyr007) linked to quartz stringers in gabbro and close to the same fault was recorded 37 km to the west (*see* section on 'Grenville Province–Labradorian; other gabbro, gabbronorite, troctolite bodies').

The other two are both associated with a series of northeast-trending faults that mark the ill-defined northwest side of the Sandwich Bay graben. At occurrence 013H/05/Pyr013, gossan zones are associated with amphibolite, garnetiferous amphibolitic gneiss, strongly deformed granitic and granodioritic material, abundant pegmatitic material, fault breccia zones and bands of hornblendite. Neither the spatial extent nor the character of the gossans was specified in field notes. At occurrence 013B/15/Pyr001 the rock is a heavily jointed, sheared, fault breccia showing silicification, hematization, chloritization, epidotization and sericitization. The original rock was possibly a K-feldspar megacrystic granitoid rock with some mafic rock. The altered gossanous material, in which it is very difficult to see fresh sulphide, forms a 10-m-wide rusty zone extending across the outcrop from the riverside into the river bank.

LATE PROTEROZOIC TO RECENT METALLOGENY AND POTENTIAL

Late Proterozoic activity involved a huge ingress of fluids, in the form of mafic magma and hydrothermal fluids. This resulted in mafic dykes and lavas and abundant quartz veins. All the activity can be linked to rifting that preceded the development of the Iapetus Ocean. The Cu–Au mineralization is an obvious target in such a setting, although Cu mineralization is far more likely to be present in offshore mafic-volcanic-filled basins than in the sparse basaltic flow remnants that are preserved onshore. A search for Au mineralization within quartz veins or Pb–Zn mineralization in carbonate-bearing fault breccia could be rewarding, however.

SURFICIAL DEPOSITS AND DIMENSION STONE

This category encompasses at-surface commodities that are mostly normally termed 'industrial' (Figure 32). Included are placer deposits, surficial materials suitable for aggregate, bedrock materials that might be usable for dimension stone, and some miscellaneous commodities that have crept into MODS (and perhaps should not be there).

ILMENITE IN BEACH SAND

The north beach of Porcupine Strand (Plate 21) has been investigated as a potential ilmenite resource by Emory-Moore and Meyer (1991, 1992) reporting on behalf of Cominco, in conjunction with the Newfoundland Department of Mines and Energy and the Centre for Cold Ocean Resources Engineering (C-CORE). Porcupine Strand consists of over 40 km of sandy beaches stretching from north of Cartwright to Groswater Bay. The mineralization (013I/03/Ti 001) consists of heavy mineral layers in both low-elevation (<10 m) raised beaches and on the modern beach complex. The raised beach terraces typically contain 0.3 to 2.0-cm-thick heavy mineral layers, although a 1-m-thick section of massive heavy mineral sands was encountered. Heavy mineral laminations/beds constitute from 30 to 80% of each terrace and the heavy mineral

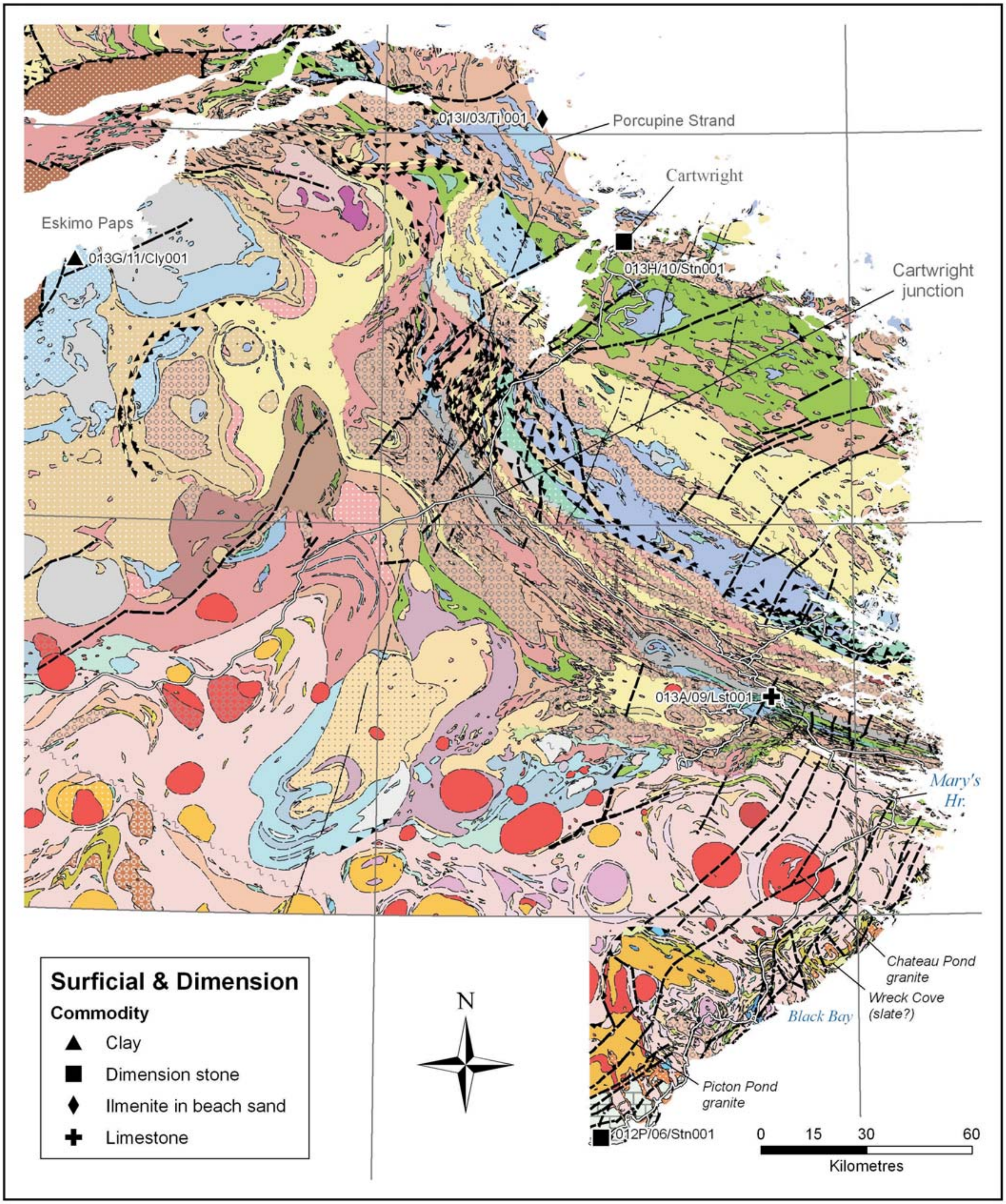


Figure 32. *Distribution of 'industrial' commodities. See text for clarification regarding the clay and limestone 'occurrences'.*

Plate 21. *Porcupine Strand, the beaches of which have been investigated for their heavy-mineral potential, especially ilmenite. North of Cartwright (mineral occurrence 013I/03/Ti 001).*

content within the laminations/beds ranges from 80 to 90%. In the supratidal zone, the modern beach sediments contain 0.5 to 40 cm thick heavy mineral layers, containing 80 to 99% heavy minerals.

The heavy mineral assemblage consists of hematite, amphibole, garnet, magnetite, and ilmenite, which commonly form monomineralic laminations. The overall TiO_2 content ranges from 1.79 to 7.4%, with an average content of 4.6% and average total Fe of 30.4%. In the intertidal zone, the modern beach sediments are characterized by an average TiO_2 content of 0.79% and an average total Fe content of 5.4%. A composite sample sent to CANMET was found to contain 27.7% hematite, 24.9% quartz, 17.1% amphibole, 16.7% feldspar, 8.8% garnet, 3.9% magnetite, and 2.0% ilmenite. As the average TiO_2 content of this sample was 4.6% some of the TiO_2 must reside in a mineral other than ilmenite. A polished thin section study indicated that some of the ilmenite forms intergrowths with hematite. An exploration program was carried out by Cominco in the region in 1991 (Szabo, 1992). Fifty-one vibracore drill holes (maximum penetration 1.5 m) were completed, as well as sampling of stream beds and in hand-dug pits. The magnetic susceptibility of all the samples was measured. Five samples were selected for further study. A heavy mineral fraction was separated using heavy liquids, the magnetic fraction was then separated using a hand magnet and polished thin sections were prepared for two samples (one from a raised beach and one from a modern beach). Partial information from Table 1 of Szabo (1992) is reproduced in Table 59.

Table 59. Analytical results from heavy-mineral-enriched beach sand, Porcupine Strand, Groswater Bay terrane (oxides in percent)

Sample	Mag. Susceptibility	Fe_2O_3 (Mag)	TiO_2 (Non-mag)	TiO_2 (Mag)
001-05 (H91-279)	4.8	85.24	10.47	5.99
003-20 (H91-280)	5.5	86.16	10.71	6.07
003-200 (H91-281)	1.0	73.7	7.48	4.96
004-000 (H91-282)	4.7	87.39	10.23	5.10
020-01 (H91-283)	2.6	79.84	8.85	5.76

Sample	Hem./Ti-hem.	Il-hem exsol.	Ilmenite	Gangue
H91-279 (present beach)	60%	18%	6%	16%
H91-280 (raised beach)	56%	22%	7%	15%

Note: Mag – magnetic; Hem – hematite; exsol - exsolution

AGGREGATE

Aggregate deposits are not discussed in detail here as reports have been delivered by Ricketts (2004, 2005), who has examined deposits close to Highway 510 and branch roads between Red Bay and Cartwright. One sand and gravel deposit was mapped at Black Bay, 7 km northeast of Red Bay. Elsewhere, south of Mary's Harbour, deposits are too small and thin to have economic significance. Several large glaciofluvial and marine deposits of sand and gravel were located between Mary's Harbour and Charlottetown, especially near the mouths of large rivers (*e.g.*, St. Lewis River, Alexis River and Gilbert River). Farther north, very large deposits of sand and gravel exist in glaciofluvial outwash and terrace deposits 15 km southeast of Cartwright junction and at Cartwright junction. Several additional deposits were located between Cartwright junction and the community of Paradise River, and one sizable deposit (from which material has already been utilized) was described 11 km southeast of Cartwright.

OTHER MATERIALS

Dimension Stone

Dickson and King (2005) carried out a rapid assessment of rock exposures along Highway 510 and branch roads between the Labrador–Quebec border and Cartwright. Only two areas were considered to have any potential for dimension stone, all other rocks being rejected as too highly fractured to be economically viable. One occurrence (*013H/10/Stn001*) consists of granite and monzonite 2 km east of Cartwright near an abandoned early-warning radar site. The granite is described as pink, coarse grained, equigranular, weakly foliated to sheared, locally garnetiferous and pyroxene bearing. The monzonite is a green-brown, coarse grained, equigranular, undeformed plagioclase–pyroxene rock. During 1:100 000-scale mapping, both were grouped as variants of the Cartwright alkali-feldspar granite (1645 Ma). The other occurrence that was considered to have merit is sandstone of the Bradore Formation in the L'Anse-au-Clair area (*012P/06/Stn001*). Here, Dickson and King (2005) judged that the flat-lying, light-brown to beige, thick sandstone beds could be quarried to yield large, joint-free blocks.

To these possibilities, the only suggestions that the author would add are, i) the late- to post-Grenvillian Chateau Pond granite and, ii) the late-tectonic Grenvillian Picton Pond quartz syenite. The Chateau Pond granite is seen on Highway 510 in road cuts between 25 and 35 km southwest of Lodge Bay. It is an attractive pink, coarse grained, homogeneous rock. Where blasted during road construction, it is somewhat shattered, but, where mapped away from the road, it appears massive and only sparsely jointed. The Picton Pond quartz syenite was identified as a potential dimension stone by Gower *et al.* (1994) because of is attractive colour, interesting mantled feldspar textures, homogeneity and proximity to existing infrastructure.

Limestone

A limestone occurrence in the Port Hope Simpson area is included in the MODS database (*013A/09/Lst001*). The author knows of no limestone in the area, and, frankly, considers it very unlikely that any exists. The source of the information is somewhat obscure but is probably Beavan (1954, p. 27) who wrote 'Port Hope Simpson area: amphibolite and crystalline limestone bands in micaceous gneisses'. This seems to have been picked up by Johnston (1958), from whence it became incorporated into MODS. Two explanations come to mind for the 'limestone'. The first is that the observer mistook the white-weathering Alexis River anorthosite for limestone. The second is that there could be bands of marble interleaved with the pelitic gneisses that escaped notice (unlikely in the author's opinion) during 1:100 000-scale mapping. Note, however, that a minor occurrence of white marble was mapped on the shoreline 15 km east of Rigolet, and pink marble was mapped 24 km southwest of Rigolet, so such rocks are known to exist in the southeast Labrador.

If limestone is being sought, then the Forteau Formation, in the Blanc Sablon–West St. Modeste area is the closest source.

Clay

The MODS database lists an occurrence of clay roughly 80 km northeast of Goose Bay, near Eskimo Paps on the south shore of Lake Melville (*013G/11/Cly001*). The clay is noted as having the appearance of brick clay. The author has no expertise in evaluating clay quality or its commercial viability. Comment is restricted to pointing out that many other apparently similar clay occurrences have been seen by the author in small cliffs farther west along the same shoreline.

Slate

No occurrences of slate are included in the MODS database for southeast Labrador. Although fissile schists are present in many places in southeast Labrador, they do not have sufficient uniformity, size, or proximity to infrastructure to be of economic interest. One possible exception is seen in the Wreck Cove area between Red Bay and Henley Harbour (Gower *et al.*, 1994). The rock is well-cleaved, fine grained and homogeneous (Plate 22), and at seashore. Even if deemed suitable, adequate volume of material might be a concern (although no evaluation has been conducted), but would be enough to sustain a cottage-industry type of operation.

Plate 22. *Mylonitic rocks showing a regular parting and having potential as slate. Wreck Cove area, south of Henley Harbour. Not currently designated as a mineral occurrence.*

FINAL COMMENTS

Corriveau *et al.* (2007) have advocated that the Grenville Province should not be disparaged as the sterile root of a collisional orogen, but, rather, as a complex juxtaposition of Andean-type volcanic and plutonic arc environments in which a wide range of metallogenic settings existed. The phrase 'complex juxtaposition' in the previous sentence is critical to keep in mind. The arcs have been swept together, dismembered, re-arranged and partially destroyed. They cannot be expected to be traceable from one end of the orogen to the other.

Despite the arc-related original settings, the fact remains that the culminating Grenvillian tectonic event was collisional. This has had a profound effect on earlier tectonic settings – one that cannot be disregarded. For example, it forces the explorationist to utilize methods applied to understand high-grade metamorphism and polycyclic ductile deformation. Nevertheless, the burden of collisional orogenesis may not be as onerous as one initially might think. Much of Grenvillian high-grade, ductile tectonism is concentrated into relatively narrow zones (high-pressure belts) in the exterior part of the Grenville orogen, whereas vast interior regions (orogen lids) escaped severe tectonism. One should not be misled into believing that these areas are free of Grenvillian metamorphism and deformation – they are not, but such effects may be moderate enough to lift the veil of tectonic overprinting that impedes effective exploration.

In eastern Labrador, and broadly applicable to the whole of the eastern Grenville Province, significant metallic mineralization types can be condensed into four metallogenic settings, namely i) Cu, Au (Mo, U) mineralization in a probable sedimentary exhalative setting, ii) Ni, Cu, PGE (Cr, V?) in a mafic/ultramafic magmatic setting, iii) Fe–Ti (P, V?) in an anorthositic magmatic setting, iv) Cu, U, Mo, F, REE (Ag, Au?) in a felsic intrusive or extrusive hydrothermal setting. Tentatively, all three of the igneous-process-related settings appear to have niches during Labradorian, Pinwarian and Grenvillian orogenesis, and seem to be mostly mid-to-late stage within those events (rather than necessarily being anorogenic, as commonly previously supposed). It is no coincidence that these three metallogenic associations exist together; their host rocks are the tripartite members of the mafic-anorthositic-monzogranitic association, which was used by Gower and Krogh (2003) as more accurately encompassing rock suites normally referred to by the abbreviation AMCG (anorthosite–mangerite/monzonite–charnockite–granite). Gower and Krogh (2003) pointed out that the abbreviation does not adequately recognize associated, volumetrically important, mafic rocks and it carries anorogenic-tectonic-setting overtones, that they did not feel were entirely appropriate.

The confirmation of age patterns into metallogenic epochs requires more data, as neither the times of mineralization are well known, nor the role of remobilization and reactivation in modifying earlier activity (processes that can lead to either ore dispersion or beneficiation). In addition to metals, the potential for industrial minerals should not be neglected (*e.g.*, muscovite, quartz, nepheline, amazonite, sapphire, garnet, dimension stone). The Grenville Province has long been recognized as a major storehouse of such commodities.

Never to be forgotten is that, in exploration, the words ‘mineralization’ and ‘economic’ are inseparably entwined and that economic success does not come easily – decades may well separate the discovery of mineral deposits and generation of wealth from them. Also to be kept is mind is that huge changes in land use are sweeping through eastern Labrador. The completion of the Trans-Labrador highway has made exploration viable in many previously inaccessible areas. At the same time, the creation of national and provincial parks will deny access elsewhere. Other economic activity, such as hydroelectric power development and forestry, will also have an impact on mineral exploration, as will the settling of aboriginal land claims.

Although the Grenville Province remains under explored, under prospected, under mapped and underestimated (Corriveau and Clark, 2005), in eastern Labrador the beacon of hope for prosperity through mineral wealth is currently shining more brightly than at any time in the past.

ACKNOWLEDGMENTS

Thanks are given to Greg Stapleton and Tara Crewe of the Mineral Deposits Section of the Geological Survey of Newfoundland and Labrador for their help in addressing interfacing this report with the MODS system. Tim van Nostrand is thanked for reviewing an earlier version of this report. Appreciation is due to Tony Paltanavage for upgrading author-prepared figures and plates, and for producing of the 1:500 000-scale map that is a companion to this report (and the Herculean task of creating the 25 1:100 000-scale geological maps on which it is based); to Joanne Rooney for typesetting; and to Chris Pereira for editorial input.

REFERENCES

Note: Assessment files commonly have informal authorship, titles and pagination, so these may differ here from reference style in the Newfoundland and Labrador geofiles and/or MODS. The alphanumeric assessment file code is consistent, however.

Anderson, D.H.
1954: Detailed geology of the Little River area, Mealy Mountains, Labrador. Newfoundland and Labrador Geological Survey, Assessment File 013G/0007 (map).

Anderson, W.J., Thein, A.M. and Coates, H.J.
1996: Paradise River project. Report on airborne geophysics, lake sediment geochemistry and geology. Licences 3218M-3244M, 3229M-3238M, 3261M-3265M, NTS: 13A/9, 13H3&4. Columbia Yukon Resources. Newfoundland and Labrador Geological Survey, Assessment File LAB/1273, 16 pages plus appendices.

Andrews, R.
1995a: First year assessment report. Rockhopper #11, Cape Charles, Labrador. NTS 3D/4E. Licence 989M. Unpublished report. Newfoundland and Labrador Geological Survey, Assessment File 003D/04/0011, 12 pages.

1995b: Second year report. Rockhopper #11, Cape Charles, Labrador. NTS 3D/4E. Licences 989M, 1186M, 4486M, 4487M, 4459M. Newfoundland and Labrador Geological Survey, Assessment File 003D/04/0015, 13 pages.

1995c: First year assessment report. Rockhopper #17, Lodge Bay, Labrador. NTS 3D/4W. Licence 4403M. Newfoundland and Labrador Geological Survey, Assessment File 003D/04/0012, 11 pages.

1995d: First year assessment report. Medicine Bag prospect – S.E. Labrador. NTS 3D/5W. Licence 4010M. Newfoundland and Labrador Geological Survey, Assessment File 003D/05/0013, 14 pages.

1995e: First year assessment report. The Salt Brook prospect, Labrador. NTS 3D/5W. Licence 4011M. Newfoundland and Labrador Geological Survey, Assessment File 003D/05/0014, 11 pages.

1995f: First year assessment report on sampling and testing for licence 646M and 709M in the St. Lewis River area, Labrador. Newfoundland and Labrador Geological Survey, Assessment File 013A/08/0023, 18 pages.

1995g: Second year assessment report Rockhopper # 8, licence 646M, 709M, NTS 13/A8, St. Lewis River, Labrador. First year assessment report, licences 4455M, 4459M, 4460M, 4664M, 4665M, 4666M. Newfoundland and Labrador Geological Survey, Assessment File 013A/08/0026, 6 pages plus additional material.

Andrews, R. and Beecham, A.W.
1997: First, Second and third year assessment report on geological exploration for licences 646M, 709M, 44460M, 4484M-4485M, 4555M, 4664M-4666M, 4808M-4810M and 5009M-5010M on claims in the Doreen Pond area, near St. Lewis Inlet, southeastern Labrador. Newfoundland and Labrador Geological Survey, Assessment File LAB/1203, 42 pages.

Andrews, R. and DiCicco, D.
1995a: First year assessment report. Rockhopper #11, Cape Charles, Labrador. NTS 3D/4E. Licence 989M. Newfoundland and Labrador Geological Survey, Assessment File 003D/04/0011, 11 pages.

Arima, M. and Gower, C.F.
1991: Osumilite-bearing granulites in the eastern Grenville Province, eastern Labrador, Canada: mineral parageneses and metamorphic conditions. Journal of Petrology, Volume 32, pages 29-61. [013H/0040].

Bailey, D.G.
1980: Geology of the Double Mer – Lake Melville area, Labrador. *In* Current Research. Mineral Development Division, Department of Mines and Energy, Newfoundland and Labrador, Report 80-1, pages 154-160. [NFLD/1148].

Balakrishnan, T.
1995: First year assessment report on geological, geochemical and trenching exploration for licences 675M-676M on claims in the Western Feeder River area, southeastern Labrador. Labrador Mica Limited. Newfoundland and Labrador Geological Survey, Assessment File LAB/1144, 63 pages.

Beavan, A.P.
1954: Report on exploration in Labrador, 1953. Brinco Limited. Newfoundland and Labrador Geological Survey, Assessment File NFLD/0119, 76 pages plus additional material.

1955: Report on exploration in Labrador, 1954. British Newfoundland Corporation Ltd. Unpublished report. Newfoundland and Labrador Geological Survey, Assessment File NFLD/0121, 35 pages plus appendices.

1980: Report on Assessment work, 1980, claim block 1173, Licence No. 1408. Senlac Resources Incorporated. Newfoundland and Labrador Geological Survey, Assessment File 013I/04/0018. 12 pages plus appendices.

Beesley, T.J.
1996: Geological and prospecting report. Licences 989M, 1186M, 4459M, 4486M, 4487M, 4644M, 4754M, Cape Charles NTS 3D/4E, Labrador. Cartaway Resources Corporation. Newfoundland and Labrador Geological Survey, Assessment File 003D/0016, 17 pages.

1997: Geological and prospecting report. License 5016M (NTS 13/A-8, 9), licence 5020M (NTS 13/A-8), licence 5013M (NTS 3D/5W). Cartaway Resources Corporation. Newfoundland and Labrador Geological Survey, Assessment File LAB/1240, 12 pages plus appendices.

1998: Second, third and fourth year assessment report on geological exploration for licences 646M, 709M, 4460M, 4664M-4666M, 4800M, 4811M on claims in the St. Lewis Inlet area, southeastern Labrador. Cartaway Resources Corporation and Rockhopper Corporation. Newfoundland and Labrador Geological Survey, Assessment File 13A/08/0043, 27 pages.

Bonnet, A.-L., Corriveau, L. and La Fleche, M.R.
2005: Chemical imprint of highly metamorphosed volcanic-hosted hydrothermal alterations in the La Romains Supracrustal Belt, eastern Grenville Province, Quebec. *In* The Grenville Province: A Geological and Mineral Resources Perspective. *Edited by* L. Corriveau and T. Clark. Canadian Journal of Earth Sciences, Volume 42, pages 1783-1814.

Bostock, H.H.
1983: Precambrian rocks of the Strait of Belle Isle area. *In* Geology of the Strait of Belle Isle, Northwestern Insular Newfoundland, Southern Labrador, and Adjacent Quebec. *Edited by* H.H. Bostock, L.M., Cumming, H. Williams and W.R. Smyth. Geological Survey of Canada, Memoir 400, pages 1-73. [NFLD/1430].

Bradley, D.A.
1966: Appendix I. Report on geology of southeastern part of Sandwich Bay - Square Island joint venture area. *In* Summary Report of Exploration during 1966. Brinex Limited. Newfoundland and Labrador Geological Survey, Assessment Files LAB/0199 and 013A/0001, 15 pages.

Butler, R.
1996: Report on rock sampling for licence 4157M on claims in Square Islands area, south shore of Labrador. Newfoundland and Labrador Geological Survey, Assessment File 003D/12/0017, 5 pages.

Butt, D.
1993: Report on prospecting and geochemical exploration for licence 446M on claims in the Ragged Point and Bad Bay area, Labrador. Newfoundland and Labrador Geological Survey, Assessment file 03D/04/0010, 13 pages.

Chadwick, B. and Garde, A.A.
1996: Paleoproterozoic oblique collision in South Greenland: a reappraisal of the Ketilian orogen. *In* Precambrian Crustal Evolution in the North Atlantic Region. *Edited by* T.S. Brewer. Geological Society of London, Special Publication Number 112, pages 179-196.

Cherry, M.E.
1978a: Geological mapping in the Sandwich Bay area, southeastern Labrador. *In* Report of Activities for 1977. Newfoundland Department of Mines and Energy, Report 78-1, pages 16-21. [NFLD/0973].

1978b: Sandwich Bay. Newfoundland Department of Mines and Energy, Mineral Development Division, Map 78176. [013H/0031].

Christie, A.M.
1951: Geology of the southern coast of Labrador from Forteau Bay to Cape Porcupine. Geological Survey of Canada, Paper 51-13, 19 pages. [LAB/0014].

Churchill, R. and Butler, R.
2006: First year assessment report on prospecting for licence 10493M on claims in the Alexis River area, southeast Labrador. Altius Resources Incorporated. Newfoundland and Labrador Geological Survey, Assessment File 013A/0059, 21 pages.

Clark, S.J.
1997: Evaluation of the Kiex/Short claim group, Red Bay, Labrador. Unimin Corporation. Newfoundland and Labrador Geological Survey, Assessment File 012P/16/0084, 15 pages.

Clark, T., Gobeil, A. and David, J.
2005: Iron oxide–copper–gold-type and related deposits in the Manitou Lake area, eastern Grenville Province, Quebec: variations in setting, composition and style. *In* The Grenville Province: a geological and mineral resources perspective. *Edited by* L. Corriveau and T. Clark. Canadian Journal of Earth Sciences, Volume 42, pages 1829-1847.

Clarke, A.H. and de Carle, R.J.
1996: First year assessment report on prospecting and geochemical and geophysical exploration for licences 4587M and 4953M-4954M on claims in the Dykes River area, Labrador. 407824 Alberta Limited. Newfoundland and Labrador Geological Survey, Assessment File 013H/10/0051, 57 pages.

Connell, M.D. and Brewer, K.
1996a: First year assessment report on geological, geochemical and geophysical exploration for licences 1929M-1930M on claims in the Savage Cove area, Labrador. Assessment Report. Consolidated Viscount Resources Limited. Newfoundland and Labrador Geological Survey, Assessment File 013H/11/0048, 16 pages plus appendices.

1996b: Eagle River property. Mineral licences 1931M and 4185M. Assessment Report. Consolidated Viscount Resources Limited. Newfoundland and Labrador Geological Survey, Assessment File 013H/11/0049, 19 pages plus appendices.

1996c: First year assessment report on geological and geochemical exploration for licence 1927M on claims in the Paradise River area, Labrador. Assessment Report. Consolidated Viscount Resources Limited. Newfoundland and Labrador Geological Survey, Assessment File 013H/0050, 42 pages.

Corbeil, R. and Villeneuve, D.H.
1995: First year assessment report on geological and geochemical exploration for licences 1646m-1656m, 1805m-1828m, 2011m, 2037m-2047m, 2094m, 2385m, 2411m, 2628m-2630m, 2638m, 2641m, 2644m-2646m, 2650m, 2656m, 2825m, 2910m-2912m, 3075m-3076m, 3129m-3130m, 3143m, 3186m, 3188m-3202m, 3679m, 3684m, 3687m, 3921m-3922m, 4246m, 4253m-4260m and 4268m-4271m on claims in various areas in Labrador. Hebron Fjord Resources Incorporated and Black Pearl Minerals Incorporated. Newfoundland and Labrador Geological Survey, Assessment File LAB/1334, 309 pages.

Corriveau, L. and Clark, T.
2005: Introduction to the Grenville Province: a geological and mineral resources perspective derived from government and academic research initiatives. *In* The Grenville Province: a geological and mineral resources perspective. *Edited by* L. Corriveau and T. Clark. Canadian Journal of Earth Sciences, Volume 42, pages 1637-1642.

Corriveau, L., Perreault, S. and Davidson, A.
2007: Prospective metallogenic settings of the Grenville Province. *In* Mineral Deposits of Canada: A Synthesis of Major Deposit-Types, District Metallogeny, the Evolution of Geological Provinces and Exploration Methods. Geological Association of Canada, Mineral Deposits Division, Special Publication Number 5, pages 819-847.

Davidson, D.D. and Kowalczyk, P.
1979: Report on the geology of an area within the Benedict Mountains area, Labrador. N.T.S. 13-J-9, 10, 15 & 16. A part of the Placer-Brinex Aillik-Benedict Mountains Joint Venture area. Placer Development Limited, Venture 161. Newfoundland and Labrador Geological Survey, Assessment File 013J/0199, 16 pages plus appendices.

Dawson, M.
1996a: Geological and geochemical report on the Tom Luscombe Brook property. Mineral licence (2936M) Labrador, Canada. Labrex Resources Limited. Newfoundland and Labrador Geological Survey, Assessment File 013J/08/0246, 5 pages plus additional material.

1996b: First year assessment report on geological exploration for licence 2937m on claims in the area north of Groswater Bay east-central Labrador. Labrex Resources Limited. Newfoundland and Labrador Geological Survey, Assessment File 013J/08/0247, 13 pages.

Dearin, C. And Wilton, D.
2005: First year assessment report on compilation, sampling and lapidary work for licences 10174M on claims in the St. Lewis Inlet area, southeastern Labrador. South Coast Ventures. Unpublished Reports, Newfoundland and Labrador Geological Survey, Assessment File 013A/08/0057, 19 pages.

Dickson, W.L. and King, M.
2005: Dimension-stone studies in Newfoundland and Labrador. *In* Current Research. Newfoundland Department of Natural Resources, Geological Survey, Report 05 1, pages 151-163. [NFLD/2903]

Donohoe, H.V.
1966: Appendix III. Report on the geology of the Don Lake and Cape Bluff areas, Labrador. *In* Summary Report of Exploration during 1966. Brinex Limited. Unpublished report Newfoundland and Labrador Geological Survey, Assessment Files LAB/0199 and 013A/16/0002, 19 pages.

Douglas, G.V.
1953: Notes on localities visited on the Labrador coast in 1946 and 1947. Geological Survey of Canada, Paper 53-1, 67 pages. [LAB/0020]

Douglas, C. and Hsu, E.Y.U.
1976: Mineral occurrences map of Labrador. Newfoundland Department of Mines and Energy, Mineral Development Division, Map 76-1, Open File LAB.0326.

Eade, K.E.
1962: Geology, Battle Harbour-Cartwright, Coast of Labrador, Newfoundland. Geological Survey of Canada, Map 22 1962. [LAB/0030].

Eaton, L.
1950: Report on C. W. Tessiers concession in eastern Labrador. H.A. Brassert and Company. Newfoundland and Labrador Geological Survey, Assessment File 003D/0001.

Emory-Moore, M. and Meyer, J.
1991: Origin and economic potential of the placer deposits in the Lake Melville and the Porcupine Strand area of eastern Labrador. Newfoundland and Labrador Geological Survey, Open File LAB/0939, 21 pages.

1992: Geology of the Porcupine Strand beach placers, eastern Labrador. *In* Current Research. Newfoundland

Department of Mines and Energy, Geological Survey Branch, Report 92-01, pages 221-230. [NFLD/2495].

Emslie, R.F.
1976: Mealy Mountains Complex, Grenville Province, southern Labrador. *In* Report of Activities, Part A. Geological Survey of Canada, Paper 76-1A, pages 165-170. [NFLD/2007].

Erdmer, P.
1984: Precambrian geology of the Double Mer – Lake Melville region, Labrador. Geological Survey of Canada, Paper 84-18, 37 pages. [LAB/0681].

Evans, E.L.
1951: Exploration in the Mealy Mountains of Labrador. Ventures Limited. Newfoundland and Labrador Geological Survey, Assessment File 013G/0001, 14 pages plus appendix.

Eveleigh, A.
1996: 1996 Drill program. Sharpe (Hawk) property Kyfanan Lake area, Labrador NTS 13A/5 and 13A/6, Licence 4745M. Cartaway Resources Corporation. Newfoundland and Labrador Geological Survey, Assessment File 013A/0037, 10 pages plus appendices.

1997: First year assessment report on prospecting and geochemical exploration for licences 3016m-3017m, 3430m-3439m, 3771m, 3874m-3876m, 3918m-3919m, 4001m, 4003m, 4014m, 4058m, 4237m, 4737m-4739m, 4741m, 4743m, 745m, 4752m and 4780m on claims in the Kyfanan Lake-St Lewis River area, southeastern Labrador. Cartaway Resources Corporation. Newfoundland and Labrador Geological Survey, Assessment File 013A/0036, 15 pages plus appendices.

Fetzer, W.G.
1953: Report on geological exploration in the Carrol Cove area, Labrador. Atlantic Iron Ore Corporation and Oglebay, Norton and Company. Newfoundland and Labrador Geological Survey, Assessment File 012P/0053, 3 pages plus additional material.

Garde, A.A., Hamilton, M.A., Chadwick, B., Grocott, J. and McCaffrey, K.J.W.
2002: The Ketilidian orogen of South Greenland: geochronology, tectonics, magmatism, and fore-arc accretion during Paleoproterozoic oblique convergence. Canadian Journal of Earth Sciences, Volume 39, pages 765-793.

Gardner, G.
1938: Exploration of Grady Islands District, Labrador parts 2 and 3. Newfoundland and Labrador Geological Survey, Assessment File 013H/0037, 340 pages plus additional material.

Gauthier, M. and Chartrand, F.
2005: Metallogeny of the Grenville Province revisited. *In* The Grenville Province: A Geological and Mineral Resources Perspective. *Edited by* L. Corriveau and T. Clark. Canadian Journal of Earth Sciences, Volume 42, pages 1719-1734.

Gower, C.F.
1981: The geology of the Benedict Mountains, Labrador. Newfoundland Department of Mines and Energy, Mineral Development Division, Report 81-3, 26 pages. [LAB/0578].

1986: Geology of the Double Mer White Hills and surrounding region, Grenville Province, eastern Labrador. Geological Survey of Canada, Paper 86-15, 52 pages. [LAB/0703].

1992: The relevance of Baltic Shield metallogeny to mineral exploration in Labrador. *In* Current Research. Newfoundland Department of Mines and Energy, Geological Survey Branch, Report 92-1, pages 331-336. [NFLD/2495].

1995: Geology of the Upper St. Lewis River area, Labrador [NTS 13A/3, 4, 5, and 6]. Newfoundland and Labrador Geological Survey, Open File 13A/0024, [Map 95-019].

1998: Geology of the upper Eagle River map region, Grenville Province, southeast Labrador. *In* Current Research. Newfoundland Department of Mines and Energy, Geological Survey Branch, Report 98-1, pages 125-141. [NFLD/2646].

1999: Geology of the Crooks Lake map region, Grenville Province, southeast Labrador. *In* Current Research. Newfoundland Department of Mines and Energy, Geological Survey Branch, Report 99-1, pages 41-58. [NFLD/2674].

2006: Uranium potential in Labrador: don't neglect the Grenville Province! Geological Association of Canada Newfoundland Section 2006 Annual Technical Meeting (abstract). Atlantic Geology, Volume 42, page 190. [NFLD/3144].

2007: Protolith recognition of metamorphosed volcanic/volcaniclastic rocks, with special reference to the Grenville Province in southeast Labrador. *In* Current Research. Department of Natural Resources, Geological Survey Branch, Report 2007-1, pages 11-23. [NFLD/2941].

2009: Battle Island – a geological treasure in coastal eastern Labrador. Newfoundland Department of Natural Resources, Geological Survey Branch, Open File 003D/05/0031, 38 pages.

2010: This is an informal way of referencing 25 bedrock geological maps at 1:100 000-scale of the eastern Makkovik Province and Grenville Province in eastern Labrador that will be released at about the same time as this report.

Gower, C.F. and Erdmer, P.
1984: The mineral potential of paragneiss in the Grenville province in eastern Labrador. *In* Current Research. Newfoundland Department of Mines, Mineral Development Division, Report 84-1, p. 80-87. [NFLD/1363].

Gower, C.F., Hall, J., Kilfoil, G.J., Quinlan, G.M. and Wardle, R.J.
1997: Roots of the Labradorian orogen in the Grenville Province in southeast Labrador: evidence from marine, deep-seismic reflection data. Tectonics, Volume 16, pages 795-809. [LAB/1554].

Gower, C.F., Heaman, L.M., Loveridge, W.D., Schärer, U. and Tucker, R.D.
1991: Grenvillian magmatism in the eastern Grenville Province, Canada. Precambrian Research, Volume 51, pages 315-336. [LAB/1065].

Gower, C.F., James, D.T., Nunn, G.A.G. and Wardle, R.J.
1995a: The Eastern Grenville Province. *In* The Geology and Mineral Deposits of Labrador: A Guide for the Exploration Geologist. Workshop on the Geology and Mineral Deposits of Labrador, held at the Hotel Newfoundland, St. John's, Newfoundland, October 25, 1995, pages 73-134. [LAB/1131].

Gower, C.F., Kamo, S. and Krogh, T.E.
2008b: Indentor tectonism in the eastern Grenville Province. Precambrian Research, Volume 167, pages 201-212. [LAB/1555].

Gower, C.F., Kamo, S., Kwok, K. and Krogh, T.E.
2008a: Proterozoic southward accretion and Grenvillian orogenesis in the interior Grenville Province in eastern Labrador; evidence from U-Pb geochronological investigations. Precambrian Research, Volume 165, pages 61-95. [NFLD/3145].

Gower, C.F. and Krogh, T.E.
2002: A U-Pb geochronological review of the Proterozoic history of the eastern Grenville Province. Canadian Journal of Earth Sciences, Volume 39, pages 795-829.

2003:.A geochronological review of the Pre-Labradorian and Labradorian geological history of the eastern Grenville Province. Ministère des Ressources Naturelles, Québec, DV2003-3, pages 147-177.

Gower, C.F., McConnell, J.W. and van Nostrand, T.
1995b: New mineral exploration targets in the Pinware terrane, Grenville Province, southeast Labrador. *In* Current Research. Newfoundland Department of Mines and Energy, Geological Survey Branch, Report 95-1, pages 15-24. [NFLD/2498].

Gower, C.F., Neuland, S., Newman, M. and Smyth, J.
1987: Geology of the Port Hope Simpson map region, Grenville Province, eastern Labrador. *In* Current Research. Newfoundland Department of Mines, Mineral Development Division, Report 87-1, pages 183-199. [NFLD/1667].

1988: Port Hope Simpson map region. Newfoundland Department of Mines, Mineral Development Division, Map 88-088. [LAB/0828].

Gower, C.F., Noel, N. and Gillespie, R.T.
1981: The geology of the Rigolet region. *In* Current Research. Newfoundland Department of Mines and Energy, Mineral Development Division, Report 81-1, pages 121-129. [NFLD/1249].

1983: Groswater Bay Map Region. Newfoundland Department of Mines and Energy, Mineral Development Division Map 8343. [013J/0233].

Gower, C.F. and Swinden, H.S.
1991: Pillow lavas in the Dead Islands area, Grenville Province, southeast Labrador. *In* Current Research. Newfoundland Department of Mines and Energy, Mineral Development Division, Report 91-1, pages 205-215. [NFLD/2494].

Gower, C.F., van Nostrand, T. and Evans-Lamswood, D.
1994: Geology of the Pinware River region, southeast Labrador. *In* Current Research. Newfoundland Department of Mines and Energy, Geological Survey Branch, Report 94-1, pages 347-369. [NFLD/2497].

Gower, C.F., van Nostrand, T., McRoberts, G., Crisby, L. and Prevec, S.
1986: Geology of the Sand Hill River   Batteau map region, Grenville Province, eastern Labrador. *In* Current Research. Newfoundland Department of Mines, Mineral Development Division, Report 86-1, pages 101-111. [NFLD/1607].

Gower, C.F., van Nostrand, T. and Smyth, J.
1988a: St. Lewis River map region. Newfoundland Department of Mines, Mineral Development Division, Map 88-087. [LAB/0827].

1988b: Geology of the St. Lewis River map region, Grenville Province, eastern Labrador. *In* Current Research. Newfoundland Department of Mines, Mineral Development Division, Report 88-1, pages 59-73. [NFLD/1701].

Halet, R.A.
1946: Geological reconnaissance of the Naskaupi Mountains and adjoining coastal region – Nfld. Labrador. Dome Exploration Limited. Newfoundland and Labrador Geological Survey, Assessment report LAB/0009, 25 pages.

Hawley, A.S.
1944: A magnetite deposit near Red Bay, Labrador. M.Sc. thesis, Department of Geology and Geography, Northwestern University, Evanston, Illinois, 98 pages plus additional material. [012P/0052].

Heaman, L.M., Gower, C.F. and Perreault, S.
2004: The timing of Proterozoic magmatism in the Pinware terrane in southeast Labrador, easternmost Quebec and northwest Newfoundland. Canadian Journal of Earth Sciences, Volume 41, pages 127-150. [LAB/1558].

Hegler, W.S.
1979: Radiometric reconnaissance surveys, Nalco Lot – 1, 1979. Newfoundland and Labrador Geological Survey, Assessment File LAB/0562, 20 pages plus additional material.

1982: Engineering geology expenditure report for licence 2210 on claim block 2884 in the Lake Melville area, Labrador. Newfoundland and Labrador Geological Survey, Assessment File 013G/03/0042, 9 pages.

Hodge, R.
1996a: Work assessment report on licence 3757M Mountaineer Cove, Labrador, Province of Newfoundland, Canada. Vulcan Minerals Incorporated. Newfoundland and Labrador Geological Survey, Assessment File 003E/04/0005, 6 pages plus appendices.

1996b: Work assessment report on licence 3758M Comfort Bight, Labrador, Province of Newfoundland, Canada. Vulcan Minerals Incorporated. Newfoundland and Labrador Geological Survey, Assessment File 003E/04/0006, 6 pages plus appendices.

1996c: Work assessment report on licence 3759M Domino Island, southeast Labrador, Province of Newfoundland, Canada. Vulcan Minerals Incorporated. Newfoundland and Labrador Geological Survey, Assessment File 003E/05/0007, 6 pages plus appendices.

1996d: First year assessment report on prospecting and geochemical exploration for licence 3760M on claims on Spotted Island, southeast Labrador. Vulcan Minerals Incorporated and Devonian Resources Incorporated. Newfoundland and Labrador Geological Survey, Assessment File 003E/0008, 18 pages.

1996e: Work assessment report on licence 4087M Fox Harbour area, southeast Labrador, Province of Newfoundland, Canada. Devonian Resources Incorporated. Newfoundland and Labrador Geological Survey, Assessment File 003D/05/0021, 13 pages.

1996f: First year assessment report on geological and geochemical exploration for licence 4081M on claims in the New York Bay area, southeast Labrador. Vulcan Minerals Incorporated and Devonian Resources Incorporated. Newfoundland and Labrador Geological Survey, Assessment File LAB/1276, 19 pages.

Hutchings, C.
1995a: Geological report, Kyfanan Lake west property, Labrador, N.T.S. No. 13A/6 Licence No. 793M, 1088M, 870M Assessment Year 1. Kasner Group of Companies. Newfoundland and Labrador Geological Survey, Assessment File 013A/06/0030, 11 pages plus additional material.

1995b: first year assessment report on prospecting and compilation for licences 1923M-1924M on claims in the area north of Black Bay, southern Labrador. Newfoundland and Labrador Geological Survey, Assessment File 012P/16/0082, 21 pages.

James, D.T., Nadeau, L., and Nunn, G.A.G.
2002: Geology of the Natashquan River (NTS 13D/SE) and Senécal Lake (NTS 13D/SW) areas, Grenville Province, Southern Labrador. *In* Current Research. Newfoundland Department of Mines, Mineral Development Division, Report 02-1, pages 79-97. [NFLD/2774].

Jolliffe, T.S.
1997: Report on exploration program (May 29 to August 3, 1996). Geological mapping, prospecting, lithogeochemical sampling and diamond drilling. Alexis River property, southeastern Labrador. Greenshield Resources Incorporated. Newfoundland and Labrador Geological

Survey, Assessment File LAB/1205, 11 pages plus additional material.

Juilland, J.S.
1965: Report on exploration program including geology, geochemistry and geophysics for the northern part of the Sandwich Bay – Square Island area, Labrador. Brinex Limited. Newfoundland and Labrador Geological Survey, Assessment File 013H/0007, 35 pages.

Johnston, D.
1958: Limestone in Labrador, part 1. Newfoundland and Labrador Geological Survey, Miscellaneous Internal Report. [LAB/0024].

Johnston, F.
1956: Geological report on the Big River – Big Bight coastal area east-central Labrador. Brinex Limited. Newfoundland and Labrador Geological Survey, Assessment File LAB/0184, 7 pages.

Jones, B.E.
1997: Summary assessment report. Geophysical, geochemical and geological exploration. June 1, 1995 – May 31, 1996. Licence 3004. Ming Financial Corporation. Newfoundland and Labrador Geological Survey, Assessment File LAB/1242, 391 pages.

Kamo, S.L. and Gower, C.F.
1994: Note: U-Pb baddeleyite dating clarifies age of characteristic paleomagnetic remanence of Long Range dykes, southeastern Labrador. Atlantic Geology, Volume 30, pages 259-262. [013H/15/0041].

Kamo, S., Gower, C.F. and Krogh, T.E.
1989: A birthdate for the Iapetus ocean? A precise U-Pb zircon and baddeleyite age for the Long Range dykes, S.E. Labrador. Geology, Volume 17, pages 602-605. [LAB/0830].

Kamo, S.L., Heaman, L.M. and Gower, C.F.
In press: Evidence for post-1200 Ma – pre-Grenvillian supracrustal rocks in the Pinware terrane at Battle Harbour, eastern Grenville Province. Canadian Journal of Earth Sciences.

Kamo, S.L., Wasteneys, H., Gower, C.F. and Krogh, T.E.
1996: Refinements to the timing of Labradorian and later events in the Grenville Province, eastern Labrador, based on new U-Pb data. Precambrian Research, Volume 80, pages 239-260. [LAB/1556].

Kents, P.
1980: Geological report Nalco N-1 area N 53°15’ W 59°30’. Nalco Limited. Newfoundland and Labrador Geological Survey, Assessment File 013G/06/0040. 5 pages plus additional material.

Kerr, A.
2007: Mafic igneous rocks in western Labrador: A regional assessment of potential for magmatic Ni-Cu ± PGE mineralization. *In* Current Research. Department of Natural Resources, Geological Survey Branch, Report 2007-1, pages 145-167. [NFLD/2941].

Kerr, A., Krogh, T.E., Corfu, F., Schärer, U., Gandhi, S.S. and Kwok, Y.Y.
1992: Episodic Early Proterozoic granitoid plutonism in the Makkovik Province, Labrador: U–Pb geochronological data and geological implications. Canadian Journal of Earth Sciences, Volume 29, pages 1166-1179. [LAB/1106].

Kerr, A., Ryan, B., Gower, C.F. and Wardle, R.J.
1996: The Makkovik Province: extension of the Ketilidian Mobile Belt in mainland North America. *In* Precambrian Crustal Evolution in the North Atlantic Region. *Edited by* T.S. Brewer. Geological Society Special Paper No. 112, pages 197-218. [LAB/1561].

Kerswill, J.A. and McConnell, J.W.
1979: The Grenville of Labrador: A possible target for uranium exploration in light of recent geological and geochemical investigations. *In* Current Research, Part B, Geological Survey of Canada, Paper 79-01B, pages 329-339. [013G/0031].

1982: Geochemistry and geology of some uraniferous granites in Labrador. *In* Uranium in Granites. *Edited by* Y.T. Maurice. Geological Survey of Canada, paper 81-23, pages 171-172. [LAB/1560].

Ketchum, J.W.F., Culshaw, N.G. and Barr, S.M.
2002: Anatomy and orogenic history of a Paleoproterozoic accretionary belt: the Makkovik Province, Labrador, Canada. Canadian Journal of Earth Sciences, Volume 39, pages 711-730. [NFLD/3146].

Kirwan, L.D.
1959: Report on prospecting in 1959 in the Brinex/Gunnex joint venture agreement area, Labrador. Newfoundland and Labrador Geological Survey, Assessment File 013J/0056, 5 pages.

1960a: Molybdenite assays from the Jay Lake area, Labrador. Brinex – Gunnex joint agreement area. Newfoundland and Labrador Geological Survey, Assessment File 013J/09/0068, 10 pages.

1960b: Clegg Lake sulphide show, Nipishish – Pottles Bay, Labrador concession. Newfoundland and Labrador Geological Survey, Assessment File 013I/12/0004, 2 pages.

1960c: Rocky Cove sulphide show, Nipishish – Pottles Bay, Labrador concession. Newfoundland and Labrador Geological Survey, Assessment File 013I/05/0003, 2 pages.

Kranck, S.H.
1966: Appendix II. Report on geology of northern part of Sandwich Bay - Square Island joint venture area. *In* Summary Report of Exploration during 1966. Brinex Limited. Newfoundland and Labrador Geological Survey, Assessment Files LAB/0199 and 013H/0011, 13 pages.

LaFlamme, C. Hinchey, A. and Sylvester, P.
2009: New U-Pb geochronological data from the Aillik domain, Makkovik Province, Labrador: Implications for the formation of the Aillik Group and evolution of the region. Geological Association of Canada. www.gac.ca/activities/abstracts/2009_Joint_Assembly/absbook/ja09_GA21C.html

Laracy, P.J.
1996: First year assessment report on beneficiation tests for licences 1481M on claims in the area north of Black Bay, southeastern Labrador. Triassic Properties Limited. Newfoundland and Labrador Geological Survey, Assessment Report 012P/16/0086, 17 pages.

1998a: First year assessment report on Licence 4303M, Labrador, Goose South, Labrador. Vulcan Minerals Incorporated. Newfoundland and Labrador Geological Survey, Assessment Report 013B/13/0024, 9 pages plus appendices.

1998b: Second and third year assessment report on market studies and industrial mineral quality for licences 1481M and 4831M on claims in the area north of Black Bay, southern Labrador. Laracy, P.C. and Triassic Properties Limited. Newfoundland and Labrador Geological Survey, Assessment Report 012P/16/0087, 44 pages.

2001: First year assessment report on prospecting and exploration history for licence 7606M on claims in the area north of Black Bay, southeastern Labrador. Laracy, P.C. Newfoundland and Labrador Geological Survey, Assessment Report 012P/16/0095, 15 pages.

Laracy, P.J., Lombardo, S. and Scott, W.J.
1997a: First year assessment report on geophysical exploration for licences 5101M-5104M on claims in the Crooked Lake area, near Goose Bay, southern Labrador. Vulcan Minerals Incorporated. Newfoundland and Labrador Geological Survey, Assessment Report 013B/13/0022, 63 pages.

1997b: Second year assessment report on geophysical exploration for licence 4303M on claims in the Crooked Lake area, near Goose Bay, southern Labrador. Vulcan Minerals Incorporated. Newfoundland and Labrador Geological Survey, Assessment Report 013B/13/0023, 55 pages.

Laracy, P.J. and Wilton, D.H.C.
1999: Fourth year assessment report on petrography for licence 1481M on claims in the area north of Black Bay, southeastern Labrador. Laracy, P.C. Newfoundland and Labrador Geological Survey, Assessment Report 012P/16/0092, 22 pages.

Lucko, W.M.
1997: Second year assessment report on diamond drilling exploration for licences 4587M and 4953M-4954M on claims in the Dykes river area, Labrador. 407824 Alberta Ltd and High G Minerals Corporation. Newfoundland and Labrador Geological Survey, Assessment File 013H/10/0053, 28 pages.

MacDougall, J.F.
1953: Geological and geophysical report for Mealy Mountains area, Labrador. Newfoundland and Labrador Corporation Limited. Newfoundland and Labrador Geological Survey, Assessment File 013G/0004, 6 pages plus additional material.

1954: Exploration in the Mealy Mountains of Labrador. Newfoundland and Labrador Corporation Limited. Newfoundland and Labrador Geological Survey, Assessment File 013G/0005, 6 pages plus additional material.

McConnell, J.W.
1978: Geochemical lake sediment, lake water, radiometric, rock and overburden surveys in Labrador: follow-up studies of 10 anomalous areas within the 1977 Uranium Reconnaissance Program lake survey. Newfoundland Department of Mines and Energy, Mineral Development Division, Open File 408, 28 pages. [LAB/0408].

1979: Geochemical follow-up studies in Labrador. *In* Report of activities for 1978. Newfoundland Department of

Mines and Energy, Mineral Development Division, Report 79-01, 1979, pages 159-162. [NFLD/0416].

1982: Regional lake sediment and water geochemistry as a guide to bedrock composition and mineralization in Labrador. *In* Prospecting in Glaciated Terrains – 1982. *Edited by* P. Davenport. Canadian Institute of Mining and Metallurgy Symposium, pages 132-160. [NFLD/1344].

McConnell, J.W. and Ricketts, M.J.
2010: A high-density lake sediment and water survey in southeast Labrador (NTS map areas 2M/13, 3D/4-5, 12-13, 12P/6-7, 9-11, 14-16, 13A/1, 9, 16 and 13H/1-11. Newfoundland and Labrador Geological Survey, Open File LAB/1538, 70 pages plus appendices.

Mercer, R.
1997: 1st year assessment report for the Sugarloaf Mountain property (Project #13A/1-001) NTS 13A/1. Trinity Resources and Energy Limited. Newfoundland and Labrador Geological Survey, Assessment File 013A/01/0035, 4 pages plus appendices.

Meyer, J.
1990: Graphite, muscovite and heavy-mineral sands exploration in Labrador. *In* Current Research. Government of Newfoundland and Labrador, Department of Mines and Energy, Geological Survey Branch, Report 90-01, 1990, pages 163-169 [NFLD/2493].

Meyer, J.R. and Dean, P.L.
1986: Industrial minerals in Labrador. *In* Current Research. Newfoundland Department of Mines and Energy, Mineral Development Division, Report 86-1, pages 1-8. [NFLD/1666].

1988: Industrial minerals and follow-up of lake- and stream-sediment geochemical anomalies in Labrador. *In* Current Research. Newfoundland Department of Mines, Mineral Development Division, Report 88-1, pages 247-259. [NFLD/1701].

Morrissey, R.D.
1999: Third year assessment report for licence 5110M and first year assessment for licence 6211M, 6209M and 6210M on 1999 mapping and sampling program, Sugar Loaf mountain, Labrador (NTS 13A/1). Trinity Resources and Energy Limited. Newfoundland and Labrador Geological Survey, Assessment File 013A/01/0044, 18 pages plus appendices.

Murthy, G., Gower, C.F., Tubrett, M. and Pätzold, R.
1989: Paleomagnetism of pre-Grenvillian mafic intrusions from the Grenville Province, southeast Labrador. Canadian Journal of Earth Sciences, Volume 26, pages 2544-2455. [LAB/0865].

Nabil, H., Clark, T. and Barnes, S.-J.
2004: A Ni-Cu-Co-PGE massive sulfide prospect in a gabbronorite dyke at Lac Volant, eastern Grenville Province, Quebec. *In* Proterozoic Tectonic Evolution of the Grenville Orogen in North America. *Edited by* R.P. Tollo, L. Corriveau, J.M. McLelland, and M.J. Bartholomew. Geological Society of America, Memoir 197, pages 145-161.

Nalco (Newfoundland and Labrador Corporation Limited.)
1953: Annual Report of Mining Department for Newfoundland and Labrador, Nalco Limited. Newfoundland and Labrador Geological Survey, Assessment File NFLD/0105, 30 pages.

Nolan, White and Associates Limited.
1978: Newfoundland and Labrador Hydro, southern Labrador. Newfoundland and Labrador Geological Survey, Assessment File LAB/0397.

Notman, A.
1954: Mineral Report no. 15 on correspondence relating to mica occurrences within the Brinco Limited. Concession, in the Hawk Bay area, southeastern Labrador. Brinco Limited. Newfoundland and Labrador Geological Survey, Assessment File 013A/16/0003, 8 pages.

Nunn, G.A.G. and van Nostrand, T.
1996a: Geology of the Kenemich River map area (NTS 13G/SW), Labrador. *In* Current Research. Newfoundland Department of Natural Resources, Geological Survey Branch, Report 96-1, pages 73-83. [NFLD/2593].

1996b: Geology of the Kenemich River map area, Labrador. Newfoundland and Labrador Geological Survey, Open File 013G/0048, Map 96-034.

Owen, J.V.
1985: Tectono-metamorphic evolution of the Grenville front zone, Smokey archipelago, Labrador. Ph.D. thesis, Memorial University of Newfoundland, St. John's, 382 pages.

Park, J.K. and Gower, C.F.
1996: Paleomagnetism of pre-Grenvillian mafic rocks from the northeast Grenville Province, Labrador: implications for the Grenville track. Canadian Journal of Earth Sciences, Volume 33, pages 746-756. [LAB/1559].

Penstone, M. and Schwellnus, J.E.G.
1953: The geology of the southeastern coast of Labrador.

Brinco Limited. Newfoundland and Labrador Geological Survey, Assessment File 012P/0055, 4 pages.

Pickett, J. W.
1996: Preliminary assessment report on Lake Michael, Lake Michael East, Michael River, Clegg Lake and Byron Bay properties, southeastern Labrador N.T.S. 13J/9 and 13I/12. Avalon Mines Limited. / Ace Developments Limited., 12 pages. Newfoundland and Labrador Geological Survey, Assessment File LAB/1281, 29 pages.

Piloski, M.J.
1955a: Appendix I. Geological report on area 'D' Labrador concession and Appendix II. Geological report on area 'E' Labrador concession. *In* Exploration in Labrador and Newfoundland, 1954, Brinco Limited. Newfoundland and Labrador Geological Survey, Assessment File NFLD/0121, 21 pages plus additional material.

1955b: Geological mapping of a copper showing on Black Island in the Hamilton Inlet area, Labrador. Brinex Limited., Newfoundland and Labrador Geological Survey, Assessment File 013I/05/0015, 2 pages.

1961a: Diamond drilling data from the Jay Lake area, Labrador. Brinex Limited. Newfoundland and Labrador Geological Survey, Assessment File 013J/09/0006, 13 pages.

1961b: Drill hole cross sections from the Jay Lake area in the Hamilton Inlet area, Labrador. Brinex Limited. Newfoundland and Labrador Geological Survey, Assessment File 013J/09/0223, 1 page.

1962: Report on operations for the year ending March 31, 1962 in Newfoundland and Labrador. Brinex Limited. Newfoundland and Labrador Geological Survey, Assessment File NFLD/0197, 32 pages.

Ralph, J.M. and Hennessey, G.W.
1996: First year assessment report on prospecting for licences 4889M-4890M, 4892M, 4897M, 4908M, 4926M and 5043M on claims in the St Lewis Inlet area, southeastern Labrador. Newfoundland and Labrador Geological Survey, Assessment File 013A/08/0032, 14 pages.

Reid, W. and Penney, G.
2007: First year assessment report on compilation work, Lake Melville Property, Lake Melville area. Licence 012087M, 13G14 NTS. Ucore Uranium Incorporated. Newfoundland and Labrador Geological Survey, Assessment File 013G/14/0053, 6 pages plus appendices.

Ricketts, M.J.
2004: Granular-aggregate mapping in southeast Labrador. *In* Current Research. Newfoundland Department of Natural Resources, Geological Survey, Report 4-1, 2004, pages 117-125. [NFLD/2864].

2005: Granular-aggregate mapping in southeast Labrador. *In* Current Research. Newfoundland Department of Natural Resources, Geological Survey, Report 5-1, 2005, pages 27-37. [NFLD/2903].

Ryan, B., Wardle, R.J., Gower, C.F. and Nunn, G.A.G.
1995: Nickel – copper sulphide mineralization in Labrador: The Voisey Bay discovery and its exploration implications. *In* Current Research. Newfoundland Department of Mines and Energy, Geological Survey Branch, Report 95-1, pages 177-204. [NFLD/2498].

Sangster, A.L., Gautier, M. and Gower, C.F.
1992: Metallogeny of structural zones, Grenville Province, northeastern North America. Precambrian Research, Volume 58, pages 401-426. [LAB/1003].

Schärer, U., Krogh, T.E. and Gower, C.F.
1986: Age and evolution of the Grenville Province in eastern Labrador from U-Pb systematics in accessory minerals. Contributions to Mineralogy and Petrology, Volume 94, pages 438-451. [LAB/0805].

Schärer, U., Krogh, T.E., Wardle, R.J., Ryan, B. and Gandhi, S.S.
1988: U-Pb ages of early and middle Proterozoic volcanism and metamorphism in the Makkovik orogen, Labrador. Canadian Journal of Earth Sciences, Volume 25, pages 1098-1107. [LAB/0823].

Scharon, L.
1952a: Titanium possibilities in the Mealy Mountains area, Labrador, Canada. Newfoundland and Labrador Corporation Limited, Newfoundland and Labrador Geological Survey Assessment File 13G/0002, 19 pages.

1952b: Field investigations in the Mealy Mountains, Labrador, during summer, 1952. Newfoundland and Labrador Corporation Limited. Report (including correspondence with the National Lead Company), Newfoundland and Labrador Geological Survey Assessment File 13G/0003, 27 pages.

Schwellnus, J.E.G.
1953: Mineral report no. 58 on prospecting in the Red Bay area, within the British Newfoundland Corporation Limited concession, Labrador. Brinco Limited. Newfoundland and Labrador Geological Survey, Assessment File 012P/09/0056, 5 pages.

Snow, P.
1980a: Project 740 – Lake Melville, Labrador NTS 13-G-14 West. Report on geological, geophysical surveys, and diamond drilling, 1980. Licence Number 1239. Northgate Exploration Limited and Whim Creek Consolidated N.L. Newfoundland and Labrador Geological Survey, Assessment File 013G/14/0038, 11 pages plus appendices.

1980b: Project 740 – Lake Melville, Labrador NTS 13-G-14 West. Report on geological, geophysical surveys, and diamond drilling, 1980. Licence Number 1241. Northgate Exploration Limited and Whim Creek Consolidated N.L. Newfoundland and Labrador Geological Survey, Assessment File 013G/14/0039, 12 pages plus appendices.

Snow, P. and Parker, R.
1979a: Project 740 Lake Melville, Labrador, Licence 1238, Field work report 1979. Northgate Exploration Limited and Whim Creek Consolidated N.L. Newfoundland and Labrador Geological Survey, Assessment File 013G/14/0032, 9 pages plus appendices.

1979b: Project 740 Lake Melville, Labrador, Licence 1239, Field work report 1979. Northgate Exploration Limited and Whim Creek Consolidated N.L. Newfoundland and Labrador Geological Survey, Assessment File 013G/14/0033, 13 pages plus appendices.

1979c: Project 740 Lake Melville, Labrador, Licence 1242, Field work report 1979. Northgate Exploration Limited and Whim Creek Consolidated N.L. Newfoundland and Labrador Geological Survey, Assessment File 013G/14/0034, 8 pages plus appendices.

1979d: Project 740 Lake Melville, Labrador, Licence 1243, Field work report, 1979. Northgate Exploration Limited. Newfoundland and Labrador Geological Survey, Assessment File 013G/14/0035, 8 pages plus appendices.

1979e: Project 740 Lake Melville, Labrador, Licence 1241, Field work report 1979. Northgate Exploration Limited and Whim Creek Consolidated N.L. Newfoundland and Labrador Geological Survey, Assessment File 013G/14/0036, 13 pages plus appendices.

Squires, G., Milton, B. and Kendle, F.
1997: First year assessment report (geology, geochemistry, geophysics) on licences 4761M, 4762M and 4763M. Ni, Cu, Co exploration in the White Bear Arm area southeast Labrador NTS 3D/13, 13A/9, 16. Noranda Mining and Exploration Incorporated. Newfoundland and Labrador Geological Survey, Assessment File LAB/1266, 14 pages plus appendices.

Steenfelt, A.
2000: Geochemical signatures of gold provinces in South Greenland. Transactions of the Institute of Mining and Metallurgy (Section B: Applied Earth Science), Volume 109, pages B14-B22.

Stendal, H. and Frei, R.
2000: Gold occurrences and lead isotopes in Ketilidian Mobile Belt, South Greenland. Transactions of the Institute of Mining and Metallurgy (Section B: Applied Earth Science), Volume 109, pages B6-B13.

Stevenson, I.M.
1970: Rigolet and Groswater Bay map areas, Newfoundland (Labrador) (13J, 13I). Geological Survey of Canada, Paper 69-48, 24 pages. [LAB/0128]

Strong, J.
1953: Mineral report No 5 on correspondence relating to a mica occurrence in the Horse Chops, Groswater Bay area, Labrador. Brinex Limited. Newfoundland and Labrador Geological Survey, Assessment File 013H/14/0003, 4 pages.

Sutton, W.R.
1965: Report on Sandwich Bay – Square Island, southeast Labrador joint venture area. Brinex Limited. Newfoundland and Labrador Geological Survey, Assessment File LAB/0200, 22 pages plus appendices.

Swinden, H.S., Wardle, R.J., Davenport, P.H., Gower, C.F., Kerr, A., Meyer, J.R., Miller, R.R., Nolan, L., Ryan, A.B. and Wilton, D.H.C.
1991: Mineral exploration opportunities in Labrador - a perspective for the 1990's. *In* Current Research. Newfoundland Department of Mines, Mineral Development Division, Report 91-1, pages 349-390. [NFLD/2494].

Szabo, N.L.
1992: First year assessment report on geological, geochemical and drilling exploration for licences 388M and 390M in the Porcupine Strand area, eastern Labrador. Comico Limited. Newfoundland and Labrador Geological Survey, Assessment File LAB/0953, 18 pages.

Thibert, F. and Vaughan, C.
1999: First year assessment report on geophysical exploration for licences 6456M – 6458M on claims in the White Bear Arm area, eastern Labrador. Falconbridge Limited. Newfoundland and Labrador Geological Survey, Assessment File 013A/0045, 35 pages.

Thomas, A., Culshaw, N.G. and Currie, K.L.
1994: Geology of the Lac Ghyvelde–Lac Long area, Labrador and Quebec. Geological Survey of Canada, Paper 89-18, 86 pages. [013D/0028].

Tucker, R.D. and Gower, C.F.
1994: A U-Pb geochronological framework for the Pinware terrane, Grenville Province, southeast Labrador, Journal of Geology, Volume 102, pages 67-78. [LAB/1017].

Turta, R.
1956: Organization and operations to December 31, 1956 for Newfoundland and Labrador. Newfoundland and Labrador Geological Survey, Assessment File NFLD/0251, 179 pages.

van Breemen, O. and Currie, K.L.
2004: Geology and U-Pb geochronology of the Kipawa Syenite complex – a thrust related alkaline pluton – and adjacent rocks in the Grenville Province of western Quebec. Canadian Journal of Earth Sciences, Volume 41, pages 431-455.

van Nostrand, T.
1992: Geology of the Alexis River region, Grenville Province, southeastern Labrador. Newfoundland Department of Mines and Energy, Report 92-3, 27 pages. [NFLD/2495].

1995: Geological, geochemical and geophysical report on the Ship Harbour claim block, Port Hope Simpson area, eastern Labrador, Newfoundland NTS 3D/12 licence #3586M. Consolidated Callinan Flin Flon Mines Limited. Newfoundland and Labrador Geological Survey, Assessment File 003D/12/0026, 22 pages plus appendices.

1996a: Geological and geochemical exploration on the New York Bay 1 claim block, southeastern Labrador, Newfoundland NTS 3D/13 licence #3587M. Consolidated Callinan Flin Flon Mines Limited. Newfoundland and Labrador Geological Survey, Assessment File 003D/13/0025, 27 pages plus appendices.

1996b: Geological, geochemical and geophysical report on the New York Bay 2 claim block, southeastern Labrador, Newfoundland NTS 3D/13 licence #3588M. Consolidated Callinan Flin Flon Mines Limited. Newfoundland and Labrador Geological Survey, Assessment File 003D/13/0024, 27 pages plus appendices.

van Nostrand, T. and Brewer, K.
1997: Geological, geophysical and geochemical report on the Crooked Lake property, Labrador. Property license 1926M, southeastern Labrador. Consolidated Viscount Resources Ltd, January 1997. Newfoundland and Labrador Geological Survey, Assessment File 013H/05/0047.

van Nostrand, T.S. and Mark, D.G.
1996: First year assessment report on geological, geochemical and geophysical exploration for licences 3020M and 3585M on claims in the Red Bay area, southeastern Labrador. Consolidated Callinan Flin Flon Mines Limited. Newfoundland and Labrador Geological Survey, Assessment File 012P/0088, 51 pages.

Wardle, R.J.
1976: The Alexis Bay - Snug Harbour region of southern Labrador. *In* Report of Activities. Newfoundland Department of Mines and Energy, Mineral Development Division, Report 76-1, pages 80-87. [NFLD/0926].

1977: Geology of the Francis Harbour - Snug Harbour area. Scale 1:100,000. Newfoundland Department of Mines and Energy, Mineral Development Division, Map 77-001. [003D/0008].

Wares, R. and Leriche, P.D.
1996: Geological and geochemical report on the Etagaulet River property, Central Labrador, Newfoundland. Labrador International Mining Company and The Labrador Nickel Syndicate. Newfoundland and Labrador Geological Survey, Assessment File 013G/10/0052, 17 pages plus appendices.

Warren, F.J.
1968: Gemstones of Newfoundland and Labrador. Tourist Services Division, Department of Tourism, Government of Newfoundland and Labrador. 9 pages.

Wasteneys, H., Kamo, S., Moser, D., Krogh, T.E., Gower, C.F. and Owen, J.V.
1997: U-Pb geochronological constraints on the geological evolution of the Pinware terrane and adjacent areas, Grenville Province, southeast Labrador, Canada. Precambrian Research, Volume 81, pages 101-128. [LAB/1557].

Wheeler, E.P.
1935: An amazonite aplite dyke from Labrador. American Mineralogist, Volume 20, pages 44-49. [LAB/0798].

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Map label	Occurrence name	Commodidy	Rock type	Map region
002M/13/Amz001	Amz	Henley Island	Amazonite	Amazonite-bearing pegmatite	Pinware River
002M/13/Amz002	Amz	York Point	Amazonite	Amazonite-bearing pegmatite	Pinware River
002M/13/Amz003	Amz, Fl, Mo	Pullman Head Southwest #1	Amazonite	Amazonite-bearing pegmatite	Pinware River
002M/13/Pyr001	Pyr	Temple Bay Southside #1	Pyrite	Pitts Hbr quartzite: rusty-weathering, pyritic	Pinware River
002M/13/Pyr002	Pyr	Pullman Head Southwest #2	Pyrite	Pitts Hbr metasedimentary gneiss: rusty-weathering muscovite schist	Pinware River
002M/13/Ti 001	Ilm (?)	Temple Bay Southside #2	Magnetite	Pegmatite: magnetite, ilmenite and garnet in enclave	Pinware River
003D/04/Amz001	Amz	Seal Islands #2	Amazonite	Amazonite-bearing pegmatite	St. Lewis River
003D/04/Cu 001	Cu	Truck Island	Copper	Malachite staining in psammitic(?) rock	St. Lewis River
003D/04/Cu 002	Cu	Pleasure Harbour Pond	Copper	Lighthouse Cove Formation: malachite staining	St. Lewis River
003D/04/Cu 003	Cu	Cape Charles	Quartz with sulphide	Quartz veins: massive sulphide	St. Lewis River
003D/04/Cu 004	Cu	Soldier Cove	Quartz with sulphide	Quartz veins: massive sulphide	St. Lewis River
003D/04/Mic001	Ms	Cape St. Charles	Muscovite	Pegmatite: muscovite	St. Lewis River
003D/04/Mic002	Ms, Amz	Seal Islands #1	Muscovite	Pegmatite: muscovite, amazonite	St. Lewis River
003D/04/Mic003	Bt	Pitts Harbour	Biotite	Pegmatite: biotite	St. Lewis River
003D/04/Pyr001	Pyr	Big Duck Island	Pyrite (+/- Cu)	Ultramafite/melagabbro: rusty zones	St. Lewis River
003D/04/Pyr002	Pyr	Pleasure Harbour	Pyrite	Pitts Hbr metasedimentary schist: pyrite, muscovite	St. Lewis River
003D/04/Pyr003	Pyr	Lodge North	Pyrite (+/-Cu)	Diorite, quartz gneiss; minor pyrite	St. Lewis River
003D/05/Amz001	Amz	Battle Harbour #1	Amazonite	Amazonite-bearing pegmatite	St. Lewis River
003D/05/Amz002	Amz	Battle Harbour #3	Amazonite	Amazonite-bearing pegmatite	St. Lewis River
003D/05/Cu 001	Cu	Frenchman Cove	Pyrite, Copper (+/- Ni)	Gabbronorite. ?leuco: malachite staining	St. Lewis River
003D/05/Cu 002	Cu	Alexis River Property	Pyrite (+/- Cu)	Gabbro, meta: pyrite and minor chalcopyrite in epidote -altered	St. Lewis River
003D/05/Cu 003	Cu, Fl, Amz, Pyr, Zr	Round Hill Pond #1	Zirconium, REE, Pyrite	Granitoid gneiss: chalcopyrite, fluorite, amazonite, pyrite, zirconium	St. Lewis River
003D/05/Fe 001	Fe (?)	Assizes Island	Magnetite	Pegmatite: magnetite/ iron oxide minerals and gneiss:	St. Lewis River
003D/05/Fl 001	Fl	Battle Harbour #2	Fluorite	Fluorite in pegmatitic pod	St. Lewis River
003D/05/Fl 002	Fl	St. Lewis Inlet #1	Fluorite	Fluorite on joint surface in granitoid gneiss	St. Lewis River
003D/05/Fl 003	Fl	Round Hill Pond #2	Fluorite	Fluorite in pegmatite; amazonite in psammitic gneiss	St. Lewis River
003D/05/Fl 004	Fl	Port Marnham #1	Fluorite	Fluorite and specular hematite in vein	St. Lewis River
003D/05/Mo 001	Mo	St. Lewis Inlet #2	Molybdenite	Diorite / leucogabbronorite gneiss: molybdenite on joint surface in	St. Lewis River
003D/05/Pyr001	Pyr	Cartridge Bight	Pyrite (+/- Cu)	Pegmatite: pyrite	St. Lewis River
003D/05/Pyr002	Pyr	Long Pond	Pyrite (+/-Cu)	Granodiorite / qtz diorite gneiss: pyrite	St. Lewis River
003D/05/Pyr003	Pyr	Petty Harbour	Quartz with sulphide	Quartz veins: pyrite	St. Lewis River
003D/05/Pyr004	Pyr	Fox Harbour East	Zirconium, REE, Pyrite	Mylonitic granite gneiss; pyrite- and muscovite-bearing gossans	St. Lewis River
003D/05/Pyr005	Pyr	Fox Harbour	Zirconium, REE, Pyrite	Diorite, quartz to granodiorite; rusty-weatheirng gossan layers	St. Lewis River
003D/05/Pyr006	Pyr	Salt Brook	Pyrite (+/-Cu)	Granitoid gneiss: desseminated sulphides	St. Lewis River
003D/05/Pyr007	Pyr, Amz	Round Hill Pond #3	Pyrite (+/- Cu)	Pegmatite: pyrite; amazonite in psammitic gneiss	St. Lewis River
003D/05/Pyr008	Pyr	Port Marnham #2	Pyrite	Amphibolite, schistose: pyrite on joint surfaces	St. Lewis River
003D/05/Zr 001	Zr	Fox Harbour Zirconium	Zirconium, REE, Pyrite	Mylonitic gneiss	St. Lewis River
003D/12/Cu 001	Cu	Occasional Harbour	Copper	Metasedimentary gneiss: pyrite Cu	Port Hope Simpson
003D/12/Cu 002	Cu	Denbigh Island	Copper	Mafic dyke, amphibolitized; malachite staining marginal to	Port Hope Simpson
003D/12/Cu 003	Cu	Gilbert Bay East	Pyrite (+/-Cu)	Granitoid rock: malachite staining in shear	Port Hope Simpson
003D/12/Cu 004	Cu	Gilbert Bay North	Copper	Metasedimentary gneiss: pyrite Cu	Port Hope Simpson
003D/12/Cu 005	Cu	River Out	Quartz with sulphide	Granite, alkal feldspar; pyrite and chalcopyrite-bearing qtz vein	Port Hope Simpson
003D/12/Fe 001	Mgt	Fishing Ships Harbour #1	Magnetite	Magnetite-rich band	Port Hope Simpson
003D/12/Mic001	Bt	Square Island #1	Biotite	Pegmatite: biotite	Port Hope Simpson
003D/12/Mic002	Bt (?)	Southeast Charlottetown	Biotite	Pegmatite: biotite	Port Hope Simpson
003D/12/Mic003	Ms	Square Island #2	Muscovite	Pegmatite: muscovite	Port Hope Simpson
003D/12/Mic004	Bt	St. Michael's Bay #4	Biotite	Pegmatite: biotite	Port Hope Simpson
003D/12/Pyr001	Pyr	Gilbert Bay	Pyrite	Granite, massive; minor sulphide	Port Hope Simpson
003D/12/Pyr002	Pyr	Southwest Bight #1	Pyrite	Metasedimentary gneiss: pyrite (with amphibolite)	Port Hope Simpson
003D/12/Pyr003	Pyr	Old Mans Head #1	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003D/12/Pyr004	Pyr	Fishing Ships Harbour North	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Map label	Occurrence name	Commodidy	Rock type	Map region
003D/12/Pyr005	Pyr	Alexis Bay #1	Pyrite	Amphibolite; rusty weathering	Port Hope Simpson
003D/12/Pyr006	Pyr	Occasional Harbour North	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003D/12/Pyr007	Pyr	Occasional Harbour West	Pyrite	Metasedimentary gneiss: magnetite, sulphide	Port Hope Simpson
003D/12/Pyr008	Pyr	Delany Cove	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003D/12/Pyr009	Pyr	Delaney Cove #2	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003D/12/Pyr010	Pyr, Cu	Southwest Bight #2	Copper	Metasedimentary gneiss: pyrite Cu	Port Hope Simpson
003D/12/Pyr011	Pyr	Old Mans Head #2	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003D/12/Pyr012	Pyr, Cu	Fishing Ships Harbour #2	Copper	Metasedimentary gneiss: pyrite Cu	Port Hope Simpson
003D/13/Cu 001	Cu	Hambrook #1	Copper	Metasedimentary gneiss: pyrite (with amphibolite) Cu	Port Hope Simpson
003D/13/Cu 002	Cu	White Bear Arm #5	Copper	Long Range dyke: malachite staining in metased gneiss marginal to	Port Hope Simpson
003D/13/Cu 003	Cu	White Bear Arm #6	Copper	Long Range dyke: malachite staining in metased gneiss marginal to	Port Hope Simpson
003D/13/Cu 004	Cu	Seal Cove #1	Copper	Metasedimentary gneiss: Long Range dyke: Cu staining in metased gneiss marginal to	Port Hope Simpson
003D/13/Cu 005	Cu	Seal Cove #2	Copper	Metasedimentary gneiss: Long Range dyke: Cu staining in metased gneiss marginal to	Port Hope Simpson
003D/13/Fe 001	Fe (?)	Triangle Harbour #1	Magnetite/ilmenite	Gabbro: heavy mineral concentrate	Port Hope Simpson
003D/13/Fe 002	Cu	Triangle Harbour #3	Copper	Metasedimentary gneiss: malachite Cu	Port Hope Simpson
003D/13/Fe 003	Mgt	White Bear Arm #7	Magnetite	Gabbro, leuco: magnetite	Port Hope Simpson
003D/13/Gnt001	Gnt	Cape Bluff Pond #6	Garnet	Metasedimentary gneiss: garnet	Port Hope Simpson
003D/13/Gnt002	Gnt	Cape Bluff Pond #7	Garnet	Metasedimentary gneiss: garnet	Port Hope Simpson
003D/13/Mic001	Bt	White Bear Arm #3	Biotite	Pegmatite: biotite	Port Hope Simpson
003D/13/Mic002	Bt, Ms	White Bear Arm #1	Biotite	Pegmatite: biotite, muscovite	Port Hope Simpson
003D/13/Mic003	Ms	Whitefish Island	Biotite	Pegmatite: biotite, muscovite	Port Hope Simpson
003D/13/Po 001	Po	Cape Bluff Pond #8	Pyrite	5-10 % Po? In v.f.g. granitic gneiss (metachert? - CFG)	Port Hope Simpson
003D/13/Pyr001	Cu	North Island #1	Copper	Metasedimentary gneiss: malachite Cu	Port Hope Simpson
003D/13/Pyr002	Pyr, Cu	Bake Apple Island	Copper	Metasedimentary gneiss: pyrite, Cu	Port Hope Simpson
003D/13/Pyr003	Pyr, Cu	Triangle Harbour #2	Copper	Metasedimentary gneiss: pyrite Cu	Port Hope Simpson
003D/13/Pyr004	Pyr, Cu	Seal Island #1	Copper	Metasedimentary gneiss: pyrite Cu	Port Hope Simpson
003D/13/Pyr005	Pyr, Cu	Cape Bluff Harbour #1	Copper	Metasedimentary gneiss: pyrite Cu	Port Hope Simpson
003D/13/Pyr006	Pyr, Cu	Cape Bluff Harbour #2	Copper	Metasedimentary gneiss: pyrite Cu	Port Hope Simpson
003D/13/Pyr007	Pyr, Cu	Fortune Arm	Copper	Metasedimentary gneiss: pyrite Cu	Port Hope Simpson
003D/13/Pyr008	Pyr, Cu	North Island #2	Copper	Metasedimentary gneiss: pyrite (with amphibolite) Cu	Port Hope Simpson
003D/13/Pyr009	Pyr	Cape Bluff Pond #1	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003D/13/Pyr010	Pyr, Cu	Cape Bluff Pond #2	Copper	Metasedimentary gneiss: pyrite Cu	Port Hope Simpson
003D/13/Pyr011	Pyr	Cape Bluff Pond #3	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003D/13/Pyr012	Pyr	Martin Bay #1	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003D/13/Pyr013	Pyr	Cape Bluff Pond #4	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003D/13/Pyr014	Pyr	Cape Bluff Pond #5	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003D/13/Pyr015	Pyr	Seal Cove #3	Pyrite	Metasedimentary gneiss: pyrite (with amphibolite)	Port Hope Simpson
003D/13/Pyr016	Pyr	New York Bay #1	Pyrite	Metasedimentary gneiss: pyrite (with amphibolite)	Port Hope Simpson
003D/13/Pyr017	Pyr	Eastern Island	Pyrite	Metasedimentary gneiss: pyrite (with amphibolite)	Port Hope Simpson
003D/13/Pyr018	Pyr	Butler Island	Pyrite	Metasedimentary gneiss: pyrite (with amphibolite)	Port Hope Simpson
003D/13/Pyr019	Pyr	West Island	Pyrite	Metasedimentary gneiss: pyrite (with amphibolite)	Port Hope Simpson
003D/13/Pyr020	Pyr	Seal Island #2	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003D/13/Pyr021	Pyr	Jennifer Island	Pyrite	Metasedimentary gneiss: pyrite (with amphibolite)	Port Hope Simpson
003D/13/Pyr022	Pyr	North Island #3	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003D/13/Pyr023	Pyr	Hambrook #2	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003D/13/Pyr024	Pyr	Hamburg Head	Pyrite	Metasedimentary gneiss: pyrite (with amphibolite)	Port Hope Simpson
003D/13/Pyr025	Pyr	Cooper Head	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003D/13/Pyr026	Pyr	Herring Cove	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003D/13/Pyr027	Pyr	Murray Point	Pyrite (+/- Cu)	Long Range dyke: Pyrite at margin	Port Hope Simpson
003D/13/Pyr028	Pyr	Southern Head	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003D/13/Pyr029	Pyr	Cape Bluff #1	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Map label	Occurrence name	Commodidy	Rock type	Map region
003D/13/Pyr030	Pyr	Cape Bluff #2	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003D/13/Pyr031	Pyr, Cu	New York Bay #2	Quartz with sulphide	Long Range trend: post-Grenvillian alteration zone	Port Hope Simpson
003D/13/Pyr032	Pyr	Martin Bay #2	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003D/13/Pyr033	Pyr	Martin Bay #3	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003D/13/Pyr034	Pyr	Cape Bluff Pond #9	Pyrite	Metasedimentary gneiss 15% pyrite on foliaton plane	Port Hope Simpson
003D/13/Pyr035	Pyr	Seal Cove #4	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
003E/04/Mic001	Ms	Hawke Island West	Muscovite	Pegmatite: muscovite	Sand Hill River
003E/04/Mic002	Ms	Inner Caplin Bay #2	Muscovite	Pegmatite: muscovite	Sand Hill River
003E/04/Mic003	Ms	Caplin Bay #3	Muscovite	Pegmatite: muscovite	Sand Hill River
003E/04/Pyr001	Pyr	Partridge Bay Pond #1	Pyrite	Metasedimentary gneiss: pyrite	Sand Hill River
003E/04/Pyr002	Pyr	Partridge Bay Pond #2	Pyrite	Metasedimentary gneiss: pyrite	Sand Hill River
003E/04/Pyr003	Pyr	Caplin Bay #1	Pyrite	Metasedimentary gneiss: pyrite	Sand Hill River
003E/04/Pyr004	Pyr	Caplin Bay North	Pyrite	Metasedimentary gneiss: pyrite	Sand Hill River
003E/04/Pyr005	Pyr	Caplin Bay Northwest	Pyrite	Metasedimentary gneiss: pyrite	Sand Hill River
003E/04/Pyr006	Pyr	Mountaineer Cove	Pyrite	Metasedimentary gneiss: pyrite	Sand Hill River
003E/04/Pyr007	Pyr	Mountaineer Cove East	Pyrite	Metasedimentary gneiss: pyrite	Sand Hill River
003E/04/Pyr008	Pyr	Caplin Bay #2	Pyrite	Metasedimentary gneiss: pyrite	Sand Hill River
003E/04/Pyr009	Pyr	Inner Caplin Bay #1	Pyrite	Metasedimentary gneiss: pyrite	Sand Hill River
003E/04/Pyr010	Pyr	Comfort Bight South #1	Pyrite	Metasedimentary gneiss: pyrite	Sand Hill River
003E/04/Pyr011	Pyr	Inner Caplin Bay #3	Pyrite	Metasedimentary gneiss: pyrite (quartzite/ metachert)	Sand Hill River
003E/04/Pyr012	Pyr	Comfort Bight South #2	Pyrite	Metasedimentary gneiss: pyrite (with quartzite)	Sand Hill River
003E/04/Pyr013	Pyr	Comfort Bight #1	Pyrite	Rusty area in 'troctolite' gneiss	Sand Hill River
003E/05/Cu 001	Cu	Open Bay	Pyrite (+/-Cu)	Granitoid gneiss: chalcopyrite on foliation plane	Sand Hill River
003E/05/Cu 002	Cu	Domino Harbour #2	Copper (Au,Pd,Pt)	Malachite and azurite in 'heavy' mafic rock	Sand Hill River
003E/05/Mo 001	Mo	Domino Harbour #1	Quartz with sulphide	Pyrite and malachite in qtz veins. Anomalous Mo	Sand Hill River
003E/05/Pyr001	Pyr	Black Bear Bay	Pyrite (+/-Cu)	Granodiorite: pyrite	Sand Hill River
003E/05/Pyr002	Pyr	Porcupine Bay	Pyrite (+/-Cu)	Diorite, quartz; pyrite	Sand Hill River
012P/06/Stn001	Stn	L'Anse-au-Clair Sandstone	Dimension stone	Sandstone	Pinware River
012P/07/Fe 001	Mgt	Forteau North	Magnetite	Pegmatite: magnetite	Pinware River
012P/09/Fe 001	Mgt	Carrol Cove	Magnetite	Pegmatite: magnetite	Pinware River
012P/09/Fe 002	Mgt	Red Bay	Magnetite/ilmenite	Red Bay gabbronorite: magnetite, ilmenite	Pinware River
012P/09/Fe 003	Mgt	Wiseman Head	Magnetite	Pegmatite: magnetite	Pinware River
012P/10/Pyr001	Pyr	West St. Modeste	Pyrite	Pitts Hbr metasedimentary/metavolcanic rocks, ferruginous: pyrite	Pinware River
012P/11/Pyr 001	Pyr	Camp Pond South	Pyrite	Pitts Hbr metasedimentary gneiss: rusty-weathering, gnt	Pinware River
012P/15/Fl 001	Fl	Stokers Hill East side #1	Fluorite	Fluorite identified in T.S.	Pinware River
012P/15/Fl 002	Fl	Stokers Hill East side #2	Fluorite	Fluorite identified in T.S.	Pinware River
012P/15/Pyr001	Pyr	Stokers Hill East side #3	Pyrite	Amphibolite; pyrite with plag-rich segregations	Pinware River
012P/15/Pyr002	Pyr	Pinware River	Pyrite	AMCG suite: rusty-weathering	Pinware River
012P/16/Cu 001	Cu	Barge Bay Northeast #1	Copper	Pitts Hbr metasedimentary/metavolcanic rocks: malachite Cu	Pinware River
012P/16/Cu 002	Cu	Big Head Pond East #1	Copper	Pitts Hbr metasedimentary gneiss: pyrite, chalcopyrite Cu	Pinware River
012P/16/Cu 003	Cu	Outside big Pond West	Copper	Pitts Hbr metasedimentary gneiss: chalcopyrite Cu	Pinware River
012P/16/Cu 004	Cu	Outside Big Pond NW	Quartz with sulphide	Quartz veins: chalcopyrite. Intruding gneissic granite	Pinware River
012P/16/Fel001	Neph	Black Bay Ponds South	Nepheline	Alkali-feldspar syenite, nepheline	Pinware River
012P/16/Fel002	Neph	Black Bay #1	Nepheline	Alkali-feldspar syenite, nepheline	Pinware River
012P/16/Fel003	Neph	Black Bay #2	Nepheline	Alkali-feldspar syenite, nepheline	Pinware River
012P/16/Fel004	Neph	Black Bay #3	Nepheline	Alkali-feldspar syenite, nepheline	Pinware River
012P/16/Fel005	Neph	Black Bay #4	Nepheline	Alkali-feldspar syenite, nepheline	Pinware River
012P/16/Fl 001	Fl	Island Pond East	Fluorite	Pitts Hbr? fluorite identified in T.S.; ass with calc-silicate minerals	Pinware River
012P/16/Mo 001	Mo, Pyr	Outside Big Pond East	Molybdenite	Pitts Hbr quartzite: pyrite and molybdenite	Pinware River
012P/16/Pyr001	Pyr	Woody Cove Southwest	Pyrite	Pitts Hbr metasedimentary/metavolcanic rocks: pyrite, muscovite and garnet with	Pinware River
012P/16/Pyr002	Pyr	Barge Bay Northeast #2	Pyrite	Pitts Hbr metasedimentary/metavolcanic rocks: pyrite	Pinware River

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Map label	Occurrence name	Commodidy	Rock type	Map region
012P/16/Pyr003	Pyr	North Brook	Pyrite (+/- Cu)	Red Bay gabbro, lecuo: rusty-weathering zone	Pinware River
012P/16/Pyr004	Pyr	Wreck Cove	Pyrite	Mafic dyke: pyrite dessiminated	Pinware River
012P/16/Pyr005	Pyr	Green Bay Cliff West	Pyrite	Pitts Hbr metasedimentary schist: pyrite	Pinware River
012P/16/Pyr006	Pyr	Wreck Cove Southwest	Pyrite	Pitts Hbr metasedimentary gneiss: pyrite in muscovite-bearing psammite	Pinware River
012P/16/Pyr007	Pyr	Big Head Pond West Side #1	Pyrite	Pitts Hbr metasedimentary gneiss: pyrite	Pinware River
012P/16/Pyr008	Pyr	Big Head Pond West Side #2	Pyrite	Pitts Hbr metasedimentary gneiss: pyrite	Pinware River
012P/16/Pyr009	Pyr	Big Head Pond Northeast Side	Pyrite	Pitts Hbr metasedimentary gneiss: pyrite in pegmatite patches in calc-silicate rock	Pinware River
012P/16/Pyr010	Pyr	Big Head Pond East #2	Pyrite	Pitts Hbr amphibolite gneiss; pyrite	Pinware River
012P/16/U 001	U	LP showing	Uranium	Pegmatite: U values	Pinware River
012P/16/U 002	U	WD showing	Uranium	U: Boulders of orthogneiss/paragneiss showing uranophane staining	Pinware River
013A/01/Sia001	Si	Big Pond	Quartz	Quartz veins	St. Lewis River
013A/01/Sia002	Si	Big Pond South	Quartz	Quartz veins	St. Lewis River
013A/01/Sia003	Si	Sugar Loaf	Quartz	Quartz veins	St. Lewis River
013A/01/Sia004	Si	Big Pond Southwest #1	Quartz	Quartz veins	St. Lewis River
013A/01/Sia005	Si	Big Pond Southwest #2	Quartz	Quartz veins	St. Lewis River
013A/04/Fel001	Neph	Riviere St. Paul #1	Nepheline	Alkali-feldspar syenite, nepheline	Kyfanan Lake
013A/04/Pyr001	Pyr	Riviere St. Paul #2	Pyrite (+/- Cu)	Long Range dyke: pyrite	Kyfanan Lake
013A/06/Fe 001	Mgt	Kyfannan Lake #3	Magnetite	Gabbronorite: magnetite, ilmenite (Kyfanan belt)	Kyfanan Lake
013A/06/Mic001	Bt	Kyfannan Lake #1	Biotite	Pegmatite: biotite	Kyfanan Lake
013A/06/Mic002	Bt, Ms	Kyfannan Lake #2	Biotite	Pegmatite: biotite, muscovite	Kyfanan Lake
013A/06/Pyr001	Pyr	Kyfannan Lake #4	Pyrite (+/- Cu)	Ultramafic rocks: pyrite in peridotite and gabbro boulders (Kyfanan belt)	Kyfanan Lake
013A/08/Gem001	Saph	Rockhopper # 8	Sapphire (corundum)	Gem: sapphire; ass with leucogabbro and pelitic gneiss	St. Lewis River
013A/08/Gem002	Saph?	Notleys Brook #2	Sapphire (corundum)	Gem: sapphire? Blue-grey crystals in biotite-hornblende dioritic gneiss	St. Lewis River
013A/08/Pyr001	Pyr	St. Lewis River #1	Pyrite	No information from assessment report, but mafic rocks in area	St. Lewis River
013A/08/Pyr002	Pyr	Notleys Brook #1	Pyrite (+/- Cu)	Amphibolite gneiss: pyrite	St. Lewis River
013A/08/Pyr003	Pyr, Amz, Mo	St. Lewis Inlet #3	Molybdenite	Pegmatite: pyrite, amazonite and molybdenite	St. Lewis River
013A/08/Sia001	Si	St. Mary's River #2	Quartz	Quartz veins along fault	St. Lewis River
013A/08/Sia002	Si	St. Mary's River #3	Quartz	Quartz veins along fault	St. Lewis River
013A/08/Sia003	Si	St. Mary's River #4	Quartz	Quartz veins along fault	St. Lewis River
013A/08/Sia004	Si	St. Mary's River #5	Quartz	Quartz veins along fault	St. Lewis River
013A/08/Sia005	Si	St. Mary's River #6	Quartz	Quartz veins along fault	St. Lewis River
013A/08/Sia006	Si	St. Mary's River #1	Quartz	Quartz veins along fault	St. Lewis River
013A/09/Cu 001	Cu, Ni, Mo, Pyr	Alexis River #1	Pyrite, Copper (+/- Ni)	Mafic intrusion: pyrite and pyrrhotite	Port Hope Simpson
013A/09/Cu 002	Cu, Ni, Pyr	Alexis River #2	Pyrite, Copper (+/- Ni)	Pyrite, pyrrhotite and chalcopyrite in mafic intrusion	Port Hope Simpson
013A/09/Cu 003	Cu, Pyr	Alexis River #6	Pyrite, Copper (+/- Ni)	Pyrite, chalcopyrite in mela-diorite to gabbronorite	Port Hope Simpson
013A/09/Cu 004	Cu	St. Michael's Bay #1	Copper (+/- Ni)	Amphibolitized gabbronorite; anomalous Cu in rock sample	Port Hope Simpson
013A/09/Cu 005	Cu, Pyr	Alexis River #7	Copper	Metasedimentary gneiss: pyrite, Cu	Port Hope Simpson
013A/09/Cu 006	Cu	Gilbert Lake #1	Copper	Metasedimentary gneiss: Cu	Port Hope Simpson
013A/09/Gem001	Tourm	Alexis Bay North #2	Other minerals	Pegmatite: tourmaline and magnetite	Port Hope Simpson
013A/09/Lst001	Lst (?)	Port Hope Simpson	Limestone	Surface materials; limestone (anorthosite?)	Port Hope Simpson
013A/09/Ni 001	Ni	St. Michael's Bay #2	Copper (+/- Ni)	Gabbronorite: anomalous Ni in rock sample	Port Hope Simpson
013A/09/Ni 002	Ni	St. Michael's Bay #3	Copper (+/- Ni)	Gabbronorite: anomalous Ni in rock sample	Port Hope Simpson
013A/09/Ni 003	Ni	Alexis River Northside	Nickel (Cu)	Gabbro: pyritic gossan at margin of	Port Hope Simpson
013A/09/Po 001	Po	West Port Hope Simpson	Pyrite, Copper (+/- Ni)	Gabbronorite host	Port Hope Simpson
013A/09/Pyr001	Pyr	Alexis Bay #2	Pyrite (+/-Cu)	Granitoid, K-fs megacrsytic	Port Hope Simpson
013A/09/Pyr002	Pyr	Alexis River #3	Pyrite, Copper (+/- Ni)	Pyrite, chalcopyrite and ?pentlandite in leucogabbro	Port Hope Simpson
013A/09/Pyr003	Pyr	Port Hope-Simpson Northeast	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
013A/09/Pyr004	Pyr	Gilbert Lake Southwest	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
013A/09/Pyr005	Pyr	Shinney's Waters South	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
013A/09/Pyr006	Pyr	Alexis River #4	Pyrite	Pyrite in hbl-gnt qtzofeld gneiss, possibly metasedimentary	Port Hope Simpson
013A/09/Pyr007	Pyr	Alexis River Mouth	Pyrite	Amphibolite: pyrite, gnt	Port Hope Simpson

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Map label	Occurrence name	Commodidy	Rock type	Map region
013A/09/Pyr008	Pyr	Alexis Bay North #1	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
013A/09/Pyr009	Pyr	Alexis River #5	Pyrite (+/-Cu)	Diorite, monzo gneiss: pyrite	Port Hope Simpson
013A/09/Pyr010	Pyr	West Gilbert Bay	Pyrite (+/- Cu)	Long Range dyke?: pyrite in gabbro	Port Hope Simpson
013A/09/Pyr011	Pyr	Shinney's Outside Pond	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
013A/09/Pyr012	Pyr	Rexxon's Island	Pyrite (+/-Cu)	Granite: pyrite	Port Hope Simpson
013A/09/Pyr013	Pyr	Notleys Brook #3	Pyrite (+/- Cu)	Amphibolitic to dioritic gneiss: pyrite	Port Hope Simpson
013A/09/Pyr014	Pyr	Gilbert Lake #2	Pyrite (+/- Cu)	Pegmatite: pyrite	Port Hope Simpson
013A/09/Pyr015	Pyr	Gilbert Lake North	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
013A/09/Pyr016	Pyr	St. Michael's Bay South	Pyrite (+/- Cu)	Long Range dyke: pyritic margin	Port Hope Simpson
013A/10/Cu 001	Cu	Bobbys Brook	Pyrite (+/- Cu)	Gabbronorite host	Port Hope Simpson
013A/10/Gnt001	Gnt	Alexis River West #4	Garnet	Gem: garnet 50 cm across in anorthosite	Port Hope Simpson
013A/10/Pyr001	Pyr	Jeffries Pond Southwest	Pyrite (+/-Cu)	Pyrite in gnt-amph-plag-?pyx rock	Port Hope Simpson
013A/10/Pyr002	Pyr	Camp Pond #1	Pyrite (+/-Cu)	Pyrite in qtz-rich gneiss bearing megacrysts	Port Hope Simpson
013A/10/Pyr003	Pyr	Camp Pond #2	Pyrite	Amphibolite: pyrite	Port Hope Simpson
013A/10/Ti 001	Ilm	Alexis River West #1	Ilmenite	AMCG suite: ilmenite (Alexis River)	Port Hope Simpson
013A/10/Ti 002	Ilm	Alexis River West #2	Ilmenite	AMCG suite: ilmenite (Alexis River)	Port Hope Simpson
013A/10/Ti 003	Ilm	Alexis River West #3	Ilmenite	AMCG suite: ilmenite (Alexis River)	Port Hope Simpson
013A/11/Fe 001	Mgt	Alexis River #8	Magnetite	Pegmatite: magnetite / qtz veins	Alexis River
013A/11/Pyr001	Pyr	Alexis River Tributary #2	Pyrite	Metasedimentary gneiss: pyrite	Alexis River
013A/11/Pyr002	Pyr, Ms	Alexis River Tributary #3	Pyrite	Metasedimentary gneiss: pyrite	Alexis River
013A/11/U 001	U	Alexis River Tributary #4	Uranium	Pegmatite: U values	Alexis River
013A/13/Pyr001	Pyr	Paradise River #7	Pyrite (+/- Cu)	Long Range dyke: pyrite in diabase	Alexis River
013A/14/Pyr001	Pyr	Alexis River Tributary #1	Pyrite (+/- Cu)	Long Range dyke: pyrite in fault breccia and qtz veins	Alexis River
013A/14/Pyr002	Pyr	Alexis River tributary #5	Pyrite (+/- Cu)	Pegmatite: pyrite	Alexis River
013A/14/Pyr003	Pyr	Alexis River tributary #6	Pyrite	Metasedimentary gneiss: pyrite	Alexis River
013A/15/Fe 001	Mgt	Hawke River #6	Magnetite	Gabbronorite: magnetite clusters	Port Hope Simpson
013A/15/Pyr001	Pyr	Jeffries Pond	Pyrite	Metasedimentary gneiss: pyrite (with quartzite)	Port Hope Simpson
013A/15/Pyr002	Pyr	Gilbert River	Pyrite	Metasedimentary gneiss: pyrite (with quartzite)	Port Hope Simpson
013A/15/Pyr003	Pyr	Alexis River Tributary #7	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
013A/16/Cu 001	Cu, Pyr	White Bear Arm North #11	Copper	Metasedimentary gneiss and pegmatite: pyrite and chalcopyrite Cu	Port Hope Simpson
013A/16/Fe 001	Mgt	White Bear Arm North #8	Magnetite/ilmenite	Gabbronorite: magnetite, chalcopyrite	Port Hope Simpson
013A/16/Fe 002	Mgt	White Bear Arm North #9	Magnetite	Pegmatite: magnetite c.g. granite	Port Hope Simpson
013A/16/Gnt001	Gnt	White Bear Arm North #1	Garnet	Metasedimentary gneiss: garnet	Port Hope Simpson
013A/16/Gnt002	Gnt	White Bear Arm North #4	Garnet	Metasedimentary gneiss: garnet	Port Hope Simpson
013A/16/Gnt003	Gnt	White Bear Arm North #5	Garnet	Metasedimentary gneiss: garnet	Port Hope Simpson
013A/16/Gnt004	Gnt	White Bear Arm North #6	Garnet	Metasedimentary gneiss: garnet	Port Hope Simpson
013A/16/Gnt005	Gnt	White Bear Arm North #7	Garnet	Metasedimentary gneiss: garnet	Port Hope Simpson
013A/16/Gnt006	Gnt	White Bear Arm North #10	Garnet	Metasedimentary gneiss: garnet	Port Hope Simpson
013A/16/Mic001	Ms (?)	Hawke River #7	Muscovite	Pegmatite: muscovite	Port Hope Simpson
013A/16/Mic002	Ms	White Bear Arm North #12	Garnet	Metasedimentary gneiss: muscovite, garnet	Port Hope Simpson
013A/16/Mic003	Ms	Hawke River Southwest Feeder#1	Muscovite	Pegmatite: muscovite	Port Hope Simpson
013A/16/Mic004	Ms	Hawke River Southwest Feeder#2	Muscovite	Pegmatite: muscovite	Port Hope Simpson
013A/16/Mic005	Ms	Southern Backwater #2	Muscovite	Pegmatite: muscovite	Port Hope Simpson
013A/16/Po 001	Po	White Bear Arm North #3	Pyrite	Metasedimentary gneiss: garnet	Port Hope Simpson
013A/16/Pyr001	Pyr	Hawke Bay	Pyrite	Metasedimentary gneiss: pyrite, Cu	Port Hope Simpson
013A/16/Pyr002	Pyr	White Bear Arm North #2	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
013A/16/Pyr003	Pyr	Southern Backwater #1	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
013A/16/Pyr004	Pyr	White Bear Arm #2	Pyrite	Metasedimentary gneiss: pyrite	Port Hope Simpson
013A/16/Pyr005	Ms, Bt	White Bear Arm #4	Muscovite	Pegmatite: biotite, muscovite	Port Hope Simpson
013A/16/Pyr006	Pyr	Charlottetown	Pyrite	Metasedimentary gneiss; amphibolite, pyrite on joint surfaces	Port Hope Simpson
013B/01/Pyr001	Pyr	St. Paul River	Magnetite	Amphibolite: pyrite (Kyfanan belt)	Upper St. Paul River

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Map label	Occurrence name	Commodidy	Rock type	Map region
013B/07/Cu 001	Cu	St. Paul River Northwest #1	Pyrite (+/- Cu)	Pegmatite: Cu malachite/azurite	Upper St. Paul River
013B/07/Mic001	Bt	St. Paul River Northwest #2	Biotite	Pegmatite: biotite	Upper St. Paul River
013B/10/Fl 001	Fl	Upper Eagle River #4	Fluorite	Granite: fluorite	Eagle River
013B/10/Mic001	Bt	Upper Eagle River #1	Biotite	Pegmatite: biotite	Eagle River
013B/10/Pyr001	Pyr	Upper Eagle River #5	Pyrite (+/- Cu)	Pegmatite: pyrite	Eagle River
013B/10/Pyr002	Pyr	Eagle River #10	Pyrite (+/-Cu)	Diorite: pyrite	Eagle River
013B/11/Cu 001	Cu, Pyr	Riviere St. Augustin #1	Pyrite (+/- Cu)	Gabbro: chalcopyrite, pyrite (Kyfanan belt)	Crooks Lake
013B/11/Pyr001	Pyr, Cu	Riviere St. Augustin #2	Pyrite (+/- Cu)	Gabbro: chalcopyrite, pyrite (Kyfanan belt)	Crooks Lake
013B/11/Sia001	Si	Crooks Lake East Side #1	Quartz	Quartz veins along fault	Crooks Lake
013B/11/Sia002	Si	Crooks Lake East Side #2	Quartz	Quartz veins along fault	Crooks Lake
013B/11/Sia003	Si	Crooks Lake East Side #3	Quartz	Quartz veins along fault	Crooks Lake
013B/12/Fe 001	Mgt, Pyr	Crooks Lake #1	Magnetite	Ultramafic rocks: iron oxide and sulphide gossan (Kyfanan belt)	Crooks Lake
013B/12/Pyr001	Pyr, Cu	Crooks Lake Southwest	Pyrite (+/- Cu)	Gabbro: chalcopyrite, pyrite (Kyfanan belt)	Crooks Lake
013B/13/Ti 001	Ilm	Goose South #1	Ilmenite	AMCG suite: ilmenomagnetite	Crooks Lake
013B/13/Ti 002	Ilm	Goose South #2	Ilmenite	AMCG suite: ilmenomagnetite	Crooks Lake
013B/13/Ti 003	Ilm	Goose South #3	Ilmenite	AMCG suite: ilmenomagnetite	Crooks Lake
013B/15/Fl 001	Fl	Upper Eagle River #6	Fluorite	Granite: fluorite	Eagle River
013B/15/Pyr001	Pyr	Upper Eagle River #2	Pyrite (+/- Cu)	Fault breccia: rusty zone	Eagle River
013B/16/Mic001	Bt	Upper Eagle River #7	Biotite	Pegmatite: biotite	Eagle River
013B/16/Pyr001	Pyr	Upper Eagle River #3	Pyrite	Gabbronorite, meta: sulphide and oxide	Eagle River
013G/01/Mic001	Ms	Eagle River #4	Muscovite	Pegmatite: muscovite	Southeast Mealy Mtns.
013G/01/Mic002	Ms	Eagle River #7	Muscovite	Pegmatite: muscovite	Southeast Mealy Mtns.
013G/01/Pyr001	Pyr	Eagle River #5	Pyrite	Amphibolite and granodiorite; pyrite	Southeast Mealy Mtns.
013G/01/Pyr002	Pyr	Eagle River #6	Pyrite	Metasedimentary gneiss: pyrite	Southeast Mealy Mtns.
013G/02/Pyr001	Pyr, Mgt	Eagle River #8	Pyrite	Metasedimentary gneiss: pyrite	Southeast Mealy Mtns.
013G/02/Pyr002	Pyr	Eagle River #9	Pyrite	Metasedimentary gneiss: pyrite	Southeast Mealy Mtns.
013G/03/Mo 001	Mo (?)	Cache Lake South	Molybdenite	Syenite; molybdenite	Kenemich River
013G/04/Fe 001	Mgt	Kenamu River	Magnetite	AMCG suite monzonite: magnetite	Kenemich River
013G/04/Fe 002	Mgt	East Kenamu River	Magnetite	AMCG suite monzonite: magnetite	Kenemich River
013G/05/Fe 001	Mgt	Fox Pond-Kenemich River	Magnetite	AMCG suite: magnetite	Kenemich River
013G/05/Fe 002	Mgt	North Kenemich River	Magnetite	AMCG suite: magnetite	Kenemich River
013G/05/Fe 003	Mgt	Upper Big River	Magnetite	AMCG suite: magnetite	Kenemich River
013G/05/Fe 004	Mgt	South Big River # 1	Magnetite	AMCG suite: magnetite	Kenemich River
013G/05/Fe 005	Mgt	South Big River # 2	Magnetite	AMCG suite: magnetite	Kenemich River
013G/05/Fe 006	Mgt	Lower Big River	Magnetite	AMCG suite: magnetite	Kenemich River
013G/05/Fe 007	Mgt	South Little River # 1	Magnetite	AMCG suite: magnetite	Kenemich River
013G/05/Fe 008	Mgt	South Little River # 2	Magnetite	AMCG suite: magnetite	Kenemich River
013G/06/Cu 001	Cu, Pyr	Gossan (Kenemich)	Copper	Metasedimentary gneiss?	Kenemich River
013G/06/Fe 001	Mgt	Little River # 3	Magnetite	AMCG suite: magnetite	Kenemich River
013G/06/Mo 001	Mo	South Kenemich River	Molybdenite	Neosome pegmatite: molybdenite	Kenemich River
013G/07/Fe 001	Mgt	Mealy Mountains #3	Magnetite	AMCG suite monzonite: magnetite	Southeast Mealy Mtns.
013G/07/Fe 002	Mgt	Mealy Mountains #4	Magnetite	AMCG suite monzogabbro: magnetite	Southeast Mealy Mtns.
013G/07/Fe 003	Mgt	Mealy Mountains #5	Magnetite	AMCG suite monzonite: magnetite	Southeast Mealy Mtns.
013G/07/Pyr001	Pyr	Mealy Mountains #6	Pyrite	Metasedimentary gneiss: pyrite	Southeast Mealy Mtns.
013G/07/Pyr002	Pyr	Mealy Mountains #7	Pyrite	Metasedimentary gneiss: pyrite	Southeast Mealy Mtns.
013G/09/Mo 001	Mo	Upper North River #1	Molybdenite	Quartzofeldspathic segregations in gneiss: molybdenite	English River
013G/09/Mo 002	Mo	Upper North River #2	Molybdenite	Granite, migmatized: molybdenite in neosome	English River
013G/10/Cu 001	Cu	Mealy Mountains #9	Copper	Quartz monzonite / metasedimentary gneiss; pyrite lens	English River
013G/10/Pyr001	Pyr	Mealy Mountains #8	Pyrite	Metasedimentary gneiss: pyrite	English River
013G/10/Pyr002	Pyr	Upper Etagualet River	Pyrite	AMCG suite: pyritic gossan	English River
013G/11/Cly001	Cly (?)	West Long Point	Clay	Surface materials; clay	Lake Melville

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Map label	Occurrence name	Commodidy	Rock type	Map region
013G/11/Fe 001	Mgt	Eskimo Paps	Magnetite	AMCG suite: magnetite	Lake Melville
013G/11/Fe 002	Mgt	East Rabbit Point	Magnetite	AMCG suite: magnetite	Lake Melville
013G/11/Ti 001	Ilm	Mealy Mountains # 1	Ilmenite	AMCG suite: ilmenite	Lake Melville
013G/11/Ti 002	Ilm	Mealy Mountains # 2	Ilmenite	AMCG suite: ilmenite	Lake Melville
013G/14/U 001	U	Charley Point West #1	Uranium	Pegmatite/diatexite: U	Lake Melville
013G/14/U 002	U	Charley Point West #2	Uranium	Pegmatite/diatexite: U	Lake Melville
013G/14/U 003	U	Charley Point West #3	Uranium	Pegmatite/diatexite: U	Lake Melville
013G/14/U 004	U	Charley Point West #4	Uranium	Pegmatite/diatexite: U	Lake Melville
013G/15/Pyr001	Pyr	St. John Island South	Pyrite (+/-Cu)	Granitoid/gabbroic rocks: pyrite	English River
013G/15/Pyr002	Pyr	English River #1	Pyrite	Metasedimentary gneiss: pyrite (with quartzite)	English River
013G/15/Pyr003	Pyr	St. John Island North	Pyrite (+/-Cu)	Granitoid/amphibolitic rocks: pyrite	English River
013G/15/Pyr004	Pyr	Neveisik Island East	Pyrite (+/-Cu)	Granitoid rocks; pyrite, with diabase and pegmatite	English River
013G/15/Pyr005	Pyr	English River #2	Pyrite	Metasedimentary gneiss: pyrite (with quartzite)	English River
013G/15/Pyr006	Pyr	English River #3	Pyrite	Metasedimentary gneiss: pyrite (with quartzite)	English River
013G/16/Pyr001	Pyr	The Backway South #1	Pyrite	Metasedimentary gneiss: pyrite	English River
013G/16/Pyr002	Pyr	The Backway South #2	Pyrite (+/-Cu)	Granitoid, K-fs megacrystic: gossan	English River
013G/16/Pyr003	Pyr	The Backway South #3	Pyrite (+/-Cu)	Granitoid, K-fs megacrystic: gossan	English River
013H/01/Cu 001	Cu	Hawke River #3	Pyrite (+/-Cu)	Diorite / qtz diorite; malachite staining in	Sand Hill River
013H/01/Cu 002	Cu	Hawke River #5	Pyrite (+/-Cu)	Granodiorite: malachite staining	Sand Hill River
013H/01/Mic001	Ms	Western Feeder #1	Muscovite	Pegmatite: muscovite	Sand Hill River
013H/01/Mic002	Bt	Black River	Biotite	Pegmatite: biotite (and qtz veins)	Sand Hill River
013H/01/Mic003	Ms	Hawke River #4	Muscovite	Pegmatite: muscovite	Sand Hill River
013H/01/Mic004	Ms	Partridge Bay Pond West	Muscovite	Pegmatite: muscovite	Sand Hill River
013H/01/Pyr001	Pyr	Hawke River North #1	Pyrite	Metasedimentary gneiss: pyrite	Sand Hill River
013H/01/Pyr002	Pyr	Hawke River North #2	Pyrite	Metasedimentary gneiss: pyrite	Sand Hill River
013H/01/Pyr003	Pyr	Hawke River #1	Pyrite	Metasedimentary gneiss: pyrite	Sand Hill River
013H/01/Pyr004	Pyr	Hawke River #2	Pyrite	Metasedimentary gneiss: pyrite	Sand Hill River
013H/02/Fe 001	Mgt	N.W. Don Lake	Magnetite	Metasedimentary gneiss: magnetite	Sand Hill River
013H/02/Fe 002	Mgt	Northwest Feeder	Magnetite	Metasedimentary gneiss: magnetite	Sand Hill River
013H/02/Mic001	Ms	Sand Hill Big Pond #2	Muscovite	Pegmatite: muscovite	Sand Hill River
013H/02/Mic002	Ms	Sand Hill Big Pond East #1	Muscovite	Pegmatite: muscovite	Sand Hill River
013H/02/Mic003	Ms	Sand Hill Big Pond East #2	Muscovite	Pegmatite: muscovite	Sand Hill River
013H/02/Mic004	Ms	Western Feeder #2	Muscovite	Pegmatite: muscovite	Sand Hill River
013H/02/Mic005	Ms	Sand Hill Big Pond #3	Muscovite	Pegmatite: muscovite, tourmaline	Sand Hill River
013H/02/Mic006	Ms	Sand Hill Big Pond #4	Muscovite	Pegmatite: muscovite	Sand Hill River
013H/02/Th 001	Th	Mountain Brook # 1	Thorium	Granodiorite:: monazite	Sand Hill River
013H/03/Ni 001	Ni, Cu	Mountain Brook # 2	Copper (+/- Ni)	Gabbro: Ni-Fe sulphides	Paradise River
013H/03/Pyr001	Pyr	Beaver Brook East	Pyrite (+/- Cu)	Long Range, leucogabbro: pyrite	Paradise River
013H/03/Pyr002	Pyr	Paradise River tributary	Pyrite (+/-Cu)	Granitic gneiss: pyrite	Paradise River
013H/04/Cu 001	Cu	Paradise River #3	Pyrite, Copper (+/- Ni)	AMCG suite: anomalous Ni in rock sample (Alexis R).	Paradise River
013H/04/Mic001	Bt	Camel Lake Northwest #1	Biotite	Pegmatite: biotite	Paradise River
013H/04/Mic002	Mgt	Camel Lake	Biotite	Pegmatite: magnetite	Paradise River
013H/04/Mic003	Bt	Camel Lake East	Biotite	Pegmatite: biotite	Paradise River
013H/04/Mic004	Bt	Camel Lake West	Biotite	Pegmatite: biotite	Paradise River
013H/04/Mic005	Bt	Camel Lake Northwest #2	Biotite	Pegmatite: biotite	Paradise River
013H/04/Mic006	Ms, Bt	Camel Lake Southwest #1	Muscovite	Pegmatite: muscovite, biotite	Paradise River
013H/04/Pyr001	Pyr	Crooked Lake Southwest	Pyrite	Metasedimentary gneiss: pyrite	Paradise River
013H/04/Pyr002	Pyr	Crooked Lake South #1	Pyrite	Gabbro/amphibolite, meta: pyrite	Paradise River
013H/04/Pyr003	Pyr	Crooked Lake South #2	Pyrite	Metasedimentary gneiss: pyrite (with amphibolite)	Paradise River
013H/04/Pyr004	Pyr	Crooked Lake South #3	Pyrite	Metasedimentary gneiss: pyrite	Paradise River
013H/04/Pyr005	Pyr	Crooked Lake South #4	Pyrite	Metasedimentary gneiss: pyrite	Paradise River

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Map label	Occurrence name	Commodidy	Rock type	Map region
013H/04/Pyr006	Pyr	Crooked Lake South #5	Pyrite	Metasedimentary gneiss: pyrite	Paradise River
013H/04/Pyr007	Pyr	Camel Lake Northwest #3	Pyrite	Metasedimentary gneiss: pyrite	Paradise River
013H/04/Pyr008	Pyr	Camel Lake Southwest #2	Pyrite (+/- Cu)	Long Range dyke: Pyrite at margin	Paradise River
013H/05/Cu 001	Cu	Paradise River #2	Copper (+/- Ni)	White Bear Arm complex	Paradise River
013H/05/Cu 002	Cu	Crooked Lake West #7	Pyrite (+/-Cu)	0.2 % Cu; host rock uncertain	Paradise River
013H/05/Cu 003	Cu	Crooked Lake Northwest #1	Copper	Metasedimentary gneiss: base/ precious metals Cu	Paradise River
013H/05/Cu 004	Cu	Crooked Lake Northwest #2	Copper	Metasedimentary gneiss: base/ precious metals Cu	Paradise River
013H/05/Cu 005	Cu	Crooked Lake Northwest #3	Copper	Metasedimentary gneiss Cu	Paradise River
013H/05/Mic001	Bt, Ms	Paradise River #1	Biotite	Pegmatite: biotite, muscovite	Paradise River
013H/05/Ni 001	Ni	Crooked Lake #1	Copper	Metasedimentary gneiss: Cu, Ni	Paradise River
013H/05/Ni 002	Ni	Crooked Lake West #6	Copper	Metasedimentary gneiss: anomalous Cu and Ni I (with metagabbro)	Paradise River
013H/05/Ni 003	Ni	Crooked Lake West #8	Copper	Long Range dyke?: anomalous Cu and Ni	Paradise River
013H/05/Ni 004	Ni	Crooked Lake West #9	Copper	Metasedimentary gneiss: anomalous Cu and Ni I (with metagabbro)	Paradise River
013H/05/Pyr001	Pyr	Crooked Lake North	Pyrite	Metasedimentary gneiss: pyrite	Paradise River
013H/05/Pyr002	Pyr	Crooked Lake #2	Pyrite	Metasedimentary gneiss: pyrite	Paradise River
013H/05/Pyr003	Pyr	Crooked Lake #3	Pyrite	Metasedimentary gneiss: pyrite	Paradise River
013H/05/Pyr004	Pyr	Crooked Lake #4	Pyrite	Metasedimentary gneiss: pyrite	Paradise River
013H/05/Pyr005	Pyr	Crooked Lake #5	Pyrite	Metasedimentary gneiss: pyrite	Paradise River
013H/05/Pyr006	Pyr, U, Cu?	Crooked Lake West #1	Copper	Metasedimentary gneiss: pyrite Cu	Paradise River
013H/05/Pyr007	Pyr	Crooked Lake West #2	Pyrite	Metasedimentary gneiss: pyrite	Paradise River
013H/05/Pyr008	Pyr	Crooked Lake West #3	Pyrite	Metasedimentary gneiss: pyrite	Paradise River
013H/05/Pyr009	Pyr	Crooked Lake West #4	Pyrite	Metasedimentary gneiss: pyrite	Paradise River
013H/05/Pyr010	Pyr	Crooked Lake West #5	Pyrite	Metasedimentary gneiss: pyrite	Paradise River
013H/05/Pyr011	Pyr	Eagle River East #1	Pyrite, Copper (+/- Ni)	Gabbronorite, leuco: pyrite	Paradise River
013H/05/Pyr012	Pyr	Eagle River #1	Pyrite, Copper (+/- Ni)	Gabbronorite, leuco: pyrite	Paradise River
013H/05/Pyr013	Pyr	Eagle River #2	Pyrite (+/- Cu)	Amphibolite gneiss: pyrite	Paradise River
013H/05/Pyr014	Pyr	Crooked Lake Northwest #4	Pyrite	Metasedimentary gneiss: pyrite	Paradise River
013H/05/Pyr015	Pyr	Crooked Lake South #6	Pyrite	Metasedimentary gneiss: pyrite (with amphibolite)	Paradise River
013H/05/Pyr016	Pyr	Crooked Lake South #7	Pyrite	Metasedimentary gneiss: pyrite (with amphibolite)	Paradise River
013H/05/Pyr017	Pyr	Crooked Lake South #8	Pyrite	Metasedimentary gneiss: pyrite	Paradise River
013H/05/Pyr018	Pyr	Crooked Lake South #9	Pyrite	Metasedimentary gneiss: pyrite	Paradise River
013H/05/Pyr019	Pyr	Crooked Lake South #10	Pyrite	Metasedimentary gneiss: pyrite	Paradise River
013H/05/Pyr020	Pyr	Crooked Lake South #11	Pyrite (+/-Cu)	Granite: pyrite, with amphibolite	Paradise River
013H/05/U 001	U	Southwest Brook tributary	Uranium	U: Anomalous radioactivity in granite	Paradise River
013H/06/Cu 001	Cu	Sand Hill River #1	Pyrite (+/- Cu)	Metasedimentary gneiss: Cu: 0.14 % Cu in gneiss	Paradise River
013H/06/Cu 002	Cu	Paradise River #4	Copper (+/- Ni)	Gabbronorite host	Paradise River
013H/06/Cu 003	Cu	Paradise River #5	Pyrite (+/- Cu)	Pegmatite: Cu metallic minerals (anomalous Cu)	Paradise River
013H/06/Cu 004	Pyr	Paradise River #6	Copper	Metasedimentary gneiss: pyrite	Paradise River
013H/06/Pyr001	Pyr	Beaver Brook Northeast	Pyrite	Granodiorite gneiss; pyrite (re-interpreted as psammitic gneiss)	Paradise River
013H/06/U 001	U	Crooked Lake East	Uranium	Tonalitic sweat in amphibolite at margin of White Bear Arm complex	Paradise River
013H/07/Pyr001	Pyr	Sand Hill River #2	Pyrite (+/-Cu)	Diorite, quartz; pyrite/magnetite	Sand Hill River
013H/09/Cu 001	Cu	Sand Hill River #3	Pyrite (+/- Cu)	Pegmatite: Cu chalcopyrite intruding qtz diorite	Table Bay
013H/10/Cr 001	Cr, Ni	Dykes River #1	Chromium	Ultramafic rocks: Cr, Ni, Cu in ultramafic/mafic rocks	Table Bay
013H/10/Cr 002	Cr, Ni	Dykes River #2	Chromium	Ultramafic rocks: Cr, Ni, Cu in ultramafic/mafic rocks	Table Bay
013H/10/Cr 003	Cr, Ni,Cu	Dykes River #3	Chromium	Ultramafic rocks: Cr, Ni, Cu in ultramafic/mafic rocks	Table Bay
013H/10/Cr 004	Cr, Ni	Dykes River #4	Chromium	Ultramafic rocks: Cr, Ni, Cu in ultramafic/mafic rocks	Table Bay
013H/10/Mo 001	Mo	Goose Cove	Molybdenite	Aplite: molybdenite, intruding qtz diorite	Table Bay
013H/10/Stn001	Stn	Radar Road Granite	Dimension stone	Monzonite outcrop	Table Bay
013H/10/V 001	V	Dykes River tributary	Vanadium	Ultramafic/mafic rocks: rusty zones	Table Bay
013H/11/Cu 001	Cu	Eagle River #11	Copper	Metasedimentary gneiss: Cu	Sandwich Bay
013H/11/Cu 002	Cu	Sandwich Bay South #2	Copper	Metasedimentary gneiss: Cu	Sandwich Bay

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Map label	Occurrence name	Commodidy	Rock type	Map region
013H/11/Cu 003	Cu	Sandwich Bay South #3	Copper	Metasedimentary gneiss: Cu	Sandwich Bay
013H/11/Cu 004	Cu	Sandwich Bay South #4	Copper	Metasedimentary gneiss: Cu	Sandwich Bay
013H/11/Cu 005	Cu	Eagle River East #2	Copper	Metasedimentary gneiss: Cu	Sandwich Bay
013H/11/Cu 006	Cu	Eagle River East #4	Copper	Metasedimentary gneiss: base/ precious metals Cu	Sandwich Bay
013H/11/Cu 007	Cu	Eagle River East #5	Copper	Metasedimentary gneiss: base/ precious metals Cu	Sandwich Bay
013H/11/Cu 008	Cu	Eagle River Glen Showing	Copper	Metasedimentary gneiss: Cu	Sandwich Bay
013H/11/Cu 009	Cu	Eagle River G&G Showing	Copper	Metasedimentary gneiss: Cu	Sandwich Bay
013H/11/Cu 010	Cu	Eagle River Edmunds Showing	Copper	Metasedimentary gneiss: Cu	Sandwich Bay
013H/11/Pyr001	Pyr	Eagle River #3	Pyrite	Metasedimentary gneiss: pyrite	Sandwich Bay
013H/11/Pyr002	Pyr	Sandwich Bay South #1	Pyrite	Metasedimentary gneiss: pyrite	Sandwich Bay
013H/11/Pyr003	Pyr	Sandwich Bay South #5	Pyrite	Metasedimentary gneiss: pyrite	Sandwich Bay
013H/11/Pyr004	Pyr	Eagle River East #1	Pyrite	Metasedimentary gneiss: base/ precious metals	Sandwich Bay
013H/11/Pyr005	Pyr	Eagle River East #3	Pyrite	Metasedimentary gneiss: base/ precious metals	Sandwich Bay
013H/11/Pyr006	Pyr	Earl Island	Pyrite	Gabbro, meta: pyrite	Sandwich Bay
013H/12/Cu 001	Cu	Southwest Brook	Pyrite (+/-Cu)	No known mineral occurrence	Sandwich Bay
013H/12/Pyr001	Pyr	Eagle River West #1	Pyrite (+/- Cu)	Long Range dyke?: 0.07 % Cu	Sandwich Bay
013H/12/Pyr002	Pyr	Southwest Brook #2	Pyrite	Metasedimentary gneiss: pyrite	Sandwich Bay
013H/12/Pyr003	Pyr	White Bear River #2	Pyrite	Metasedimentary gneiss: pyrite	Sandwich Bay
013H/12/U 001	U	White Bear River #3	Uranium	Pegmatite; U values	Sandwich Bay
013H/14/Mic001	Ms (?)	Woody Island	Muscovite	Metasedimentary gneiss / Pegmatite, muscovite	Sandwich Bay
013H/15/Fe 001	Fe (?)	Huntington Island	Magnetite/ilmenite	Gabbro: heavy mineral concentrate	Table Bay
013H/15/Mic001	Ms, Pyr, Fl	Curlew Harbour	Muscovite	Pegmatite: muscovite	Table Bay
013H/16/Fe 001	Fe (?)	Grady Island #1	Magnetite/ilmenite	Gabbro: heavy mineral concentrate	Table Bay
013H/16/Mic001	Ms	Grady Island #2	Muscovite	Pegmatite: muscovite	Table Bay
013H/16/Mic002	Ms	Black Island #1	Muscovite	Pegmatite: muscovite	Table Bay
013H/16/Mic003	Ms	Black Island #2	Muscovite	Pegmatite: muscovite	Table Bay
013H/16/Mic004	Ms	Black Island #3	Muscovite	Pegmatite: muscovite	Table Bay
013I/03/Cu 001	Cu	South Duck Islands	Quartz with sulphide	Quartz vein intruding tonalitic gneiss; malachite staining in	Groswater Bay
013I/03/Pyr001	Pyr	Porcupine Strand	Pyrite	Sulphide in 'trap' rocks	Groswater Bay
013I/03/Ti 001	Ilm	Porcupine Strand North Beach	Ilmenite in beach sand	Beach sands: ilmenite	Groswater Bay
013I/04/Cu 001	Cu	Green Islands	Pyrite (+/- Cu)	Pegmatite: Cu chalcopyrite intruding metagabbro	Groswater Bay
013I/04/Cu 002	Cu	Backway No 2	Copper	Metasedimentary gneiss; Cu	Groswater Bay
013I/04/Cu 003	Cu	Susies Head	Pyrite (+/- Cu)	Gabbro/diorite: Cu mineralization in qtz-calcite stringers ass with shears	Groswater Bay
013I/04/Pyr001	Pyr	Backway No 1	Copper	Metasedimentary/metavolcanic gneiss: pyrite	Groswater Bay
013I/04/Pyr002	Pyr	Snooks Cove	Pyrite (+/-Cu)	Tonalitic and granitic gneiss; pyrite	Groswater Bay
013I/04/U 001	U	The Backway	Uranium	Pegmatite/diatexite: U	Groswater Bay
013I/05/Au 001	Au	Northwest Brook tributary	Copper (Au,Pd,Pt)	Mafic/ultramafic rock: Au	Groswater Bay
013I/05/Cu 001	Cu	Rocky Cove #1	Copper (Au,Pd,Pt)	Gabbro: pyrite and chalcopyrite at margin	Groswater Bay
013I/05/Cu 002	Cu	Black Island #4	Copper	Metasedimentary gneiss: pyrite, Cu	Groswater Bay
013I/05/Cu 003	Cu	Black Island #5	Copper	Metasedimentary gneiss; Cu	Groswater Bay
013I/05/Cu 004	Cu	Black Island #6	Copper	Metasedimentary gneiss; Cu	Groswater Bay
013I/05/Pyr001	Pyr	Gull Island	Pyrite	Gabbro: pyrite, ass with tonalite/granodiorite	Groswater Bay
013I/06/Pyr001	Pyr	Pottle's Bay	Copper (Au,Pd,Pt)	Mylonitized granitoid rock, pyrite	Groswater Bay
013I/06/Pyr002	Pyr	Entry Island No 1	Pyrite	Metasedimentary gneiss: pyrite	Groswater Bay
013I/06/Pyr003	Pyr	Entry Island No 2	Pyrite	Metasedimentary gneiss: pyrite	Groswater Bay
013I/11/Pyr001	Pyr	Byron Bay No 2	Pyrite	Syenite, pyroxene-bearing: pyrite	Byron Bay
013I/11/Pyr002	Pyr	Man of War Point	Pyrite	Pyrite in qtzofeldspathic rock with porphyroblasts	Byron Bay
013I/12/Cu 001	Cu	Clegg Lake	Copper (Au,Pd,Pt)	Gabbro: pyrite and chalcopyrite at margin	Byron Bay
013I/12/Pyr001	Pyr	Byron Bay No 1	Pyrite	Sulphides in hbl-chl gneiss (metagabbbro?)	Byron Bay
013I/13/Cu 001	Cu	Sloop Cove Island	Pyrite (+/-Cu, Pb)	Granodiorite: malachite in shear	Byron Bay
013I/13/Fl 001	Fl	False Cape #1	Fluorite	Granite: fluorite	Byron Bay

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Map label	Occurrence name	Commodidy	Rock type	Map region
013I/13/Pyr001	Pyr	False Cape #2	Pyrite	Granite, massive: pyrite-biotite-garnet-epidote clusters	Byron Bay
013I/13/Pyr002	Pyr	False Cape #3	Pyrite	Granite, massive: pyrite-biotite-garnet-epidote clusters	Byron Bay
013J/01/Mic001	Ms, Tourm	Turners Bight	Muscovite	Pegmatite: muscovite, tourmaline	Rigolet
013J/01/Mo 001	Mo (?)	Henrietta Island #1	Molybdenite		Rigolet
013J/01/Pyr001	Pyr	Groswater Bay #1	Pyrite	Metasedimentary gneiss: pyrite	Rigolet
013J/01/Pyr002	Pyr	Ticoralak Head	Pyrite	Pyrite in granulite-facies plag-hbl-gnt mylonite	Rigolet
013J/01/Pyr003	Pyr	Jewel Point	Pyrite (+/- Cu)	Pyrite in brittle-fault breccia	Rigolet
013J/01/Pyr004	Pyr	Henrietta Island #2	Pyrite	Metasedimentary gneiss: pyrite (with quartzite)	Rigolet
013J/01/Pyr005	Pyr	Henrietta Island #3	Pyrite	Metasedimentary / ortho- gneiss: pyrite	Rigolet
013J/01/Pyr006	Pyr, Cu	Henrietta Island #4	Copper	Metasedimentary gneiss: pyrite (with quartzite) Cu	Rigolet
013J/01/Pyr007	Pyr	Pike Back Run	Pyrite	Amphibolite and metagabbro, garnet,: pyrite	Rigolet
013J/01/Pyr008	Pyr	Groswater Bay #2	Pyrite	Metasedimentary gneiss: pyrite	Rigolet
013J/01/Pyr009	Pyr	Henrietta Island #5	Pyrite	Metasedimentary / ortho- gneiss: pyrite	Rigolet
013J/01/U 001	U	South Henrietta Island	Uranium	Pegmatite/diatexite: U	Rigolet
013J/01/U 002	U	The Backway South #4	Uranium	Pegmatite/diatexite: U	Rigolet
013J/01/U 003	U	Henrietta Island #6	Uranium	Pegmatite/diatexite: U	Rigolet
013J/02/Mo 001	Mo (?)	Double Mer South	Molybdenite		Rigolet
013J/02/Mo 002	Mo	Lake Melville North #1	Quartz with sulphide	Quartz veins: molybdenite in qtz vein	Rigolet
013J/02/Pyr001	Pyr	Lake Melville North #2	Pyrite	Metasedimentary gneiss: pyrite	Rigolet
013J/02/Pyr002	Pyr	Henrietta Island #7	Pyrite (+/-Cu)	Granodiorite/microgranite gneiss: pyrite with amphibolite	Rigolet
013J/02/Pyr003	Pyr	Cull De Sac #1	Pyrite	Metasedimentary gneiss: pyrite	Rigolet
013J/02/Pyr004	Pyr	Cull De Sac #2	Pyrite	Metasedimentary gneiss: pyrite	Rigolet
013J/02/Pyr005	Pyr	The Narrows #1	Pyrite	Metasedimentary gneiss: pyrite	Rigolet
013J/02/Pyr006	Pyr	The Narrows #2	Pyrite	Metasedimentary gneiss: pyrite	Rigolet
013J/02/Pyr007	Pyr	Peter Lewis Island	Pyrite	Metasedimentary gneiss: pyrite	Rigolet
013J/02/Pyr008	Pyr	Big Pot Cove	Pyrite (+/-Cu)	Granodiorite/tonalite gneiss: pyrite	Rigolet
013J/02/Pyr009	Pyr	Lake Melville North #3	Pyrite	Metasedimentary gneiss: pyrite	Rigolet
013J/02/Pyr010	Pyr	Big Pot Cove North	Pyrite	Metasedimentary gneiss: pyrite	Rigolet
013J/02/U 001	U	Caravalla Point	Uranium	Pegmatite/diatexite: U	Rigolet
013J/02/U 002	U	Green Point Northeast	Uranium	Pegmatite/diatexite: U	Rigolet
013J/02/Zn 001	Zn, Pb	Double Mer	Quartz with sulphide	Quartz veins: galena, sphalerite	Rigolet
013J/04/Pyr001	Pyr	Partridge Point Brook tributary #1	Pyrite	Metasedimentary gneiss: pyrite, Cu?	Double Mer
013J/04/Pyr002	Pyr	Main River tributary #1	Pyrite (+/-Cu)	Granite; pyrite, copper?	Double Mer
013J/05/Pyr001	Pyr	Main River tributary #2	Pyrite	Metasedimentary schist: pyrite	Double Mer
013J/05/Pyr002	Pyr	Main River tributary #3	Pyrite	Metasedimentary schist: pyrite	Double Mer
013J/06/Pyr001	Pyr	Partridge Point Brook Northside	Pyrite (+/-Cu)	Pyrite in biotite-hbl-gnt gneiss (metasedimentary?)	Double Mer
013J/06/Pyr002	Pyr	Partridge Point Brook tributary #2	Pyrite	Amphibolitic gneiss: pyrite, with micorgranite layers	Double Mer
013J/08/Cu 001	Cu	Fox Cove Brook	Pyrite (+/-Cu)	Granitoid, K-fs megacrystic: malachite	Rigolet
013J/08/Pyr001	Pyr	North Groswater Bay	Pyrite	Pyrite? In gabbroic rock	Rigolet
013J/08/Pyr002	Pyr	Tom Luscombes Pond East #1	Pyrite	Gabbro: chalcopyrite, pyrite and pyrrhotite at margin	Rigolet
013J/08/Pyr003	Pyr	Fox Cove Brook Southside	Pyrite	Metasedimentary schist: pyrite	Rigolet
013J/08/Pyr004	Pyr	Tom Luscombes Pond East #2	Pyrite	Metasedimentary gneiss: pyrite	Rigolet
013J/09/Cu 001	Cu, Pt, Pd, Au	Lake Michael #1	Copper (Au,Pd,Pt)	Gabbro: Chalcopyrite, pyrrhotite, pyrite	Benedict Mtns.
013J/09/Cu 002	Cu	North Michael River	Copper (Au,Pd,Pt)	Gabbro: chalcopyrite, pyrite	Benedict Mtns.
013J/09/Cu 003	Cu, Pt, Pd	Lake Michael #2	Copper (Au,Pd,Pt)	Gabbro: Cu near contact with orthogneiss	Benedict Mtns.
013J/09/Mo 001	Mo	Jay Lake	Molybdenite	Aillik Group; Possibly a glacial erratic	Benedict Mtns.
013J/09/Pyr001	Pyr	Tukialik Bay	Pyrite (+/-Cu, Pb)	Fluorite and pyrite in pegmattic quartz vein	Benedict Mtns.
013J/09/Pyr002	Pyr	Tuchialic Bay	Pyrite	Granitic rock, fine-grained: pyrite	Benedict Mtns.
013J/09/U 001	U	Benedict Mountains #1	Uranium	U in felsic volcanic rocks	Benedict Mtns.
013J/09/U 002	U	Benedict Mountains #2	Uranium	U in felsic volcanic rocks	Benedict Mtns.
013J/10/Fl 001	Fl	Pamiulik River East	Fluorite	Syenite, fluorite	Benedict Mtns.

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Map label	Occurrence name	Commodidy	Rock type	Map region
013J/10/Fl 002	Fl	Mount Benedict	Fluorite	Fluorite in porphry/syenite	Benedict Mtns.
013J/10/Fl 003	Fl	Stag Bay Brook	Fluorite	Granite: fluorite	Benedict Mtns.
013J/15/Cu 001	Cu	Manak Bay	Pyrite (+/-Cu, Pb)	Pegmatite: pyrite quartz vein: intruding Aillik qtzite	Benedict Mtns.
013J/15/Cu 002	Cu, Pb, Fl	Stag Bay No 1	Pyrite (+/-Cu, Pb)	Granite: galena, pyrite and fluorite in shear zone	Benedict Mtns.
013J/15/Fl 001	Fl	Big River No 1	Fluorite	Granite: fluorite	Benedict Mtns.
013J/15/Fl 002	Fl	East Stag Bay	Fluorite	Granite: fluorite	Benedict Mtns.
013J/15/Fl 003	Fl	Iron Island	Fluorite	Granite: fluorite	Benedict Mtns.
013J/15/Fl 004	Fl	Burnt Island	Fluorite	Granite: fluorite	Benedict Mtns.
013J/15/Fl 005	Fl	Pamiulik Bay	Fluorite	Fluorite in microgranite intruding Aillik Group correlatives	Benedict Mtns.
013J/15/Gem001	Amz, Tpz	Long Tickle, Adlavik Islands	Gems	Gem: Amazonite-bearing pegmatite; topaz	Benedict Mtns.
013J/15/Mo 001	Mo	Big River No 2	Molybdenite	No information	Benedict Mtns.
013J/15/Pb 001	Pb, Pyr	Porcupine Point	Pyrite (+/-Cu, Pb)		Benedict Mtns.
013J/15/Pyr001	Pyr	Stag Bay No 2	Pyrite	Granite: galena, pyrite and fluorite in shear zone	Benedict Mtns.
013J/15/Pyr002	Pyr	Burnt Island Tickle No 2	Pyrite	Pyrite in breccia zone in felsic volcanic rocks	Benedict Mtns.
013J/15/Pyr003	Pyr	Rocky Cove #2	Pyrite	Pyrite in felsic volcanic rocks	Benedict Mtns.
013J/15/U 001	U	Anomaly B-22	Uranium	U felsic volcanics and related rocks	Benedict Mtns.
013J/15/U 002	U	T-649	Uranium	U felsic volcanics and related rocks	Benedict Mtns.
013J/15/U 003	U	Super 7	Uranium	U in felsic volcanics and related rocks	Benedict Mtns.
013J/15/U 004	U	Powe Showing	Uranium	U in felsic volcanic rocks	Benedict Mtns.
013J/15/U 005	U	Priority One	Uranium	U in felsic volcanic rocks	Benedict Mtns.
013J/15/U 006	U	Harbinger	Uranium	U in felsic volcanic rocks	Benedict Mtns.
013J/16/Fl 001	Fl	Bear Island	Fluorite	Granite: fluorite in epidote-filled fractures	Benedict Mtns.
013J/16/Fl 002	Fl	East Tukialik Bay No 1	Fluorite	Granite: fluorite	Benedict Mtns.
013J/16/Fl 003	Fl	East Tukialuk Bay No 2	Fluorite	Granite: fluorite in fractures	Benedict Mtns.
013J/16/Fl 004	Fl	Deus Cape	Fluorite	Granite gneiss; fluorite	Benedict Mtns.
013J/16/Mo 001	Mo	West Tukialik Bay	Molybdenite	Neosome pegmatite: molybdenite	Benedict Mtns.

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Terrane	Easting	Northing	Reference
002M/13/Amz001	Pinware	578546	5761191	GSNL (field notes; CG93-777)
002M/13/Amz002	Pinware	576197	5757247	GSNL (field notes; VN93-664)
002M/13/Amz003	Pinware	573209	5753931	GSNL (field notes; VN93-652)
002M/13/Pyr001	Pinware	573900	5760080	GSNL (field notes; CG93-732)
002M/13/Pyr002	Pinware	572563	5753324	GSNL (field notes; DL93-314)
002M/13/Ti 001	Pinware	573790	5760560	GSNL (field notes; CG93-730)
003D/04/Amz001	Pinware	579181	5762864	Butt (1993)
003D/04/Cu 001	Pinware	589298	5772082	GSNL (field notes; VO92-023)
003D/04/Cu 002	Pinware	586159	5772891	GSNL (field notes; VN87-305); Meyer and Dean (1988, p. 253)
003D/04/Cu 003	Pinware	593170	5785930	Andrews (1995a, b); Beesley (1996)
003D/04/Cu 004	Pinware	592590	5785010	Andrews (1995a, b); Beesley (1996)
003D/04/Mic001	Pinware	591761	5786542	Piloski (1955, Area E, p. v)
003D/04/Mic002	Pinware	580110	5761847	Douglas (1953; p. 9, Fig. 2). Butt (1993); GSNL (field notes; CG87-421)
003D/04/Mic003	Pinware	575953	5762428	GSNL (field notes; CG87-400)
003D/04/Pyr001	Mealy Mtns. / Pinware	587522	5782825	GSNL (field notes; JS87-586)
003D/04/Pyr002	Pinware	588903	5772992	GSNL (field notes; VN87-347)
003D/04/Pyr003	Pinware	578880	5789112	GSNL (field notes; VN87-111); Andrews (1995c)
003D/05/Amz001	Pinware	596031	5792779	GSNL (field notes; CG08-005)
003D/05/Amz002	Pinware	595444	5793694	GSNL (field notes; CG08-026)
003D/05/Cu 001	Lake Melville	592128	5807863	GSNL (field notes; CG87-336)
003D/05/Cu 002	Lake Melville	569556	5810721	Jolliffe (1997; Grid A3)
003D/05/Cu 003	Lake Melville	582004	5805888	GSNL (field notes; CG03-288)
003D/05/Fe 001	Pinware	588300	5791350	Christie (1951, p.18)
003D/05/Fl 001	Pinware	596418	5792796	GSNL (field notes; CG87-487; CG07-144)
003D/05/Fl 002	Lake Melville	568601	5807670	GSNL (field notes; CG03-258)
003D/05/Fl 003	Lake Melville	582775	5805777	GSNL (field notes; CG03-290)
003D/05/Fl 004	Lake Melville	587203	5804116	GSNL (field notes; CG03-302)
003D/05/Mo 001	Lake Melville	570053	5807554	GSNL (field notes; CG03-262)
003D/05/Pyr001	Pinware	594607	5789811	GSNL (field notes; JS87-556)
003D/05/Pyr002	Pinware	578966	5791741	GSNL (field notes; VN87-117); Andrews (1995d)
003D/05/Pyr003	Lake Melville	590578	5806798	GSNL (field notes; VN87-381)
003D/05/Pyr004	Lake Melville	591203	5800882	GSNL (field notes; VN87-455)
003D/05/Pyr005	Lake Melville	589400	5801289	GSNL (field notes; VN87-459)
003D/05/Pyr006	Pinware	582963	5789477	Andrews (1995e)
003D/05/Pyr007	Lake Melville	582509	5805762	GSNL (field notes; CG03-289)
003D/05/Pyr008	Lake Melville	586472	5804627	GSNL (field notes; CG03-299)
003D/05/Zr 001	Lake Melville	591849	5801223	Meyer and Dean (1988, p. 254 and Fig .4); Hodge (1996)
003D/12/Cu 001	Lake Melville	580400	5832550	Bradley (1966, Plate VII); Eaton (1950)
003D/12/Cu 002	Lake Melville	577336	5821137	GSNL (field notes; CG86-721)
003D/12/Cu 003	Lake Melville	577838	5825948	GSNL (field notes; MN86-210)
003D/12/Cu 004	Lake Melville	571275	5832461	GSNL (field notes; MN86-264)
003D/12/Cu 005	Lake Melville	569178	5827338	GSNL (field notes; SN86-221)
003D/12/Fe 001	Lake Melville	583034	5829015	Eaton (1950)
003D/12/Mic001	Hawke River	577795	5842797	Bradley (1966); GSNL (field notes; SN86-373)
003D/12/Mic002	Hawke River	568600	5844600	GSNL records. Source of information unknown
003D/12/Mic003	Hawke River	578642	5843116	Butler (1996)
003D/12/Mic004	Hawke River	567469	5841616	GSNL (field notes; JS86-387)
003D/12/Pyr001	Lake Melville	575784	5827874	GSNL (field notes; JS86-207)
003D/12/Pyr002	Lake Melville	583442	5831563	GSNL (field notes; JS86-462)
003D/12/Pyr003	Lake Melville	583976	5831148	GSNL (field notes; JS86-463)
003D/12/Pyr004	Lake Melville	583301	5830074	GSNL (field notes; JS86-467)

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Terrane	Easting	Northing	Reference
003D/12/Pyr005	Lake Melville	569937	5817470	GSNL (field notes; JS86-488)
003D/12/Pyr006	Lake Melville	579748	5833806	GSNL (field notes; MN86-401)
003D/12/Pyr007	Lake Melville	573237	5832290	GSNL (field notes; SN86-387)
003D/12/Pyr008	Lake Melville	579079	5832824	GSNL (field notes; SN86-397)
003D/12/Pyr009	Lake Melville	579677	5832676	GSNL (field notes; SN86-398)
003D/12/Pyr010	Lake Melville	583585	5831433	van Nostrand (1995)
003D/12/Pyr011	Lake Melville	584195	5831349	van Nostrand (1995)
003D/12/Pyr012	Lake Melville	583957	5829740	van Nostrand (1995)
003D/13/Cu 001	Hawke River	575851	5854229	GSNL (field notes; MN86-373)
003D/13/Cu 002	Hawke River	569843	5846992	van Nostrand (1996b)
003D/13/Cu 003	Hawke River	570258	5847164	van Nostrand (1996b)
003D/13/Cu 004	Hawke River	572850	5853062	van Nostrand (1996a)
003D/13/Cu 005	Hawke River	572892	5852882	van Nostrand (1996a)
003D/13/Fe 001	Hawke River	577300	5854500	Christie (1951, p.17)
003D/13/Fe 002	Hawke River	577468	5854343	Wardle (1976; RW75-397)
003D/13/Fe 003	Hawke River	570954	5847888	van Nostrand (1996b)
003D/13/Gnt001	Hawke River	567385	5859900	Squires et al. (1997; Rock descrip., p. 7; BEM96-161)
003D/13/Gnt002	Hawke River	567540	5858500	Squires et al. (1997; Rock descrip., p. 17; 178523)
003D/13/Mic001	Hawke River	572000	5850350	Christie (1951, p.17)
003D/13/Mic002	Hawke River	568750	5848250	Christie (1951, p.17)
003D/13/Mic003	Hawke River	573900	5851350	Meyer and Dean (1988, p. 254 and Fig. 5)
003D/13/Po 001	Hawke River	567510	5858670	Squires et al. (1997; Rock descrip., p. 11; 178260)
003D/13/Pyr001	Hawke River	578796	5851538	Wardle (1976; RW75-434)
003D/13/Pyr002	Hawke River	576145	5851546	GSNL (field notes; CG86-542)
003D/13/Pyr003	Hawke River	576700	5854100	Donohue (1966)
003D/13/Pyr004	Hawke River	575400	5852600	Donohue (1966)
003D/13/Pyr005	Hawke River	575400	5855250	Donohue (1966)
003D/13/Pyr006	Hawke River	576270	5855200	Donohue (1966)
003D/13/Pyr007	Hawke River	573200	5854800	Donohue (1966)
003D/13/Pyr008	Hawke River	578100	5852200	Wardle (1976; no data stn.); GSNL (field notes; CG84-191; JS86-410-414)
003D/13/Pyr009	Hawke River	567800	5857000	Donohue (1966)
003D/13/Pyr010	Hawke River	567450	5859000	Donohue (1966)
003D/13/Pyr011	Hawke River	567900	5861450	Donohue (1966)
003D/13/Pyr012	Hawke River	574766	5867465	GSNL (field notes; CG86-363)
003D/13/Pyr013	Hawke River	574506	5858076	GSNL (field notes; CG86-404)
003D/13/Pyr014	Hawke River	574385	5857047	GSNL (field notes; CG86-405)
003D/13/Pyr015	Hawke River	573071	5853411	GSNL (field notes; CG86-507)
003D/13/Pyr016	Hawke River	568543	5852412	GSNL (field notes; CG86-520)
003D/13/Pyr017	Hawke River	579955	5852021	GSNL (field notes; CG86-526)
003D/13/Pyr018	Hawke River	579309	5850578	GSNL (field notes; CG86-529; CG07-530)
003D/13/Pyr019	Hawke River	578092	5851189	GSNL (field notes; CG86-532)
003D/13/Pyr020	Hawke River	575057	5853264	GSNL (field notes; CG86-537)
003D/13/Pyr021	Hawke River	577057	5853181	GSNL (field notes; CG86-546)
003D/13/Pyr022	Hawke River	578752	5852019	GSNL (field notes; JS86-403; JS86-405)
003D/13/Pyr023	Hawke River	575213	5854541	GSNL (field notes; MN86-374)
003D/13/Pyr024	Hawke River	574830	5854030	GSNL (field notes; MN86-378)
003D/13/Pyr025	Hawke River	580506	5866452	GSNL (field notes; MN86-344)
003D/13/Pyr026	Hawke River	577790	5861813	GSNL (field notes; SN86-312)
003D/13/Pyr027	Hawke River	578472	5861202	GSNL (field notes; SN86-318)
003D/13/Pyr028	Hawke River	578856	5860322	GSNL (field notes; SN86-320)
003D/13/Pyr029	Hawke River	579705	5854397	GSNL (field notes; SN86-347)

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Terrane	Easting	Northing	Reference
003D/13/Pyr030	Hawke River	577837	5855599	GSNL (field notes; SN86-352)
003D/13/Pyr031	Hawke River	568410	5850740	Meyer and Dean (1988, p. 252 and Fig. 5); Hodge (1996)
003D/13/Pyr032	Hawke River	574690	5868090	GSNL (field notes; CG86-362)
003D/13/Pyr033	Hawke River	574677	5866897	GSNL (field notes; CG86-364)
003D/13/Pyr034	Hawke River	567470	5858503	Squires et al. (1997; Rock descrip., p. 11; 178258)
003D/13/Pyr035	Hawke River	571984	5852948	van Nostrand (1996a)
003E/04/Mic001	Hawke River	574200	5878628	GSNL (field notes; CG86-431)
003E/04/Mic002	Hawke River	569115	5884125	GSNL (field notes; GM85-496)
003E/04/Mic003	Hawke River	576173	5884086	GSNL (field notes; SP85-038)
003E/04/Pyr001	Hawke River	571500	5891120	Eade (1962, map)
003E/04/Pyr002	Hawke River	568510	5890200	Eade (1962, map)
003E/04/Pyr003	Hawke River	578676	5884219	GSNL (field notes; CG85-482); Hodge (1996b)
003E/04/Pyr004	Hawke River	576510	5884352	GSNL (field notes; CG85-563); Hodge (1996b)
003E/04/Pyr005	Hawke River	570827	5891368	GSNL (field notes; CG85-565)
003E/04/Pyr006	Hawke River	572892	5876383	Douglas (1953); Hodge (1996a); GSNL (field notes; CG85-558A,B,C)
003E/04/Pyr007	Hawke River	574055	5876591	GSNL (field notes; GM85-470; Hodge (1996a)
003E/04/Pyr008	Hawke River	577604	5882090	GSNL (field notes; GM85-584)
003E/04/Pyr009	Hawke River	569105	5883768	GSNL (field notes; GM85-494)
003E/04/Pyr010	Hawke River	583517	5888112	GSNL (field notes; GM85-524)
003E/04/Pyr011	Hawke River	574404	5887855	GSNL (field notes; GM85-514)
003E/04/Pyr012	Hawke River	583452	5888487	GSNL (field notes; GM85-526)
003E/04/Pyr013	Hawke River	583189	5888997	Hodge (1996b)
003E/05/Cu 001	Hawke River	574803	5911594	GSNL (field notes; CG85-579)
003E/05/Cu 002	Groswater Bay	581466	5925732	Douglas (1953); GSNL (field notes; SP85-167); Hodge (1996c)
003E/05/Mo 001	Groswater Bay	582359	5924643	Douglas (1953); GSNL (field notes; SP85-167); Hodge (1996c)
003E/05/Pyr001	Hawke River	573726	5905630	GSNL (field notes; GM85-562)
003E/05/Pyr002	Hawke River	566952	5924244	GSNL (field notes; LC85-096)
012P/06/Stn001	Hawke River	495750	5697900	Dickson and King (2005, p.155)
012P/07/Fe 001	Pinware	503580	5703053	GSNL (field notes; CG93-280)
012P/09/Fe 001	Pinware	535230	5727350	Hawley (1944); Douglas (1953); Fetzer (1953)
012P/09/Fe 002	Pinware	540500	5731850	Schwellnus (1953); Penrose and Schwellnus (1953)
012P/09/Fe 003	Pinware	544259	5732140	Schwellnus (1953); Penrose and Schwellnus (1953)
012P/10/Pyr001	Pinware	520311	5716721	Penrose and Schwellnus (1953); GSNL (field notes; CG93-209)
012P/11/Pyr 001	Pinware	496574	5731496	GSNL (field notes; CG93-449)
012P/15/Fl 001	Pinware	513322	5741046	Bostock et al. (1983, map; BK71-517)
012P/15/Fl 002	Pinware	512613	5737938	Bostock et al. (1983, map; BK71-542)
012P/15/Pyr001	Pinware	522000	5735475	GSNL (field notes; VN93-273)
012P/15/Pyr002	Pinware	526270	5746704	GSNL (field notes; VN93-596)
012P/16/Cu 001	Pinware	556699	5740555	GSNL (field notes; CG93-408)
012P/16/Cu 002	Pinware	545408	5755385	GSNL (field notes; CG03-052)
012P/16/Cu 003	Pinware	546347	5757485	GSNL (field notes; CG03-060)
012P/16/Cu 004	Pinware	547651	5759043	GSNL (field notes; CG03-064)
012P/16/Fel001	Pinware	543775	5743380	GSNL (field notes; CG93-561)
012P/16/Fel002	Pinware	543177	5743268	GSNL (field notes; CG93-478)
012P/16/Fel003	Pinware	542216	5742869	GSNL (field notes; CG03-029)
012P/16/Fel004	Pinware	538929	5740152	Bostock (field notes; BK71-607; neph i.d. by Gower); Clarke (1997)
012P/16/Fel005	Pinware	539273	5740136	Clark (1997)
012P/16/Fl 001	Pinware	552013	5752506	Bostock et al. (1983, map; field notes; BK71-527)
012P/16/Mo 001	Pinware	553928	5758063	GSNL (field notes; DL93-293)
012P/16/Pyr001	Pinware	565375	5748096	GSNL (field notes; VN93-412)
012P/16/Pyr002	Pinware	557913	5741795	GSNL (field notes; CG93-412)

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Terrane	Easting	Northing	Reference
012P/16/Pyr003	Pinware	538310	5734050	GSNL (field notes; CG93-021)
012P/16/Pyr004	Pinware	566520	5749135	GSNL (field notes; CG93-455)
012P/16/Pyr005	Pinware	557607	5741435	GSNL (field notes; CG93-410)
012P/16/Pyr006	Pinware	564318	5747108	GSNL (field notes; VN93-408)
012P/16/Pyr007	Pinware	541954	5753932	GSNL (field notes; VN93-566)
012P/16/Pyr008	Pinware	542125	5754608	GSNL (field notes; VN93-568)
012P/16/Pyr009	Pinware	545502	5756066	GSNL (field notes; CG03-055)
012P/16/Pyr010	Pinware	545061	5754422	GSNL (field notes; CG03-047)
012P/16/U 001	Pinware	552520	5758600	www.silverspruceresources.com/s/NewsReleases.asp
012P/16/U 002	Pinware	563849	5756584	www.silverspruceresources.com/s/NewsReleases.asp
013A/01/Sia001	Pinware	561220	5788530	Meyer and Dean (1986, p.4)
013A/01/Sia002	Pinware	560390	5785920	Meyer and Dean (1986, p.4)
013A/01/Sia003	Pinware	558780	5783720	Meyer and Dean (1986, p.4); Mercer et al. (1997); Morrissey (1999)
013A/01/Sia004	Pinware	556500	5780300	Meyer and Dean (1986, p.4)
013A/01/Sia005	Pinware	555300	5778780	Meyer and Dean (1986, p.4)
013A/04/Fel001	Pinware	453701	5777385	GSNL (field notes; CG92-178)
013A/04/Pyr001	Pinware	434653	5777040	GSNL (field notes; JA92-144)
013A/06/Fe 001	Mealy Mtns. / Pinware	466734	5791056	Eveleigh (1996)
013A/06/Mic001	Pinware	487375	5801650	GSNL (field notes; CG92-081)
013A/06/Mic002	Pinware	473583	5802409	GSNL (field notes; VN92-105)
013A/06/Pyr001	Mealy Mtns. / Pinware	467932	5803897	Hutchings (1996)
013A/08/Gem001	Lake Melville	558172	5813098	GSNL (field notes; CG87-055); Andrews (1995)
013A/08/Gem002	Lake Melville	552375	5816098	Beesley (1997, p. 6, Fig. 3)
013A/08/Pyr001	Lake Melville	534256	5806056	Eveleigh (1996, 1997)
013A/08/Pyr002	Lake Melville	562200	5813673	Jolliffe (1997; Grid A1)
013A/08/Pyr003	Pinware	561450	5806632	GSNL (field notes; CG03-180)
013A/08/Sia001	Pinware	547732	5795635	Eade (1962, map)
013A/08/Sia002	Pinware	548140	5796705	Eade (1962, map)
013A/08/Sia003	Pinware	548805	5798182	Eade (1962, map)
013A/08/Sia004	Pinware	554810	5798522	Eade (1962, map)
013A/08/Sia005	Pinware	553820	5796639	Eade (1962, map)
013A/08/Sia006	Pinware	552927	5794611	Eade (1962, map)
013A/09/Cu 001	Lake Melville	542100	5825500	Piloski (1955; Area E, p. iii)
013A/09/Cu 002	Lake Melville	539920	5826040	Jolliffe (1997; Grid G7)
013A/09/Cu 003	Lake Melville	549229	5822075	GSNL (field notes; SN86-066)
013A/09/Cu 004	Hawke River	565320	5842470	Anderson et al. (1996; Rock sample 10836; Appendix D)
013A/09/Cu 005	Lake Melville	545718	5825032	GSNL (field notes; CG03-227)
013A/09/Cu 006	Lake Melville	542958	5838474	GSNL (field notes; CG04-043)
013A/09/Gem001	Lake Melville	564916	5825750	GSNL (field notes; JS86-218)
013A/09/Lst001	Lake Melville	544200	5823500	Johnston (1958)
013A/09/Ni 001	Hawke River	563625	5841835	Anderson et al. (1996; Rock sample 10833; Appendix D)
013A/09/Ni 002	Hawke River	561240	5841288	Anderson et al. (1996; Rock sample 10834; Appendix D)
013A/09/Ni 003	Lake Melville	539017	5831419	GSNL (field notes; CG03-243)
013A/09/Po 001	Lake Melville	538700	5824000	GSNL records. Source of information unknown
013A/09/Pyr001	Lake Melville	551550	5828910	Eade (1962, map)
013A/09/Pyr002	Lake Melville	539650	5826120	Jolliffe (1997; Grid G7)
013A/09/Pyr003	Lake Melville	548891	5825408	GSNL (field notes; CG86-070)
013A/09/Pyr004	Lake Melville	543907	5834917	GSNL (field notes; CG86-478)
013A/09/Pyr005	Lake Melville	554791	5829149	GSNL (field notes; CG86-772)
013A/09/Pyr006	Lake Melville	553844	5826252	GSNL (field notes; CG86-778)
013A/09/Pyr007	Lake Melville	557497	5821222	GSNL (field notes; JS86-215)

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Terrane	Easting	Northing	Reference
013A/09/Pyr008	Lake Melville	559255	5826572	GSNL (field notes; MN86-027)
013A/09/Pyr009	Lake Melville	538755	5827881	GSNL (field notes; MN86-037)
013A/09/Pyr010	Lake Melville	558356	5833495	GSNL (field notes; MN86-316)
013A/09/Pyr011	Lake Melville	558332	5829409	GSNL (field notes; MN86-465)
013A/09/Pyr012	Lake Melville	566780	5826692	GSNL (field notes; SN86-225)
013A/09/Pyr013	Lake Melville	552167	5817932	GSNL (field notes; CG03-212)
013A/09/Pyr014	Lake Melville	540841	5837214	GSNL (field notes; CG04-051)
013A/09/Pyr015	Lake Melville	546590	5842915	GSNL (field notes; CG04-074)
013A/09/Pyr016	Hawke River	565726	5837321	GSNL (field notes; CG04-104)
013A/10/Cu 001	Lake Melville	533000	5821600	GSNL records. Source of information unknown
013A/10/Gnt001	Lake Melville	517183	5833553	GSNL (field notes; SN86-262)
013A/10/Pyr001	Lake Melville	520636	5839503	GSNL (field notes; CG86-232)
013A/10/Pyr002	Lake Melville	523958	5836794	GSNL (field notes; MN86-269)
013A/10/Pyr003	Lake Melville	528343	5836147	GSNL (field notes; CG04-137)
013A/10/Ti 001	Lake Melville	504992	5839619	GSNL (field notes; JS86-260)
013A/10/Ti 002	Lake Melville	504829	5839441	GSNL (field notes; JS86-261)
013A/10/Ti 003	Lake Melville	504490	5840350	GSNL (field notes; CG01-001)
013A/11/Fe 001	Pinware	493089	5834135	GSNL (field notes; VN91-078)
013A/11/Pyr001	Mealy Mtns.	494858	5819830	GSNL (field notes; VN91-266)
013A/11/Pyr002	Mealy Mtns.	488140	5821467	GSNL (field notes; VN91-388)
013A/11/U 001	Mealy Mtns.	490700	5843200	www.kirrinresources.com/s/AlexisRiver.asp
013A/13/Pyr001	Mealy Mtns.	438144	5851923	GSNL (field notes; CG91-014)
013A/14/Pyr001	Lake Melville	485283	5852040	GSNL (field notes; DD91-080)
013A/14/Pyr002	Lake Melville	484471	5865203	GSNL (field notes; CG03-354)
013A/14/Pyr003	Lake Melville	497573	5854019	GSNL (field notes; CG03-364)
013A/15/Fe 001	Hawke River	527850	5862422	GSNL (field notes; MN86-071)
013A/15/Pyr001	Lake Melville	523745	5844557	GSNL (field notes; CG86-221)
013A/15/Pyr002	Lake Melville	506850	5853160	GSNL (field notes; CG86-280)
013A/15/Pyr003	Lake Melville	502126	5850594	GSNL (field notes; CG03-366)
013A/16/Cu 001	Hawke River	564404	5861000	Eade (1962, map); Donohue (1966)
013A/16/Fe 001	Hawke Bay	562800	5858680	Squires et al. (1997; Rock descrip., p. 14; 178517)
013A/16/Fe 002	Hawke River	567060	5859900	Squires et al. (1997; Rock descrip., p. 14; BEM96-17)
013A/16/Gnt001	Hawke River	566750	5860950	Squires et al. (1997; Rock descrip., p. 7; 178254)
013A/16/Gnt002	Hawke River	565870	5861900	Squires et al. (1997; Rock descrip., p. 2; GCS96-85)
013A/16/Gnt003	Hawke River	566793	5860448	Squires et al. (1997; Rock descrip., p. 10; 178510)
013A/16/Gnt004	Hawke River	565560	5861300	Squires et al. (1997; Rock descrip., p. 15; BEM96-12)
013A/16/Gnt005	Hawke River	566100	5861400	Squires et al. (1997; Rock descrip., p. 18; 178525)
013A/16/Gnt006	Hawke River	567150	5859340	Squires et al. (1997; Rock descrip., p. 7; BEM96-163)
013A/16/Mic001	Hawke River	548250	5872000	Notman (1954)
013A/16/Mic002	Hawke River	566900	5859910	Squires et al. (1997; Rock descrip., p. 18; 178524)
013A/16/Mic003	Hawke River	542947	5871031	GSNL (field notes; CG86-256)
013A/16/Mic004	Hawke River	543980	5867760	GSNL (field notes; JS86-077)
013A/16/Mic005	Hawke River	555323	5864302	GSNL (field notes; JS86-107)
013A/16/Po 001	Hawke River	562650	5859300	Squires et al. (1997; Rock descrip., p. 11; 178262)
013A/16/Pyr001	Hawke River	556723	5867539	Eade (1962, map)
013A/16/Pyr002	Hawke River	564900	5860270	Squires et al. (1997; Rock descrip., p. 10; 178257)
013A/16/Pyr003	Hawke River	560572	5866428	GSNL (field notes; CG86-124; CG86-125)
013A/16/Pyr004	Hawke River	566227	5847861	GSNL (field notes; JS86-435)
013A/16/Pyr005	Hawke River	561592	5848575	GSNL (field notes; SN86-345)
013A/16/Pyr006	Hawke River	559157	5846356	GSNL (field notes; CG04-001)
013B/01/Pyr001	Mealy Mtns. / Pinware	406398	5780182	GSNL (field notes; CG99-341)

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Terrane	Easting	Northing	Reference
013B/07/Cu 001	Pinware	386004	5815168	GSNL (field notes; CG99-220)
013B/07/Mic001	Pinware	391643	5806282	GSNL (field notes; CG99-155)
013B/10/Fl 001	Pinware	389799	5845171	GSNL (field notes; CG97-300)
013B/10/Mic001	Pinware	397206	5826616	GSNL (field notes; CG97-244)
013B/10/Pyr001	Pinware	390353	5831999	GSNL (field notes; CG08-048)
013B/10/Pyr002	Pinware	372581	5827734	GSNL (field notes; CG08-063)
013B/11/Cu 001	Mealy Mtns. / Pinware	337956	5825587	GSNL (field notes; CG09-013)
013B/11/Pyr001	Mealy Mtns. / Pinware	333271	5827538	GSNL (field notes; CG10-021)
013B/11/Sia001	Pinware	351375	5841675	GSNL (field notes; CG98-121)
013B/11/Sia002	Pinware	352939	5842895	GSNL (field notes; CG98-120)
013B/11/Sia003	Pinware	356400	5845000	GSNL (field notes; CG98-119)
013B/12/Fe 001	Mealy Mtns. / Pinware	320282	5843019	GSNL (field notes; CG98-256)
013B/12/Pyr001	Mealy Mtns. / Pinware	319715	5835587	GSNL (field notes; CG10-013)
013B/13/Ti 001	Mealy Mtns.	308891	5862534	Laracy (1998; Fig. 4)
013B/13/Ti 002	Mealy Mtns.	308639	5862735	Laracy (1998; Fig. 4)
013B/13/Ti 003	Mealy Mtns.	308715	5863211	Laracy (1998; Fig. 4)
013B/15/Fl 001	Pinware	381959	5850335	GSNL (field notes; CG97-179)
013B/15/Pyr001	Mealy Mtns.	391112	5863627	GSNL (field notes; CG97-075)
013B/16/Mic001	Pinware	409010	5853710	GSNL (field notes; CG07-022)
013B/16/Pyr001	Mealy Mtns.	400705	5868959	GSNL (field notes; CG97-090)
013G/01/Mic001	Mealy Mtns.	425841	5893363	GSNL (field notes; CG95-014)
013G/01/Mic002	Mealy Mtns.	421905	5896524	GSNL (field notes; VN95-040)
013G/01/Pyr001	Mealy Mtns.	421017	5890825	GSNL (field notes; VN95-008)
013G/01/Pyr002	Mealy Mtns.	423969	5891291	GSNL (field notes; VN95-016)
013G/02/Pyr001	Mealy Mtns.	394061	5900492	GSNL (field notes; CG95-172)
013G/02/Pyr002	Mealy Mtns.	396269	5896756	GSNL (field notes; CG95-287)
013G/03/Mo 001	Mealy Mtns.	337188	5902643	Hegler (1982)
013G/04/Fe 001	Mealy Mtns.	308000	5901000	MacDougall (1953; Anomaly A532594-1; p. 4 and Map 1)
013G/04/Fe 002	Mealy Mtns.	316181	5886306	MacDougall (1953; Anomaly A5312594-1; p. 4 and Map 1)
013G/05/Fe 001	Mealy Mtns.	324535	5909217	MacDougall (1953, 1954; Anomaly A533594)
013G/05/Fe 002	Mealy Mtns.	317830	5919141	MacDougall (1953, 1954; Anomaly A534594)
013G/05/Fe 003	Mealy Mtns.	332400	5920700	MacDougall (1953, p.4 and Map 1)
013G/05/Fe 004	Mealy Mtns.	330200	5924500	MacDougall (1953, p.3 and Map 1)
013G/05/Fe 005	Mealy Mtns.	330200	5925200	MacDougall (1953, p.3 and Map 1)
013G/05/Fe 006	Mealy Mtns.	331200	5926000	MacDougall (1953, p.3 and Map 1)
013G/05/Fe 007	Mealy Mtns.	333500	5927000	MacDougall (1953, 1954)
013G/05/Fe 008	Mealy Mtns.	333900	5929400	MacDougall (1953, 1954)
013G/06/Cu 001	Mealy Mtns.	356050	5921960	Jones (1997)
013G/06/Fe 001	Mealy Mtns.	334500	5929800	MacDougall (1953, 1954)
013G/06/Mo 001	Mealy Mtns.	338292	5905423	Kents (1980; NALCO N-1)
013G/07/Fe 001	Mealy Mtns.	376325	5905547	GSNL (field notes; CG95-178)
013G/07/Fe 002	Mealy Mtns.	380328	5904774	GSNL (field notes; CG95-184)
013G/07/Fe 003	Mealy Mtns.	380301	5925790	GSNL (field notes; CG95-248)
013G/07/Pyr001	Mealy Mtns.	389688	5911086	GSNL (field notes; CG95-161)
013G/07/Pyr002	Mealy Mtns.	390918	5910556	GSNL (field notes; CG95-163)
013G/09/Mo 001	Lake Melville	412695	5956197	GSNL (field notes; CG80-550)
013G/09/Mo 002	Lake Melville	418178	5956062	GSNL (field notes; CG81-547)
013G/10/Cu 001	Mealy Mtns.	384611	5933918	Wares and Leriche (1996); GSNL (field notes; CG09-022)
013G/10/Pyr001	Mealy Mtns.	400501	5931945	GSNL (field notes; GF81-154)
013G/10/Pyr002	Mealy Mtns.	372980	5953340	Emslie (1976), and pers. comm.
013G/11/Cly001	Mealy Mtns.	346200	5948300	GSNL records. Source of information unknown

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Terrane	Easting	Northing	Reference
013G/11/Fe 001	Mealy Mtns.	342499	5947760	MacDougall (1953; Anomaly A536592-1; p. 4 and Map 1)
013G/11/Fe 002	Mealy Mtns.	338450	5936800	MacDougall (1953, 1954)
013G/11/Ti 001	Mealy Mtns.	362600	5942850	Evans (1951; anomaly 2)
013G/11/Ti 002	Mealy Mtns.	354450	5941500	Evans (1951; anomaly 2)
013G/14/U 001	Lake Melville	343690	5977740	Kerswill and McConnell (1979, Fig 36.3)
013G/14/U 002	Lake Melville	350066	5977376	Kerswill and McConnell (1979, Fig 36.3)
013G/14/U 003	Lake Melville	348000	5975550	Snow and Parker (1979)
013G/14/U 004	Lake Melville	356339	5979450	Kerswill and McConnell (1979, Fig 36.3)
013G/15/Pyr001	Lake Melville	372677	5975238	GSNL (field notes; NN80-215)
013G/15/Pyr002	Lake Melville	383751	5971220	GSNL (field notes; NN80-442)
013G/15/Pyr003	Lake Melville	372386	5984337	GSNL (field notes; NN80-289)
013G/15/Pyr004	Lake Melville	391004	5982035	GSNL (field notes; NN80-246)
013G/15/Pyr005	Lake Melville	392533	5969788	GSNL (field notes; NN80-473)
013G/15/Pyr006	Lake Melville	393337	5968680	GSNL (field notes; NN80-613)
013G/16/Pyr001	Lake Melville	420633	5983741	GSNL (field notes; RG80-379)
013G/16/Pyr002	Lake Melville	420980	5979705	GSNL (field notes; RG80-518)
013G/16/Pyr003	Lake Melville	417739	5977635	GSNL (field notes; RG80-519)
013H/01/Cu 001	Hawke River	536360	5893010	GSNL (field notes; VN85-265)
013H/01/Cu 002	Hawke River	555095	5872913	GSNL (field notes; VN85-377)
013H/01/Mic001	Hawke River	535990	5872635	GSNL (field notes; CG85-252)
013H/01/Mic002	Hawke River	542318	5899379	GSNL (field notes; CG85-300)
013H/01/Mic003	Hawke River	547281	5875176	GSNL (field notes; VN85-290)
013H/01/Mic004	Hawke River	565181	5894987	GSNL (field notes; VN85-360)
013H/01/Pyr001	Hawke River	555856	5884756	GSNL (field notes; CG85-326)
013H/01/Pyr002	Hawke River	551272	5884207	GSNL (field notes; CG85-390)
013H/01/Pyr003	Hawke River	561774	5876377	GSNL (field notes; GM85-386)
013H/01/Pyr004	Hawke River	562819	5876557	GSNL (field notes; GM85-388)
013H/02/Fe 001	Hawke River	509150	5895900	Donohue (1966); Kranck (1966)
013H/02/Fe 002	Hawke River	523449	5879518	GSNL (field notes; CG85-291)
013H/02/Mic001	Hawke River	517626	5892295	GSNL (field notes; CG85-131)
013H/02/Mic002	Hawke River	525089	5886421	GSNL (field notes; CG85-220)
013H/02/Mic003	Hawke River	526689	5887747	GSNL (field notes; CG85-224)
013H/02/Mic004	Hawke River	527665	5873211	GSNL (field notes; VN85-241)
013H/02/Mic005	Hawke River	508732	5888748	Donohue (1966; HVD153-66)
013H/02/Mic006	Hawke River	526624	5878307	Donohue (1966; HVD163-66)
013H/02/Th 001	Hawke River	506370	5882600	Bradley (1966; Area 7)
013H/03/Ni 001	Hawke River	494422	5885035	Kranck (1966, p.11)
013H/03/Pyr001	Hawke River	495931	5895694	GSNL (field notes; VN84-156)
013H/03/Pyr002	Lake Melville	472192	5875627	GSNL (field notes; CG04-146)
013H/04/Cu 001	Lake Melville	454580	5895280	Anderson et al. (1996; Rock sample 10818; Appendix D)
013H/04/Mic001	Lake Melville	448127	5880741	GSNL (field notes; CG84-240)
013H/04/Mic002	Lake Melville	455684	5877343	GSNL (field notes; CG84-279)
013H/04/Mic003	Lake Melville	462356	5878442	GSNL (field notes; CG84-289)
013H/04/Mic004	Lake Melville	443440	5879895	GSNL (field notes; CG84-321)
013H/04/Mic005	Lake Melville	443816	5892420	GSNL (field notes; CG84-426)
013H/04/Mic006	Mealy Mtns.	443999	5875298	GSNL (field notes; CG07-017)
013H/04/Pyr001	Lake Melville	455526	5899772	GSNL (field notes; CG84-182)
013H/04/Pyr002	Lake Melville	462570	5892399	GSNL (field notes; NN84-489)
013H/04/Pyr003	Lake Melville	461756	5891125	GSNL (field notes; NN84-490)
013H/04/Pyr004	Lake Melville	461445	5897198	GSNL (field notes; VN84-456)
013H/04/Pyr005	Lake Melville	459325	5893242	GSNL (field notes; VN84-473)

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Terrane	Easting	Northing	Reference
013H/04/Pyr006	Lake Melville	459331	5893136	GSNL (field notes; VN84-474)
013H/04/Pyr007	Mealy Mtns.	440071	5884747	GSNL (field notes; VN84-483)
013H/04/Pyr008	Mealy Mtns.	444343	5875585	GSNL (field notes; CG07-031)
013H/05/Cu 001	Hawke River	466300	5909300	Piloski (1955; Area E, p. iii)
013H/05/Cu 002	Lake Melville	452237	5905666	Sutton et al. (1965; Plate XII and sample location map; LM-65-8)
013H/05/Cu 003	Lake Melville	458544	5917660	Sutton et al. (1965; Plate XII and sample location map; LM-65-17)
013H/05/Cu 004	Lake Melville	458725	5917195	Sutton et al. (1965; Plate XII and sample location map; LM-65-18)
013H/05/Cu 005	Lake Melville	459008	5917965	Sutton et al. (1965; Plate XII and sample location map; LM-65-19)
013H/05/Mic001	Lake Melville	461000	5903750	Douglas (1953), Kranck (1966);GSNL (field notes; CG84-187)
013H/05/Ni 001	Lake Melville	455609	5909898	Piloski (1955; Area E, p. iii & sketch map)
013H/05/Ni 002	Lake Melville	456520	5910620	Sutton et al. (1965; Plate XII and sample location map; JJ-65-4)
013H/05/Ni 003	Lake Melville	456188	5910126	van Nostrand and Brewer (1997; showing B grid map A5.2)
013H/05/Ni 004	Lake Melville	456094	5909885	van Nostrand and Brewer (1997; showing A grid map A5.2)
013H/05/Pyr001	Lake Melville	466498	5920029	GSNL (field notes; CG84-029)
013H/05/Pyr002	Lake Melville	462962	5914615	GSNL (field notes; CG84-040)
013H/05/Pyr003	Lake Melville	458653	5907480	GSNL (field notes; CG84-083)
013H/05/Pyr004	Lake Melville	459298	5905335	GSNL (field notes; CG84-091)
013H/05/Pyr005	Lake Melville	459333	5910271	GSNL (field notes; CG84-097)
013H/05/Pyr006	Lake Melville	460946	5910519	GSNL (field notes; CG84-103)
013H/05/Pyr007	Lake Melville	456096	5909977	GSNL (field notes; CG84-105)
013H/05/Pyr008	Lake Melville	455691	5910271	GSNL (field notes; CG84-107)
013H/05/Pyr009	Lake Melville	453282	5905875	GSNL (field notes; CG84-157)
013H/05/Pyr010	Lake Melville	452969	5905556	GSNL (field notes; CG84-159)
013H/05/Pyr011	Lake Melville	445824	5904048	GSNL (field notes; NN84-073)
013H/05/Pyr012	Lake Melville	443860	5908291	GSNL (field notes; NN84-141)
013H/05/Pyr013	Lake Melville	448516	5914798	GSNL (field notes; NN84-378)
013H/05/Pyr014	Lake Melville	459191	5918276	GSNL (field notes; NN84-426)
013H/05/Pyr015	Lake Melville	459566	5904128	GSNL (field notes; NN84-444)
013H/05/Pyr016	Lake Melville	454870	5902660	GSNL (field notes; NN84-458)
013H/05/Pyr017	Lake Melville	464944	5904883	GSNL (field notes; NN84-471)
013H/05/Pyr018	Lake Melville	461580	5900813	GSNL (field notes; NN84-560)
013H/05/Pyr019	Lake Melville	461131	5900749	GSNL (field notes; NN84-561)
013H/05/Pyr020	Lake Melville	461619	5905567	GSNL (field notes; MW84-002)
013H/05/U 001	Lake Melville	447104	5924327	GSNL (field notes; NN84-395)
013H/06/Cu 001	Hawke River	498082	5900221	Kranck (1966, p.11; ELM 102-66)
013H/06/Cu 002	Hawke River	470162	5912130	GSNL records. Source of information unknown
013H/06/Cu 003	Hawke River	472415	5912942	GSNL (field notes; CG04-201)
013H/06/Cu 004	Hawke River	482104	5920404	GSNL (field notes; CG04-285)
013H/06/Pyr001	Hawke River	493468	5914896	GSNL (field notes; VN84-145)
013H/06/U 001	Lake Melville	470477	5915484	GSNL (field notes; NN84-549)
013H/07/Pyr001	Hawke River	502135	5920945	GSNL (field notes; GM85-004)
013H/09/Cu 001	Hawke River	539404	5932239	GSNL (field notes; VO81-355)
013H/10/Cr 001	Hawke River	503748	5941919	GSNL (field notes; CG04-243)
013H/10/Cr 002	Hawke River	503961	5941547	GSNL (field notes; CG04-245)
013H/10/Cr 003	Hawke River	504415	5941171	GSNL (field notes; CG04-247)
013H/10/Cr 004	Hawke River	504540	5940904	GSNL (field notes; CG04-248)
013H/10/Mo 001	Groswater Bay	509555	5953826	GSNL (field notes; VO81-017)
013H/10/Stn001	Pinware	502280	5952754	Dickson and King (2005, p.155)
013H/10/V 001	Hawke River	510184	5933142	GSNL (field notes; CG04-266)
013H/11/Cu 001	Hawke River	470951	5935779	Douglas (1953); Sutton (1965; Plate XIII)
013H/11/Cu 002	Hawke River	475345	5929391	Sutton et al. (1965); GSNL (field notes; CG81-184)

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Terrane	Easting	Northing	Reference
013H/11/Cu 003	Hawke River	474151	5929267	GSNL (field notes; CG81-186)
013H/11/Cu 004	Hawke River	473462	5929106	GSNL (field notes; CG81-187)
013H/11/Cu 005	Hawke River	474376	5932475	Sutton et al. (1965; Plate XII and sample location map; LM-65-15)
013H/11/Cu 006	Hawke River	476020	5929839	Sutton et al. (1965; Plate XII and sample location map; LM-65-28)
013H/11/Cu 007	Hawke River	474674	5929692	Sutton et al. (1965; Plate XII and sample location map; LM-65-35)
013H/11/Cu 008	Hawke River	469678	5935427	Connell and Brewer (1996)
013H/11/Cu 009	Hawke River	469914	5936012	Connell and Brewer (1996)
013H/11/Cu 010	Hawke River	470256	5936799	Connell and Brewer (1996)
013H/11/Pyr001	Hawke River	469930	5936022	GSNL (field notes; CG81-170)
013H/11/Pyr002	Hawke River	476248	5931176	GSNL (field notes; CG81-180)
013H/11/Pyr003	Hawke River	480266	5930174	GSNL (field notes; CG81-218)
013H/11/Pyr004	Hawke River	474594	5931824	Sutton et al. (1965; Plate XII and sample location map; LM-65-13)
013H/11/Pyr005	Hawke River	474873	5932410	Sutton et al. (1965; Plate XII and sample location map; LM-65-16)
013H/11/Pyr006	Hawke River	497270	5950836	Cherry (field notes and data stn map; MC77-057)
013H/12/Cu 001	Lake Melville	463000	5935280	GSNL records. Source of information unknown
013H/12/Pyr001	Lake Melville	465293	5931358	Sutton et al. (1965; Plate XII and sample location map; LM-65-85)
013H/12/Pyr002	Lake Melville	456400	5933280	GSNL (field notes; CG81-480)
013H/12/Pyr003	Lake Melville	459455	5939860	GSNL (field notes; CG81-488)
013H/12/U 001	Lake Melville	442880	5931671	Piloski (1955; Area E, p. vi)
013H/14/Mic001	Groswater Bay	493120	5967400	GSNL records. Source of information unknown
013H/15/Fe 001	Groswater Bay	505800	5961000	Christie (1951, p.17)
013H/15/Mic001	Groswater Bay	526729	5956349	GSNL (field notes; VO81-075)
013H/16/Fe 001	Groswater Bay	539856	5964623	Christie (1951, p.17)
013H/16/Mic001	Groswater Bay	538955	5963070	Gardner (1938)
013H/16/Mic002	Groswater Bay	542006	5959388	Gardner (1938)
013H/16/Mic003	Groswater Bay	543275	5958682	GSNL (field notes; CG81-317)
013H/16/Mic004	Groswater Bay	540908	5960039	GSNL (field notes; CG81-326)
013I/03/Cu 001	Groswater Bay	474332	6008150	GSNL (field notes; CG80-696)
013I/03/Pyr001	Groswater Bay	476690	5992310	Stevenson (1970; map; SG68-110)
013I/03/Ti 001	Groswater Bay	479100	5987600	Emory-Moore and Meyer (1992)
013I/04/Cu 001	Groswater Bay	464890	6008915	GSNL (field notes; CG80-338)
013I/04/Cu 002	Lake Melville	453893	5985195	GSNL (field notes; CG80-758)
013I/04/Cu 003	Lake Melville	447030	5993358	GSNL (field notes; RG80-107)
013I/04/Pyr001	Lake Melville	443560	5992100	Beavan (1980); GSNL (field notes; CG84-196A,B; RG80-114A,C)
013I/04/Pyr002	Groswater Bay	449318	6006174	GSNL (field notes; CG80-271)
013I/04/U 001	Lake Melville	435714	5996640	Piloski (1955; Area E, p. vi); Beavan (1980)
013I/05/Au 001	Groswater Bay	447330	6035096	Corbeil and Villeneuve (1995)
013I/05/Cu 001	Groswater Bay	443458	6026089	Kirwan (1960); Sketch map
013I/05/Cu 002	Groswater Bay	448630	6025179	GSNL (field notes; CG79-795)
013I/05/Cu 003	Groswater Bay	449420	6023510	Halet (1946, p. 22); GSNL (field notes; CG84-197)
013I/05/Cu 004	Groswater Bay	449651	6021756	GSNL (field notes; CG79-800)
013I/05/Pyr001	Groswater Bay	441082	6025444	GSNL (field notes; CG79-902)
013I/06/Pyr001	Groswater Bay	469741	6036341	Stevenson (1970; map; SGJ68-108)
013I/06/Pyr002	Groswater Bay	494595	6037816	Stevenson (1970; map; SG68-181)
013I/06/Pyr003	Groswater Bay	495140	6036962	GSNL (field notes; CG79-337)
013I/11/Pyr001	Makkovik Province	471415	6052519	GSNL (field notes; CG79-275)
013I/11/Pyr002	Makkovik Province	481440	6039669	GSNL (field notes; AD79-209)
013I/12/Cu 001	Groswater Bay	462310	6039780	Kirwan (1960)
013I/12/Pyr001	Groswater Bay	445906	6049413	Stevenson (1970; map; SGJ68-081)
013I/13/Cu 001	Makkovik Province	439687	6079758	GSNL (field notes; CG79-252)
013I/13/Fl 001	Makkovik Province	444379	6073529	GSNL (field notes; CG79-191)

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Terrane	Easting	Northing	Reference
013I/13/Pyr001	Makkovik Province	445991	6074589	GSNL (field notes; CG79-219)
013I/13/Pyr002	Makkovik Province	445903	6075344	GSNL (field notes; CG79-220)
013J/01/Mic001	Groswater Bay	429977	6009635	GSNL (field notes; CG80-049)
013J/01/Mo 001	Lake Melville	407200	5993600	No record in Gower's/Stevensons's notes, reports or maps; or assessment files
013J/01/Pyr001	Lake Melville	420460	6009105	GSNL (field notes; CG84-198)
013J/01/Pyr002	Lake Melville	418227	6011327	GSNL (field notes; CG79-960)
013J/01/Pyr003	Lake Melville	411040	6011006	GSNL (field notes; CG80-018)
013J/01/Pyr004	Lake Melville	410246	5994976	GSNL (field notes; CG80-154)
013J/01/Pyr005	Lake Melville	408691	5994972	GSNL (field notes; RG80-004)
013J/01/Pyr006	Lake Melville	409233	5994805	GSNL (field notes; RG80-006)
013J/01/Pyr007	Lake Melville	409777	5997662	GSNL (field notes; RG80-057)
013J/01/Pyr008	Lake Melville	420993	6008280	GSNL (field notes; RG80-464)
013J/01/Pyr009	Lake Melville	408614	5995738	GSNL (field notes; RG80-474)
013J/01/U 001	Lake Melville	412381	5986534	GSNL (field notes; CG80-442)
013J/01/U 002	Lake Melville	423681	5984709	Piloski (1955; Area E, p. vi)
013J/01/U 003	Lake Melville	404542	5994307	GSNL (field notes; RG80-326)
013J/02/Mo 001	Lake Melville	393000	6001520	Gower and Erdmer (1984)
013J/02/Mo 002	Lake Melville	386608	5992464	GSNL (field notes; CG80-538)
013J/02/Pyr001	Lake Melville	383476	5993083	GSNL (field notes; CG80-594)
013J/02/Pyr002	Lake Melville	400630	5994998	GSNL (field notes; LG80-002)
013J/02/Pyr003	Lake Melville	397175	5993036	GSNL (field notes; NN80-009)
013J/02/Pyr004	Lake Melville	396992	5991883	GSNL (field notes; NN80-016)
013J/02/Pyr005	Lake Melville	394239	6002532	GSNL (field notes; NN80-034)
013J/02/Pyr006	Lake Melville	393098	6001663	GSNL (field notes; NN80-035)
013J/02/Pyr007	Lake Melville	395878	5984790	GSNL (field notes; NN80-258)
013J/02/Pyr008	Lake Melville	390251	5988194	GSNL (field notes; NN80-269)
013J/02/Pyr009	Lake Melville	390241	5992739	GSNL (field notes; NN80-571)
013J/02/Pyr010	Lake Melville	390977	5989413	GSNL (field notes; RG80-316)
013J/02/U 001	Lake Melville	394984	5989442	GSNL (field notes; NN80-115)
013J/02/U 002	Lake Melville	381949	5989748	GSNL (field notes; CG80-585)
013J/02/Zn 001	Lake Melville	395650	6005260	Halet (1946, p. 22); positioned on Stevenson's map
013J/04/Pyr001	Lake Melville	332585	6001065	Gower (1986); GSNL (field notes; CG83-392)
013J/04/Pyr002	Groswater Bay	312314	6008962	Gower (1986); GSNL (field notes; CG83-307)
013J/05/Pyr001	Groswater Bay	318454	6025055	Gower (1986); GSNL (field notes; CG83-267)
013J/05/Pyr002	Groswater Bay	318395	6025124	Gower (1986); GSNL (field notes; CG83-432)
013J/06/Pyr001	Lake Melville	338150	6023200	Gower (1986); GSNL (field notes; CG83-025)
013J/06/Pyr002	Lake Melville	352895	6013844	Gower (1986); GSNL (field notes; CG83-086)
013J/08/Cu 001	Groswater Bay	404342	6029964	GSNL (field notes; CG79-670)
013J/08/Pyr001	Groswater Bay	423272	6037141	Stevenson (1970; map; SG68-055)
013J/08/Pyr002	Groswater Bay	411169	6036935	Stevenson (1970; map; SG68-053)
013J/08/Pyr003	Groswater Bay	422287	6030600	GSNL (field notes; DB79-214)
013J/08/Pyr004	Groswater Bay	409621	6038034	Dawson (1996)
013J/09/Cu 001	Groswater Bay	410430	6051350	Piloski (1955); Area D, p. i , ii & sketch map)
013J/09/Cu 002	Groswater Bay	421327	6052466	Piloski (1955); Area D, p. i & sketch map)
013J/09/Cu 003	Groswater Bay	410293	6052476	Pickett (1996)
013J/09/Mo 001	Makkovik Province	405170	6057700	Kirwan (1960)
013J/09/Pyr001	Makkovik Province	411660	6063890	Douglas (1953; Fig 4)
013J/09/Pyr002	Makkovik Province	412969	6062034	GSNL (field notes; CG79-463)
013J/09/U 001	Makkovik Province	417630	6057450	www.megauranium.com/main/?aillikeast
013J/09/U 002	Makkovik Province	426480	6058460	www.megauranium.com/main/?aillikeast
013J/10/Fl 001	Labradorian	401069	6064287	GSNL (field notes; CG79-104)

Appendix 1. Listing of Mineral Occurrences in eastern Labrador

Occurrence code	Terrane	Easting	Northing	Reference
013J/10/Fl 002	Labradorian	402187	6065844	GSNL (field notes; CG79-100)
013J/10/Fl 003	Makkovik Province	384600	6062980	Stevenson (1970; map; near SG68-311)
013J/15/Cu 001	Makkovik Province	376800	6091740	Douglas (1953; Fig 4)
013J/15/Cu 002	Makkovik Province	386110	6077500	Douglas (1953; Fig 4)
013J/15/Fl 001	Makkovik Province	376840	6076790	Stevenson (1970; map; near SG68-166)
013J/15/Fl 002	Makkovik Province	390601	6078130	GSNL (field notes; CG79-038)
013J/15/Fl 003	Makkovik Province	390874	6082054	GSNL (field notes; CG79-047)
013J/15/Fl 004	Makkovik Province	393994	6076627	GSNL (field notes; CG79-034)
013J/15/Fl 005	Makkovik Province	398255	6073296	GSNL (field notes; CG79-018)
013J/15/Gem001	Makkovik Province	383790	6096000	Wheeler (1935)
013J/15/Mo 001	Makkovik Province	376820	6075270	Stevenson (1970; map; near SG68-165)
013J/15/Pb 001	Makkovik Province	377460	6082060	Stevenson (1970; map; near SG68-167)
013J/15/Pyr001	Makkovik Province	385540	6075310	Douglas (1953; Fig 4)
013J/15/Pyr002	Makkovik Province	394351	6071124	GSNL (field notes; CG79-166)
013J/15/Pyr003	Makkovik Province	393201	6071041	GSNL (field notes; CG79-163)
013J/15/U 001	Makkovik Province	395940	6072260	Davidson (1979)
013J/15/U 002	Makkovik Province	382490	6072108	www.silverspruceresources.com/s/NewsReleases.asp
013J/15/U 003	Makkovik Province	378850	6070275	www.silverspruceresources.com/s/NewsReleases.asp
013J/15/U 004	Makkovik Province	394400	6071400	www.megauranium.com/main/?aillikeast
013J/15/U 005	Makkovik Province	393530	6070470	www.megauranium.com/main/?aillikeast
013J/15/U 006	Makkovik Province	393250	6070290	www.megauranium.com/main/?aillikeast
013J/16/Fl 001	Makkovik Province	406152	6074809	GSNL (field notes; CG79-059)
013J/16/Fl 002	Makkovik Province	409890	6071670	Douglas (1953; Fig 4)
013J/16/Fl 003	Makkovik Province	412006	6071923	GSNL (field notes; CG79-114)
013J/16/Fl 004	Makkovik Province	422120	6082050	Stevenson (1970; map; near SGJ68-137)
013J/16/Mo 001	Makkovik Province	405600	6069880	Douglas (1953; Fig 4)

Appendix 2. Minerals from Eastern Labrador Identified by X-ray Diffraction

Sample	Easting	Northing	Material	Identified Mineral	Formula
CG03-224A	547414	5823482	Black mineral (allanite)	Allanite (metamict)	$Ca(Ce,La,Y,Ca)Al_2(Fe2+,Fe3+)(SiO_4)(Si_2O_7)H_2O$
CG03-224B1	547414	5823482	Honey-coloured mineral (zeolite?)	Stilbite (zeolite)	$NaCa_2Al_2Si_{13}O_{36.}14H_2O$
CG03-224B1	547414	5823482	White mineral (zeolite?)	Scolecite (zeolite)	$CaAl_2Si_3O_{10.}3H_2O$
CG03-224C	547414	5823482	Pale purplish material (?)	Illite, albite, sepiolite	
CG03-224D1	547414	5823482	Off-white mineral (?)	Prehnite	$Ca_2Al(AlSi_3O_{10})(OH)_2$
CG03-224D1	547414	5823482	White mineral (zeolite?)	Prehnite plus chabazite (Ca-zeolite)	$Ca_2Al(AlSi_3O_{10})(OH)_2$
CG79-081A	421288	6079749	Black, silvery mineral in feldspar (ilmenite?)	Hematite	Fe_2O_3
CG79-794	449250	6024859	Pink mineral (thulite–manganesian zoisite?)	Member of epidote group (zoisite?), plus minor quartz and feldspar	$Ca_2Al_3(SiO_4)(Si_2O_7)O(OH)$
CG80-115	402988	5999660	Opaque mineral in feldspar (ilmenite?)	Hematite	Fe_2O_3
CG80-280B	458358	6006556	Opaque mineral in pegmatite (ilmenite?)	Hematite	Fe_2O_3
CG84-197C	449420	6023510	White rosettes (zeolite?)	Zeolite (cf. stilbite), plus quartz	$NaCa_2Al_2Si_{13}O_{36.}14H_2O$
CG85-132B	517961	5892651	Small dark-red mineral (K-fs/zeolite?)	Analcite (Ca-zeolite), minor quartz, possibly pollucite and unknown phase	$NaAlSi_2O_{6.}H_2O$
CG86-136B	561098	5861885	Black mineral (tourmaline?)	Dravite (magnesian tourmaline)	$NaMg_3(Al,Mg)_6B_3Si_6O_{27}(OH)$
CG86-191	511516	5853352	Black mineral in granitoid (pyroxene/ amphibole?)	Amphibole	$Ca_2(Mg,Fe,Al)_5(Al,Si)_8O_{22}(OH)_2$ (hornblende)
CG86-731B	575572	5818996	Silvery-grey mineral (chalcocite?)	Hematite	Fe_2O_3
CG87-430A	584239	5770448	Silvery-grey mineral in pegmatite vein (ilmenite?)	Hematite	Fe_2O_3
JS86-078B	544543	5867818	Opaque mineral in pegmatite (ilmenite?)	Hematite	Fe_2O_3
RG80-040B	407480	5998838	Cause of red staining (hematite?)	Not enough stain to identify	

Notes
1. Analyst: R. Mason, Memorial University of Newfoundland.
2. Easting and Northing based on NAD 27 Zone 21.
3. In ‘Material’ column, bracketed mineral was that guessed at outcrop.
4. The mineral formula is for the first phase mentioned.