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INDUSTRIAL-MINERALS SURVEYS IN NEWFOUNDLAND AND LABRADOR

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Mineral Deposits Section

ABSTRACT

Industrial mineral assessment activities in 1995 consisted of follow-up work on a deposit of refractory and abrasive minerals (garnet – kyanite – staurolite) near Corner Brook, industrial carbonates (limestone – dolomite – marble) in western White Bay, and dimension and ornamental stone in northern Labrador. Additional garnet – kyanite mineralization was noted northeast of Corner Brook Lake, further adding to the commercial potential of the mineralized zone. In western White Bay, potential reserves of the Coney Arm limestone deposit were enlarged through detailed mapping and sampling. In northern Labrador, preliminary field work was carried out on sources of carving and ornamental stone, along with dimension-stone prospects in the gneisses and migmatites around the community of Hopedale.

WESTERN NEWFOUNDLAND

CORNER BROOK (GARNET – KYANITE – STAUROLITE)

Field work carried out in 1995 on a promising garnet – kyanite – staurolite deposit south of Corner Brook has significantly enlarged the zone of potential economic interest. The deposit is hosted by a unit of Paleozoic schists, the Breeches Pond formation of Cawood and van Gool (1992) and is of potential commercial interest as a source of refractories and abrasives (Howse, 1994). Additional garnet – kyanite – staurolite mineralization in pelitic schist was identified in outcrops east of Corner Brook Lake (Figures 1 and 2). The showings comprise small ridges and hills that are topographically suitable for quarrying should the mineral commodities prove to be commercially viable. The best mineralized zone is exposed over an 800-m-strike length and is estimated to be between 60 and 70 m thick. Preliminary tests on samples collected from the deposit showed a kyanite content ranging from 15 to 20 percent. Garnets, commonly ranging up to 5 cm in diameter are estimated to comprise up to 30 percent of the rock in places, although both the size and amount of garnet may vary. Staurolite is also present in variable amounts and crystals up to 7 cm in length were noted. The present work suggests that further testing of this deposit including core drilling may be warranted. The deposit is located within 10 km of the Trans-Canada Highway and can be accessed through existing woods roads.

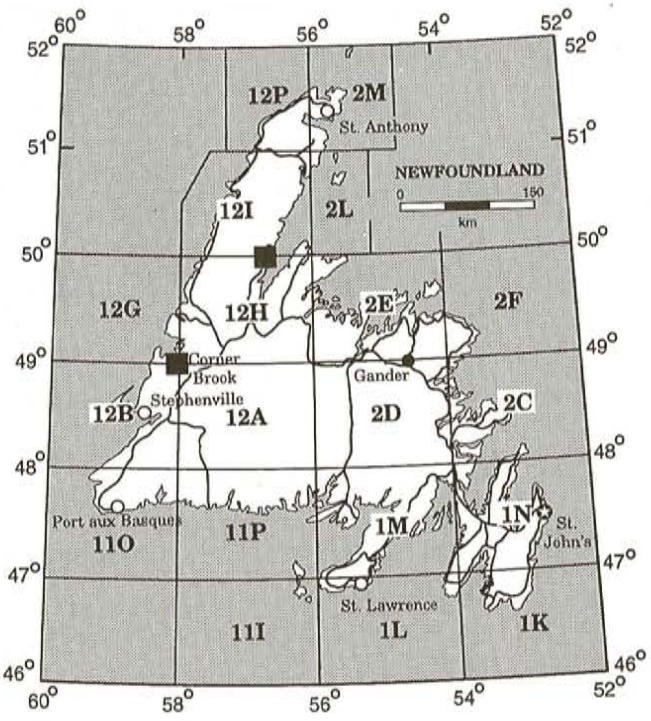

Figure 1. *Location of study areas, insular Newfoundland.*

WESTERN WHITE BAY (LIMESTONE, DOLOMITE)

An assessment of the southward extension of the Coney Arm limestone deposit has been carried out. The limestone is part of the Eocambrian to Cambrian Coney Arm Group of clastic-carbonate rocks that unconformably overlie the Long

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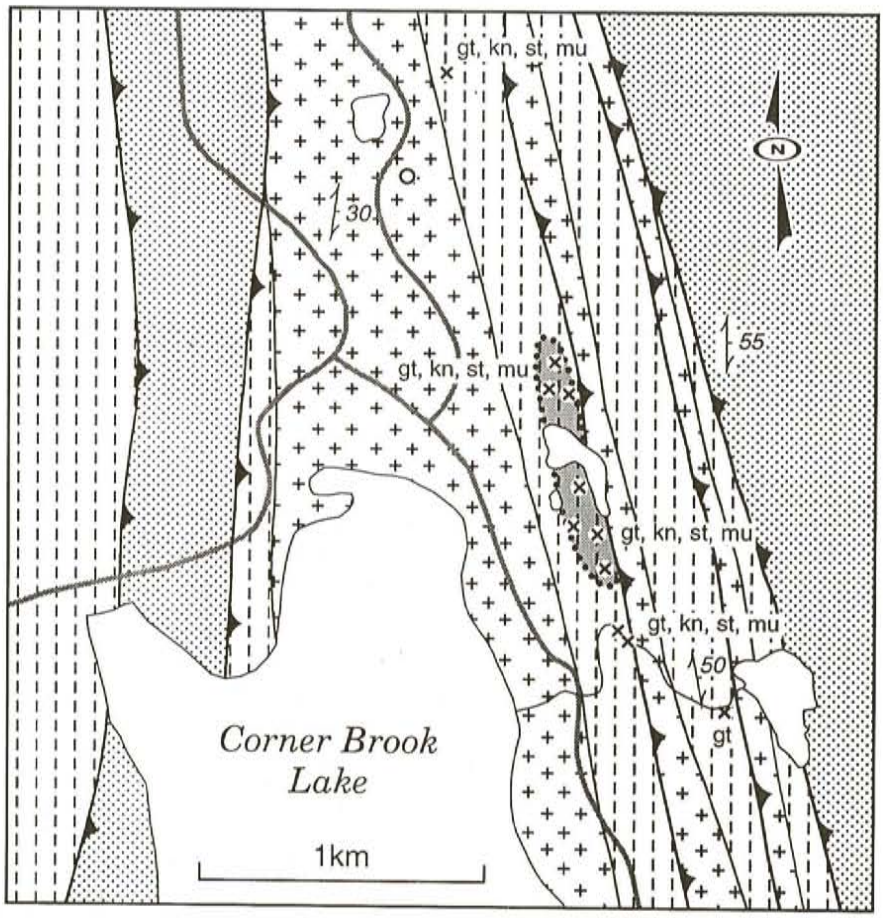

LEGEND

?LATEST PRECAMBRIAN-MID ORDOVICIAN

Breeches Pond Formation

?LATEST PRECAMBRIAN-EARLY ORDOVICIAN

Mount Musgrave Group

PRECAMBRIAN

Corner Brook Lake Complex

SYMBOLS

Stratigraphic contact .....

Thrust fault .....

Cleavage .....

Mineral occurrence (in place, float) ..... × ○

Garnet-kyanite-staurolite muscovite deposit .....

Figure 2. *Geology of the northeast tip of Corner Brook Lake showing location of the garnet – kyanite – staurolite deposit; geology modified after Cawood and van Gool (1992).*

Range Complex. This work showed that the dark-grey, recrystallized limestone unit between Aspy Cove and the bottom of Great Coney Arm extends southward for at least 3.5 km (Figures 1 and 3). The limestone forms a relatively narrow, easterly 60 to 70° dipping unit, paralleling and forming part of the west slope of Coney Arm River valley. Thus, the west slope of the valley effectively forms the eastern boundary of the deposit. Mapping and chip sampling over a reconnaissance grid encountered good- to excellent-quality stone near and along the valley slope. Samples were collected along cross-sectional lines that were positioned at 400-m intervals along the deposit's northeast strike. The deposit is overlain by a sequence of dolomite and marble with some interbedded dark-grey limestone. Narrow diabase dykes intrude the carbonate sequence in at least two areas.

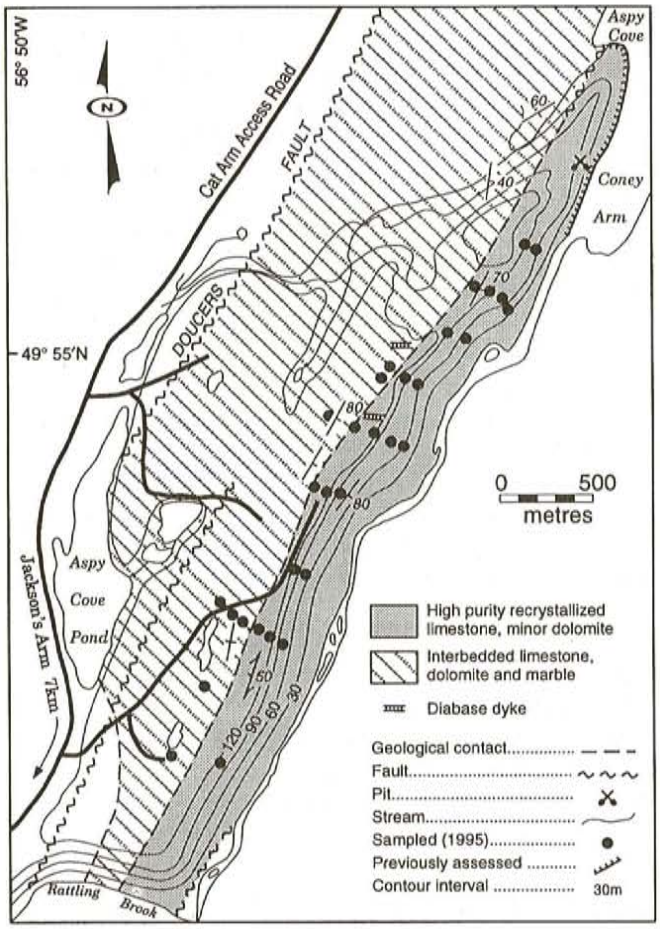

Figure 3. *The Coney Arm limestone deposit showing the area assessed in 1995.*

Previous sampling of coastal exposures has shown that the Coney Arm limestone deposit combines high purity with substantial reserves (Howse, 1995). It may be suitable for a wide range of industrial uses including those related to environmental cleanup and pollution control in addition to applications in the chemical, metallurgical, and agricultural industries. Samples collected during the present field program have been sent to the Newfoundland Department of Natural Resources geochemical laboratory for analyses, and results will be released when they become available.

LABRADOR

INTRODUCTION

During the 1995 field season, several potential dimension-stone quarry sites (in granitic gneisses and migmatites) and carving stone (serpentinite) deposits, were examined near the community of Hopedale, Labrador (Figures 4 and 5). Meyer and Montegue (1994, 1995) documented soapstone deposits within the Archean terrane on the northern Labrador coast and readers are referred to their descriptions of the different prospects. They demonstrated that rocks in the Okak and Hopedale areas, host a variety of small soapstone deposits that can provide suitable stone for the growing Labrador carving-stone industry. The Hopedale region, in addition to being more accessible, appears to host the widest selection of soapstone in terms of colours and textures.

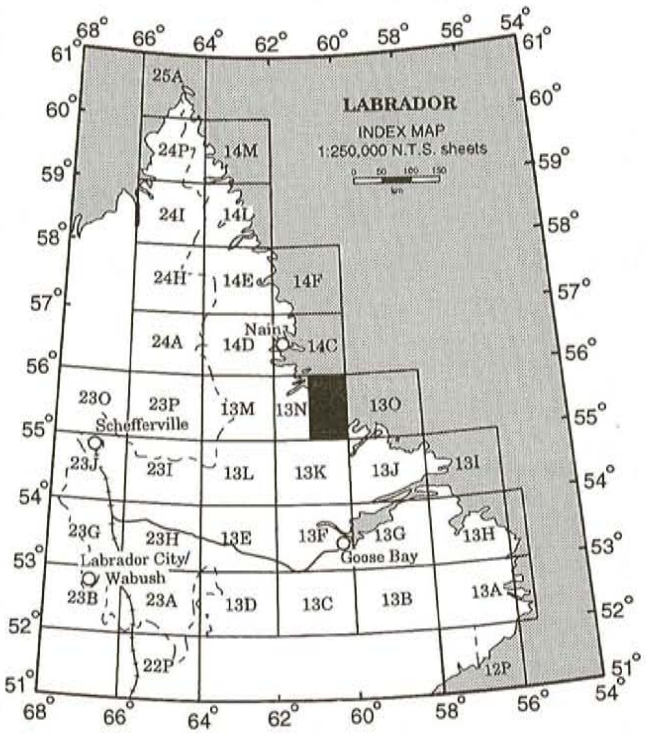

Figure 4. *Locaton of study area, Labrador.*

The present investigation focused on serpentinite near Hopedale (Kukkiniarvik Bay) and potential dimension-stone sites in granitic gneiss and migmatite near the community (Figure 5). Reconnaissance traverses for "soapstone" were carried out on the peninsula south of the Hopedale and known

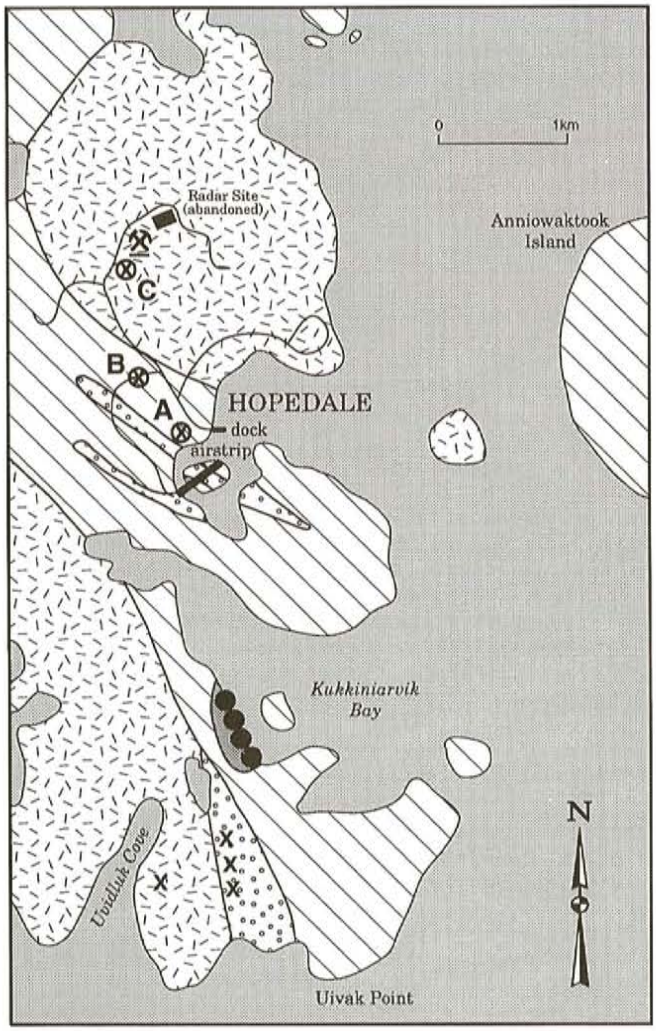

Figure 5. *Dimension-stone and carving-stone prospects near Hopedale, Labrador; showing locations of sites discussed in text, geology after Ermanovics (1993).*

deposits were re-examined for the benefit of the first author. The following summarizes the results of this preliminary survey.

KUKKINIARKVIK SERPENTINITE

The Kukkiniarkvik Bay serpentinite deposit (also sometimes referred to as the Tooktoosner Bay deposit) is located about 3 km south of Hopedale on the shore of Kukkiniarkvik Bay. The host rock is a 50 m by 1 km outcrop of ultramafic rocks in garnetiferous gneiss. The deposits of interest consist of discontinuous serpentinite pods that collectively comprise a limited resource in terms of tonnage, yet constitutes valuable source of material for local carvers. The stone is relatively soft (3 to 4 on Moh's scale) thus suitable for hand tooling, yet strong enough to withstand the rigours of handling without chipping. It also polishes extremely well (Meyer and Montague, 1995).

The inland parts of the peninsula, south of the above prospects, were investigated for carving stone. Particular attention was focused on a valley underlain by amphibolite and ultramafic rocks that trend in a north – south direction across the peninsula. Several areas of serpentized rock were noted along this valley, some of which may be potential sources of carving stone. All except one site are located on the west side of the valley near the contact with granitic gneiss, the dominant rock type in the area. At one site about midway across the valley there is evidence of possible human activity in the form of broken stone and possibly some excavation. The serpentized zones are a yellowish green on the weathered surface, a grey green on the fresh surface, and generally appear to be harder, coarser textured, and more brittle than the material on the coast. A massive but narrow outcrop of the above was traced almost continuously for a distance of 200 m, paralleling the north – south trend of the gneiss with which it is in contact. Serpentization appears to be stronger near the contact and may indicate the presence of a fault.

An outcrop of potential carving-quality stone was noted on the east side of Uvidluk Cove about 150 m inland from the shore. The stone occurs along a steep 4 m bank and is flanked by felsic gneiss. The serpentized zone forms a shear zone, 4 m in width along which the rock is strongly fractured. Fragments of sufficient size for carving could possibly be recovered from this site.

The inland occurrences appear to be inferior to those on the coast in terms of their carving-stone potential. The degree of serpentization is less and the rocks are harder and more fractured and brittle.

DIMENSION-STONE POTENTIAL IN GNEISSES AND MIGMATITES AROUND HOPEDALE

A directory of the Canadian stone industry published by Bergeron (1995) lists 120 Canadian companies involved in the extraction and preparation of various types of rock for

dimensional, monumental, and ornamental purposes. Quebec, the leading provincial producer of crystalline igneous rocks (quarries in granite, monzonite, charnockite, anorthosite, gabbro, and diabase), has grown from 25 quarries in 1982 (Nantel, 1983) to the current level of 64 quarries, producing stone of almost 70 different trade names. The Quebec rocks are from slightly deformed or undeformed massifs and, to a lesser extent, from gneissic complexes.

The Province of Newfoundland and Labrador has experienced a rebirth and growth in the stone industry. A high level of local entrepreneurial interest and activity sparked by government programs and incentives has resulted in the development of quarries in anorthosite, granite, gabbro, slate and sandstone, as well as demonstration projects based on promising granite and marble prospects. The anorthosite "Labradorite-granite" quarry at Ten Mile Bay, owned and operated by the Torngait Ujaganniavingit Corporation (TUC), under the direction of the Labrador Inuit Development Corporation (LIDC), produces a very unique and attractive stone for export to Europe, where it is marketed under the trade names "reflect blue" and "blue eyes".

The success, to date, of the anorthosite operation at Ten Mile Bay (another similar operation at John Hayes Harbour, 13 km to the south, is in the early stages of development) raises the possibility of additional stone-based industries on the Labrador coast. In the Hopedale region, Ermanovics (1993) noted the dimension-stone potential of granite exposed in nearly continuous outcrops on the western shore of Island Harbour Bay about 40 km southeast of Hopedale. The massive, pale-pink to dark-grey granite is relatively fracture free and because of its quality and sheltered location is a potential dimension-stone source (Ermanovics, 1993). Granitic gneiss and migmatite, which underlie the community of Hopedale and much of the surrounding district, have been discussed previously as a potential dimension-stone resource (Meyer and Montague, 1995). In particular, the highly deformed rock known as the Maggio migmatite (Ermanovics, 1993) which is superbly exposed at a number of potential quarry sites within the community, was singled out for attention. Preliminary reaction by the Italian marketing agents of the LIDC anorthorsite operation at Ten Mile Bay, to samples of the Hopedale migmatite, was favourable (Meyer and Montague, *op. cit*). The following sites (Figure 5) were briefly examined during the present visit.

Site A

Located on the southwest side of harbour near the new dock, the stone at this site is multicoloured (mainly white, pink, and black) with a "swirly banded" texture characteristic of the Maggo gneiss (Plates 1 and 2). The rock is massive with widely spaced joints that would allow the removal of large blocks. The dominant set of joints, which strike 120° and dip subvertically, would facilitate the removal of blocks 2 to 3 m wide. Apart from the major joints, there is little fracturing. However, the presence of dark (mafic) bands, which in some zones make up to 50 percent of the rock, would reduce the amount of marketable stone.

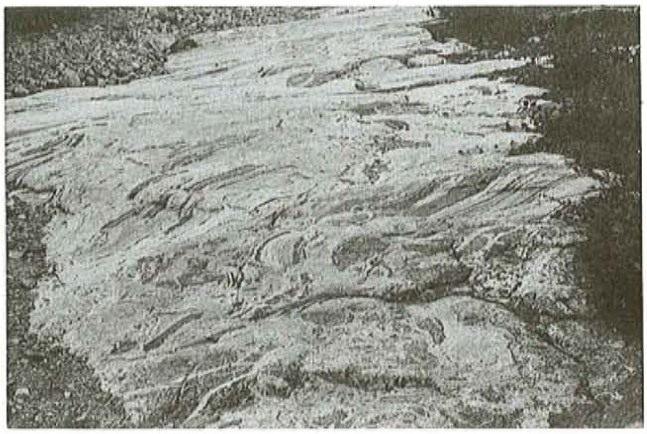

Plate 1. *Smooth, flat migmatized gneiss at Site B.*

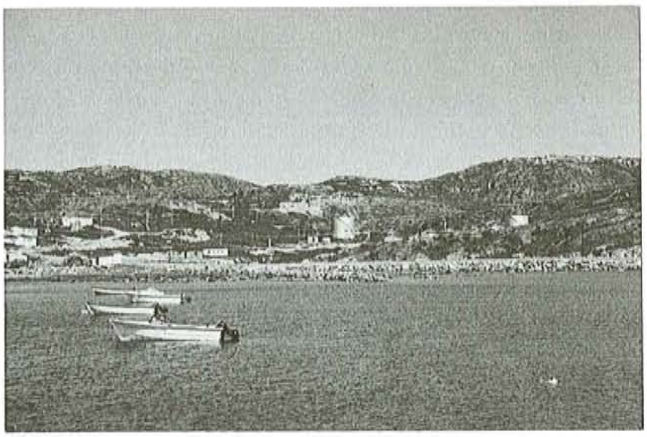

Plate 2. *View looking northwest from the dock in Hopedale. Site A is located in the middle background, abandoned radar site is on the higher hill to the right.*

One of the most distinctive and attractive features of this particular site is the presence of pink, feldspar-rich zones in the rock, which are probably large enough for selective quarrying. A 5-m-wide band of this material was traced up a 10° slope for 30 m and could support a trial bench. The total area of quarryable stone going up slope from the beach in an approximate westerly direction measures about 250 m by 150 m, with slope grade ranging from 15° at the water to 20° at the top.

Site B

The road to the airstrip provides excellent access to this site, which is within 700 m of the dock. The rock is smooth and flat with no major joints although blasting for local road construction has opened up some surface fractures. One particularly attractive, lighter zone containing attractive pink banding could easily be quarried with a likely good recovery. A preliminary estimate of the zone's dimensions indicates a length of 150 m, width 15 m, with adequate elevation for at least two benches.

Site C

This dimension-stone prospect is located approximately 1 km northwest of the community on the high ground near the abandoned American radar station (Plate 3). One of the advantages of this particular location is the presence of a natural quarry face on the south end of the deposit (Plate 2). There are very few joints present, and the colour and texture of the stone is good. One potentially quarryable block (75 by 65 m) has excellent elevation. The overall reserves are extensive for this site although selective quarrying to produce material of consistent colour and texture would have to be carried out.

Plate 3. *Potential quarry face in gneiss at Site C.*

SUMMARY

The community of Hopedale has easy access to a variety of carving- and dimension-stone resources. Nearby deposits of soapstone, though small, are well known locally and can supply the needs of local carvers. Preliminary surveys of other rock types in and around the community suggest there is potential for expanding the local talents and traditional interest in working with stone to include the possible development of quarries capable of producing attractive tiles and panels. Presently there is a need to identify the most commercially attractive stone among the various sites and to take out test blocks for sampling and promotion.

Hopedale, as a potential producer of dimension stone, enjoys several advantages. The community (population 500) is located on a large harbour with good wharf facilities, and is serviced weekly by a coastal boat during the shipping season. It has an all-weather airstrip (830 m) for short take-off and landing (STOL) aircraft, which maintains a daily service from Goose Bay. An extensive network of gravel roads provides access to main outcrops.

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