

MARBLE ASSESSMENT PROJECT—1987

A.F. Howse
Mineral Deposits Section

ABSTRACT

Marble deposits of potential commercial interest on Newfoundland's Great Northern Peninsula occur within a continuous belt from Canada Bay in the south to about 10 km south of Hare Bay in the north, a distance of more than 50 km. Two of these deposits, located at Penny's Pond and Coles Pond, have been shown by diamond drilling to contain at least three million tonnes of high-purity marble. The purity and size of these deposits, and their proximity to deep-water ports, have focused attention on this region as a potential primary source of high-purity marble for use in such industrial applications as mineral fillers and whiteners.

The marble occurs along deformed zones of St. George Group carbonate rocks that underlie the Hare Bay Allochthon. South of Hare Bay, erosion of the allochthon has exposed a 20-km-long belt of recrystallized dolomite and limestone, known as the White Arm Window. Locally, within the window, the limestones have been altered into white to grey marble. Several deposits of this marble were examined in 1987.

Occurrences of recrystallized limestones and dolomites of the St. George Group were also assessed in the Pinchgut Lake area south of Corner Brook.

INTRODUCTION

Work completed in the 1987 field season concluded a 3-year assessment of Newfoundland's marble resource. The objectives of the study were to identify and document marble deposits and determine potential industrial uses. The project began with an island-wide survey that included extensive sampling of high-purity marble deposits in western Newfoundland. This work resulted in the identification of several promising prospects. One of these, the Penny's Pond deposit near Roddickton (Figure 1), was selected for follow-up mapping and diamond drilling. This drilling delineated significant reserves of high-purity marble that may be suitable for use in the filler and whitener industries (Howse, 1987). A similar deposit was discovered and drilled near Coles Pond, 10 km north of Penny's Pond. The Newfoundland Department of Mines has invited proposals for the development of both of these deposits.

In 1987, the zone of documented marble occurrences was extended, as a result of the investigation of showings north of Coles Pond and west of Croque (Figure 1). Most of these deposits lie in a belt of Lower to Middle Ordovician carbonate rocks known as the White Arm Window (Smyth, 1971; Stouge, 1983a). Access to this region is by a gravel road linking the communities of St. Julien's and Croque on the eastern coast of the Great Northern Peninsula with the Roddickton—Main Brook highway (Route 432). Logging roads and trails branching off the main roads provide additional access.

Deep-water harbours, though lacking in shipping facilities, exist at Roddickton, Croque, and Hare Bay.

A belt of recrystallized dolomite and limestone, south of Pinchgut Lake near Corner Brook, was also investigated in 1987. Some minor occurrences of white marble and more extensive zones of dolomitic marble were identified and sampled for chemical and physical analyses.

All samples collected during the 1987 field season have been sent to the Newfoundland Department of Mines geochemical laboratory for chemical analyses. Selected samples will be tested for brightness. The results will be included in a report to be published on Newfoundland's marble resource.

WHITE ARM WINDOW MARBLE

Geological Setting

The Hare Bay Allochthon has been eroded from White Arm Pond southward to expose an approximately 20-km-long belt of carbonate rocks known as the White Arm Window (Smyth, 1971) (Figure 2). Stouge (1983a) divided the carbonate rocks within the window into the Brent Island and Southern Arm formations of the Lower Ordovician St. George Group.

Interbedded grey to black limestone and grey dolomite of the Middle Ordovician Table Head Group underlie the northern part of the window.

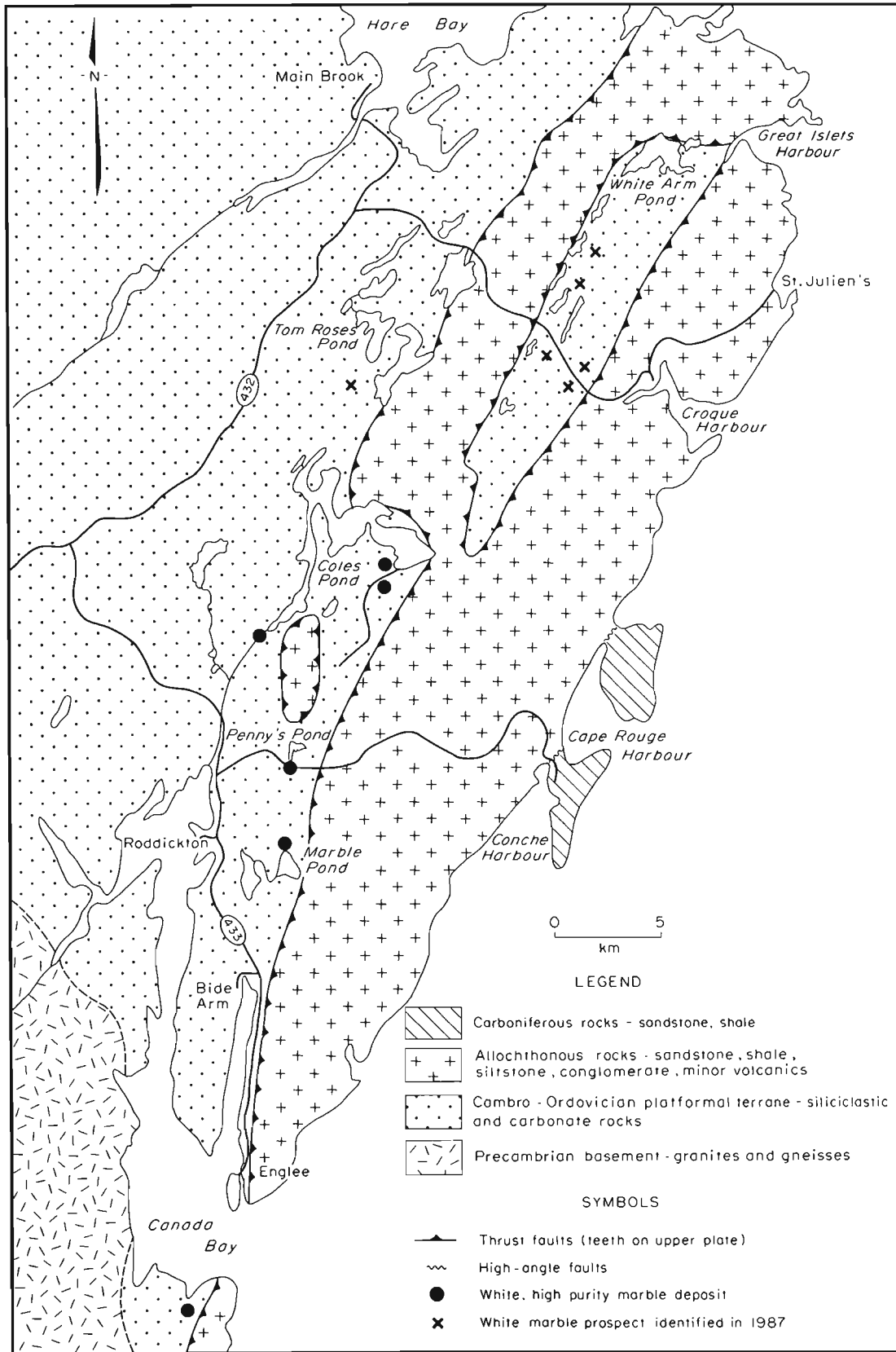
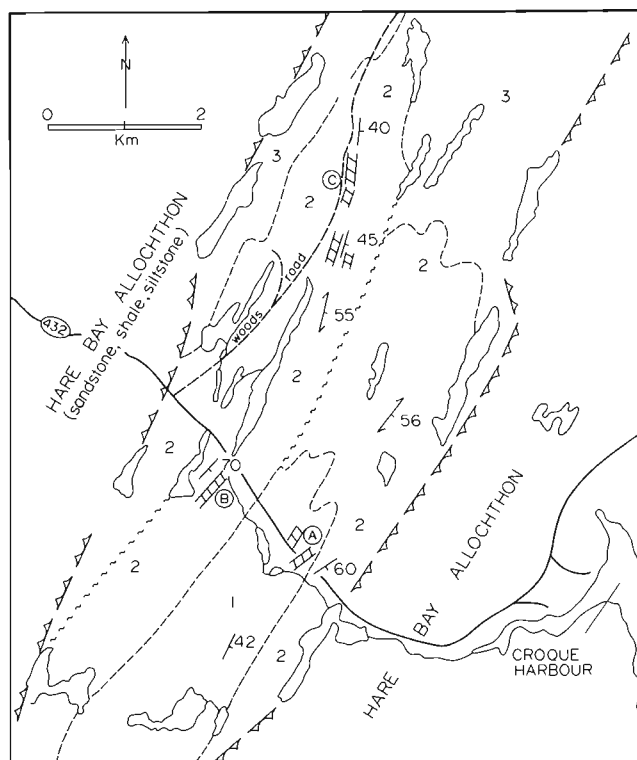


Figure 1. Geological elements of the Canada Bay-Hare Bay region showing location of white marble deposits. Geology simplified after Knight (1987) and Stouge (1983a,b).



LEGEND

MIDDLE ORDOVICIAN

Table Head Group

- 3 *Interbedded grey to black limestone and grey dolomite*

LOWER ORDOVICIAN

St. George Group

- 2 *Southern Arm Formation: interbedded limestone and dolomite*
- 1 *Brent Island formation: medium-bedded limestone, minor dolomite*

SYMBOLS

- Strike and dip of bedding
- Strike and dip of cleavage
- Thrust faults (teeth on upper plate)
- High-angle faults (assumed)
- Conformable contact
- White to light grey marble

Figure 2: Location of white marble deposits in the White Arm Pond Window. Letters refer to deposits described in text; A—Powerline, B—Skidder Trail, and C—Sawmill. Geology after Stouge (1983a).

Northeast-trending faults cut the sequence, and the carbonate rocks display a strong northeast-trending regional cleavage. The limestones and dolomites on the eastern and western margins of the White Arm Window in particular, have been recrystallized into fine- to medium-grained crystalline carbonates. Locally, the limestones have been sheared and bleached by metamorphism into white and grey marble. Several such deposits were investigated in 1987. For convenience, the more significant deposits were informally named the Powerline, Skidder Trail and Sawmill deposits; these are described separately below.

Powerline Deposit

Bands of white, grey and blue marble are exposed north and south of the Croque road near the eastern margin of the White Arm Window (Figure 2). The Croque power transmission line crosses the deposit.

The marble occurs within interlayered limestones and dolomites of the Brent Island formation. The marble is part of the northeast-trending, tightly folded sequence of dolomites and limestones exposed on the north and south sides of the Croque road.

The purest marble occurs just a few metres south of the road, where a 23-m-wide band has been exposed by road and powerline construction. The marble has a light-brown-weathered surface and is strongly cleaved (050°/40°SE). On fresh surfaces, the marble is white to buff and is fine grained.

Bands of mica-rich impurities, 30- to 40-cm wide, were observed in some large loose blocks. Because of overburden, the marble cannot be traced along strike beyond a few metres. Thin-bedded recrystallized dolomite that occurs immediately above and below the white marble strikes northeast and dips 45° to the southeast. This dolomite is bleached light grey and contains numerous cm-scale veins of white quartz and grey chert nodules.

North of the road, beginning at a point approximately 50 m northwest of the showing described above, a section of northeast-trending, interlayered dolomite, limestone and marble is sporadically exposed over a distance of 145 m. Within the steeply eastward-dipping sequence, at least 7 bands of white marble, ranging in width from 1 to 13 m, are present. The marble is fairly white and pure, and is intimately associated with cherty, quartz-veined dolomite. Repetitive bands of bluish limestone containing dolomitic burrows, mixed dolomite and marble are also present in the sequence.

Skidder Trail Deposit

White marble is exposed at several locations along the western margin of the White Arm Window. The showings occur within the Southern Arm Formation.

One of the marble showings, informally called the Skidder Trail deposit, is exposed discontinuously along the low ridges and logging trails about 500 m southwest of the Croque road. The deposit consists of interlayered white, high-

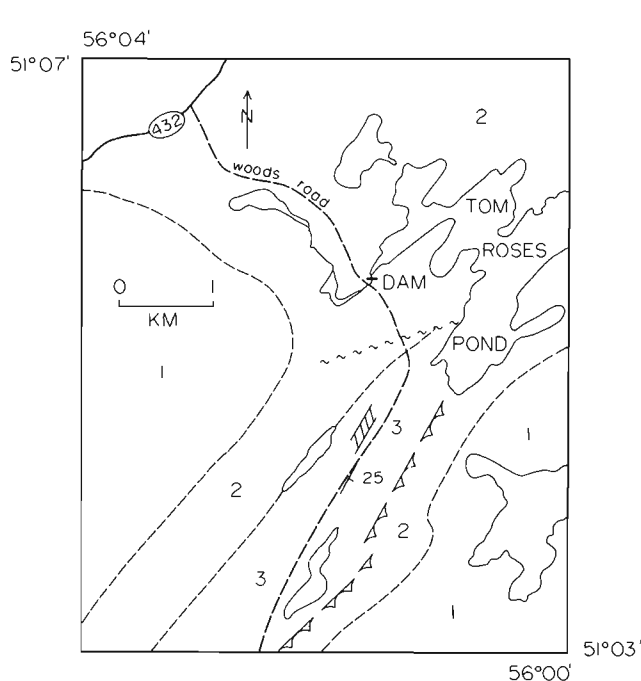


Figure 3. Location of white marble deposit near Tom Roses Pond. Geology after Stouge (1983b).

purity marble and beige-weathered, light-grey dolomite. Marble is the dominant rock unit in the deposit. Bands of marble, ranging in width up to 8 m, were observed along a northeast-trending belt traceable for more than 600 m. The marble is fine grained and somewhat chalky in places. Thin, silty laminations are found in some of the bands aligned along a strong cleavage that trends northeast and dips steeply (70° – 80°) to the southeast.

It appears likely that significantly wider bands of marble than those noted exist in the area. It is difficult, however, to confirm this, because of lack of continuous outcrop. In one partially exposed section, the author collected chip samples over a 100-m width; only two minor bands of dolomite, (2-m and 4-m wide) were noted. Trenching and/or overburden drilling is necessary to properly assess the area.

Sawmill Deposits

White marble is exposed in two northeast-trending zones located approximately 3- and 4-km north of the Croque road (location C, Figure 2). Both lie within the Southern Arm Formation and outcrop along the flanks and crests of a series of northeast-trending low hills and ridges. A woods road, which branches northward from the Croque road, provides access to the area.

The southern zone consists of fine grained, white to grey marble bands interlayered with dolomite. The marble is strongly cleaved ($020^{\circ}/65^{\circ}$ SE) and easily breaks into slabs. Lack of continuous outcrop makes it impossible to determine the maximum width of dolomite-free marble. However, separate discontinuous outcrops, 3- to 4-m wide, were observed and these were sampled over a sectional width of approximately 50 m. Impurities noted in the zone are sericite,

LEGEND

LOWER ORDOVICIAN

- 3 St. George Group

MIDDLE TO UPPER CAMBRIAN

- 2 Port au Port Group

HADRYNIAN TO MIDDLE CAMBRIAN

- 1 Labrador Group

SYMBOLS

- Strike and dip of bedding
- Conformable contact
- Thrust fault (teeth on upper plate)
- High-angle fault (assumed)
- White to light grey marble

iron stains along fracture planes, a chlorite schist band (1-m wide) and thin, cm-scale shaly bands.

The northern zone of marble showings consists of at least two bands of white marble, 15- and 20-m wide, located about 1 km north of the deposit described above. The marble outcrops along a low ridge. It is ivory white, fine- to medium-grained and strongly cleaved ($020^{\circ}/50^{\circ}$ – 55° SE).

The above marble occurrences suggest that there is excellent potential for locating significant deposits of white, high-purity marble in the White Arm Window. In particular, the area underlain by the Southern Arm Formation warrants more attention. Since bedrock exposure constitutes only about 5 percent of the area, trenching and/or overburden drilling is necessary to properly assess the marble potential of the region.

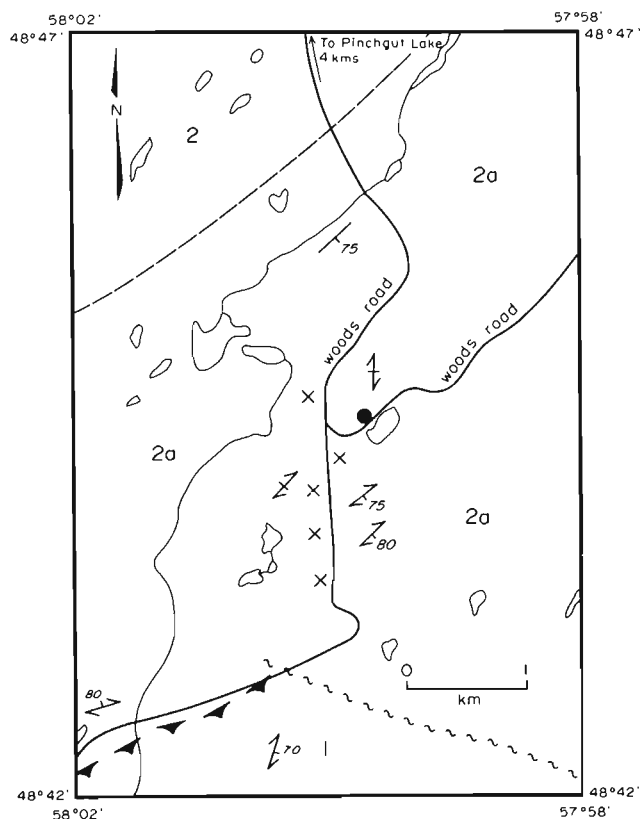
ST. GEORGE GROUP OUTSIDE OF WHITE ARM WINDOW

Geological Setting

Whitish-grey marble is present in a parautochthonous slice of St. George Group limestone and dolomite located immediately south of Tom Roses Pond, approximately 4 km east of Route 432 (Figure 3). Stouge (1983b) assigned the host rocks to the Brent Island formation and attributed the marble to shearing and secondary bleaching of the unit.

Tom Roses Pond Deposit

The marble outcrops along a low ridge and also on a bush road joining Route 432 to the northwest corner of Coles Pond. It is fine- to medium-grained, strongly cleaved ($025^{\circ}/20^{\circ}$ E),



LEGEND

LOWER ORDOVICIAN

- 2 Undivided St. George Group carbonate rocks;
2a, deformed and recrystallized limestone and
dolomite

HELIKIAN OR OLDER

- 1 Crystalline basement rocks

SYMBOLS

- ↘ Strike and dip of bedding
- ↗ Strike and dip of cleavage
- ▶ Thrust fault (teeth on upper plate)
- ~ High-angle fault (assumed)
- Conformable contact
- High-calcium white marble
- x Dolomitic marble

Figure 4. Geological sketch map showing location of white marble and dolomitic marble south of Pinchgut Lake near Corner Brook. Geology after Williams (1981).

and contains black and brown stains along fracture planes. In places, the marble has completely disintegrated into a white clay. The zone strikes northeast and is intermittently exposed for about 300 m. The thickness of this relatively flat-lying marble is unknown. Representative samples were collected for analyses.

CORNER BROOK AREA

Pinchgut Road Deposit

Narrow bands of ivory-white marble and wider, more extensive zones of pink dolomitic marble occur near Big Gull Pond about 20 km south of Corner Brook. A network of woods roads branching (south) from Pinchgut Lake on the Trans Canada Highway provides access to the area (Figure 4).

The white marble showings occur in highly deformed and recrystallized limestones and dolomites of the Lower Ordovician St. George Group. The best occurrence is 8 m wide; but because of overburden, it is traceable for only a few metres along strike. The marble is mottled dark grey on weathered surfaces and white on fresh surfaces; it has a slightly pink cast in some areas. It is fine- to medium-grained and has a strong, subvertical, north-trending cleavage. Other narrower bands of marble and some float were also observed in the immediate area. Representative samples were collected for chemical and physical analyses.

A 1500-m-wide zone of recrystallized dolomite and dolomitic marble, exposed by new road construction and located just south of the white marble, was also investigated and sampled. In places, the rock has an attractive red and pink colour, suggesting a potential use as building or decorative stone. However, the rock is extensively jointed and fractured and shatters easily. Impurities are small nodules of chert and pervasive hematite along fractures. Bands of recrystallized beige dolomite and mottled, blue-grey recrystallized dolomite also occur in the sequence.

ACKNOWLEDGMENTS

Dwayne Simms provided cheerful and competent help in the field. Crossing paths with Paul Delaney frequently resulted in useful discussions and advice as well as insights into the American League pennant race. The encouragement and advice from Paul Dean is also much appreciated. An early version of the manuscript was reviewed and improved by Sean O'Brien and Jamie Meyer.

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