

MARBLE ASSESSMENT IN THE RODDICKTON AREA OF THE GREAT NORTHERN PENINSULA, NEWFOUNDLAND

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ABSTRACT

White high-purity marble deposits at Penny's Pond and Coles Pond, near Roddickton, have been assessed by detailed mapping and diamond drilling. The marble deposits occur along a deformed zone of St. George Group carbonate rocks, which underlie the Hare Bay allochthon.

The Penny's Pond white marble deposit strikes approximately north and dips 45-50° eastward. It is overlain by bluish-gray marble and underlain by crystalline dolomitic marble and limestone. The white marble was traced 450 m southward from Penny's Pond in 11 drillholes spaced at 40 m intervals and returning AQ-size core. The average width of the zone is at least 58 m.

The Coles Pond marble forms an asymmetrical northeast-trending syncline. Coarsely crystalline calcite is found along the syncline axis. The west limb of the syncline was tested by eight holes, which indicated the presence of a significant reserve of white marble.

The deposits are of potential commercial interest as mineral fillers because of a combination of features including a high degree of brightness, fine grained texture, easy grindability, and a high-calcium, low-impurity content.

INTRODUCTION

The reassessment of Newfoundland's marble resource that began in 1985 was continued during the 1986 field season. The aim of the project is to determine potential value of the resource for such industrial applications as fillers, whiteners and dimension stone. The 1985 survey involved extensive sampling of white, high-purity marble prospects in western Newfoundland, to determine their potential value in the filler industry. In order to meet the requirements of a superior-grade filler, marble must have a high-calcium content and possess a minimum of acid-insoluble components such as quartz and other hard abrasive minerals. High brightness, in the order of 94 to 96 percent light reflectance (compared to a pure ASTM standard), is essential for premium grades (Guillet and Kriens, 1984).

All of the samples collected in 1985 were chemically analyzed, and selected samples were tested for whiteness and brightness. By matching dry brightness with chemical composition, targets for the 1986 follow-up program were selected. Several promising prospects were identified, the purest and whitest of which are located in the Canada Bay—Roddickton area of the Great Northern Peninsula (Figure 1). There, deposits of marble are found along strongly deformed zones within parautochthonous St. George Group carbonate rocks, which underlie the Hare Bay allochthon (Figure 2). One of these prospects (the Penny's Pond deposit) was selected for follow-up work consisting of diamond drilling and detailed mapping. During the course of the 1986 work, other deposits

of white marble were discovered in the region. These were also mapped in detail and subsequently drilled.

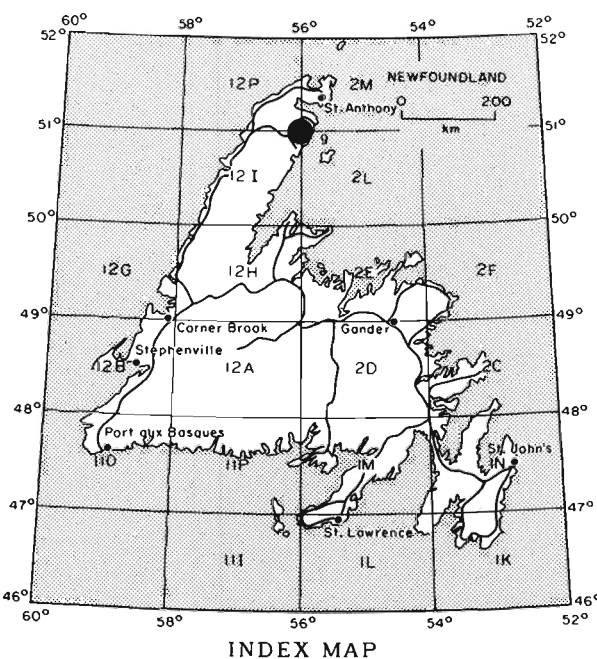


Figure 1. *Location of marble-assessment area—1986.*

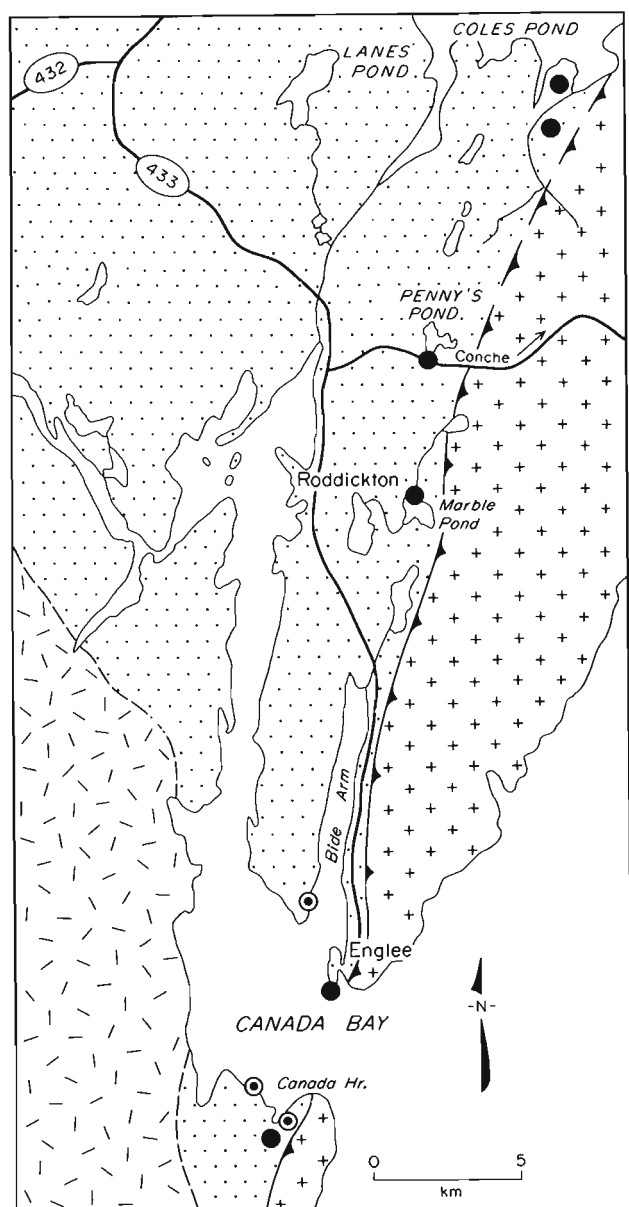


Figure 2. Generalized map of the Canada Bay–Roddickton area showing main geological elements and the location of marble deposits.

Drill core from the 1986 project was sent to the Department of Mines and Energy geochemical laboratory for chemical analyses. Representative samples will be tested for whiteness and brightness. Comprehensive reports

incorporating the results of the 1986 study will be published at a later date. The following account describes the work carried out in 1986, and includes brief descriptions of the Penny's Pond deposit and the new prospects near Coles Pond.

PENNY'S POND DEPOSIT

Previous Work

The Penny's Pond marble deposit is exposed immediately north and south of Conche Highway (Route 433), about 3.5 km east of its junction with the main Roddickton–Englee highway (Route 432). The deposit was briefly mentioned by Besaw (1972), whose report contains a chemical analysis of a single sample collected from the deposit. Knight (1984) drew attention to marble in the Roddickton area, and also collected samples from the deposit to make some preliminary tests of its quality.

In 1985, the deposit was investigated to evaluate its potential as a source of mineral fillers (Howse, 1986). Nine chip samples that were collected across the zone were chemically analyzed. Duplicate samples were also tested for dry brightness and whiteness qualities. The results (Table 1) were excellent, and coupled with the high-CaO, low-impurity content, led to the continued assessment of the deposit.

Table 1. Chemical analyses of chip samples from the Penny's Pond marble deposits, including results of whiteness and brightness tests

Sample No.	CaO	Al ₂ O ₃	MgO	SiO ₂	DB*	W†
5945973	55.3	.08	.23	.74	95.7	96.5
5945975	55.5	.19	.29	1.00	96.3	97.3
5945976	55.3	.17	.27	.86	96.6	95.9
5945977	55.7	.10	.27	.80	95.1	95.5
5945979	55.2	.21	.27	.96	96.6	97.7
5945981	55.0	.14	.22	.85	96.6	97.7
5945967	55.6	.05	.19	.31	96.2	96.8
5945968	54.5	.15	.22	.60	95.3	96.2
5945971	53.8	.17	.26	.63	95.5	96.2
Average	55.1	.14	.25	.75	96.0	96.6

Note: Tests for brightness and whiteness by I.M.D. Laboratories Ltd. (1986)

* dry brightness index

† whiteness index

1986 Assessment Program

The Penny's Pond prospect was drilled to test the continuity, quality, and dimension of the deposit. A control grid consisting of a cut baseline with crosslines at 40-m intervals was established over the deposit (Figure 3). The lines were surveyed and levelled using a transit, and all outcrops were accurately located and plotted at 1:500 scale. The drilling consisted of 11 AQ holes totalling 718 m spaced at 40-m intervals along the strike (approximately 180°) of the zone. The holes were inclined at 45° and drilled in a westerly

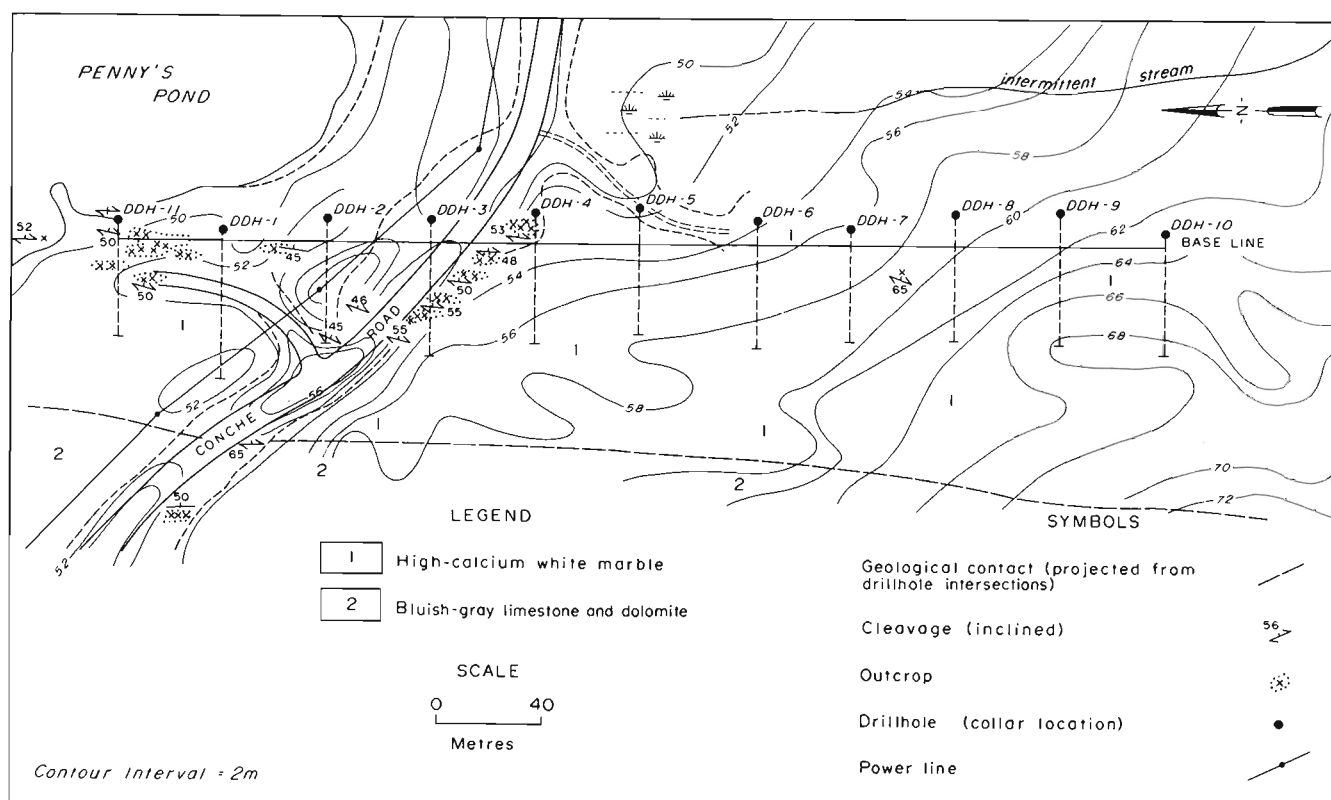


Figure 3. Plan of Penny's Pond marble deposit showing geology, relief and location of drillholes.

direction. Overburden thickness averaged less than 2 m and core recovery was generally excellent.

Description of the Deposit

The marble has a fairly strong north-trending, moderately east-dipping cleavage in outcrop. In the drill core, however, the cleavage is not as apparent, and massive, relatively unfractured sections are common. The marble is extremely fine grained and breaks with a conchoidal fracture, commonly producing a white powder in the process. Although classed as a white marble, its color varies from ivory to pure white, and some sections have a distinctly blue cast. The main contaminant is chlorite, which occurs as thin films along fractures and in bands of carbonate schist several centimetres thick. Other impurities include very minor amounts of sericite along some fractures, and rare quartz. Although thin streaks and patches of these minerals, particularly chlorite, appear through much of the white marble, there are bands of pure white stone up to 5 m thick containing little or no contaminants and no apparent fractures.

The drilling program traced the marble zone southward from the south shore of Penny's Pond for over 450 m. However, the marble extends southward beyond the limit of the drilling, apparently extending underneath a small shallow pond located at the southern extremity of the grid. The bottom of this pond is covered with a grayish-white marl-like sediment containing a high-calcium content, presumably derived from the underlying marble.

The width of the white marble zone, as defined by the drilling, averages at least 58 m. The footwall is a mottled grayish-blue limestone unit, which was intersected in all but the two southernmost drillholes. The hanging wall contact with the overlying blue marble unit is not clearly defined because of a lack of bedrock exposure. As all holes were collared in the white marble unit, its average width must be considered a minimum thickness.

COLES POND DEPOSITS

New deposits of high-purity white marble were discovered northeast of Penny's Pond in 1986. These deposits are exposed along woods roads just south of Coles Pond, about 8 km north of the Conche highway. The white marble overlies dolomitic marble and limestone in a northeast-trending asymmetric syncline, which has a steeply dipping east limb and a more gently dipping west limb. The structure is cut by a fault, which parallels the fold axis. Coarsely crystalline white calcite occurs along a southern part of the axis (Figure 4).

Three areas were tested by diamond drilling. Eight holes, totalling 354 m, were drilled on the western limb of the structure. One hole tested a section of the east limb, and a 47-m hole tested the calcite occurrence. In the following brief descriptions, these prospects are informally referred to as the Coles Pond north and south deposits, and the calcite deposit.

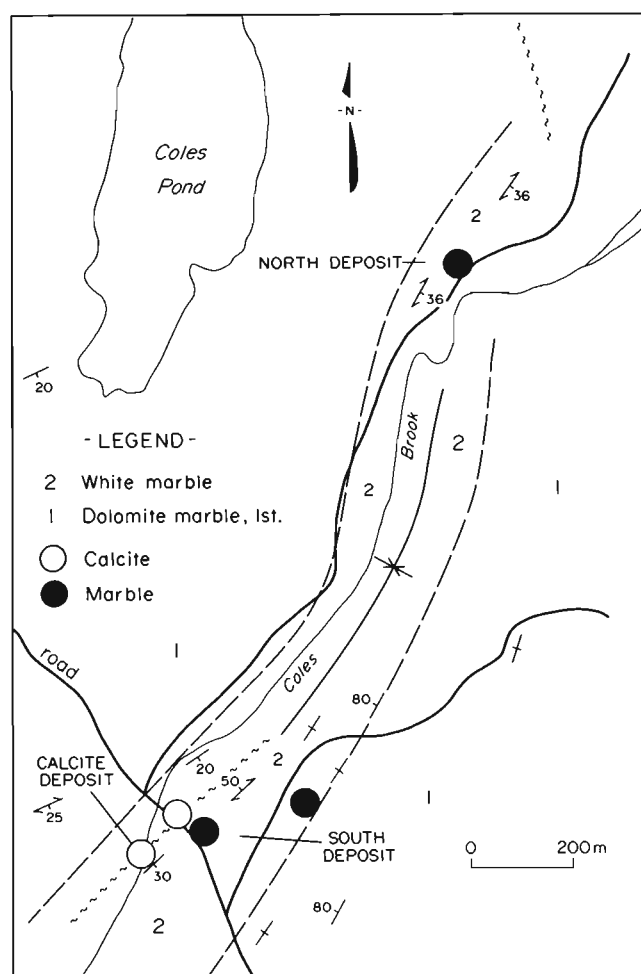


Figure 4. Geological sketch map showing the location of exposed white marble and calcite south of Coles Pond.

Coles Pond (north) deposit

This deposit, sporadically exposed along a northeast-trending ridge, consists of gently southeast dipping, cleaved, ivory, white and blue marble. Like the Penny's Pond prospect, it is extremely fine grained and breaks easily, producing a white powder.

Eight holes of 45 m average depth and inclined at 60° were spaced at 40-m intervals along the base of the ridge and drilled in a northwesterly direction normal to the trend of the zone (Figure 5). The results confirmed the predominantly white marble composition of the ridge, but drill core also showed significant sections of interbanded, mottled and cloudy, grayish-blue limestone and marble. In the two holes drilled at the northeast end of the ridge, this type of rock is predominant.

Like the Penny's Pond prospect, the Coles Pond (north) deposit contains thin bands of chlorite along cleavage planes. Very rare quartz in a calcite matrix was also noted. The presence of chlorite gives a cloudy or mottled appearance to some sections of white marble.

This deposit represents a potentially significant reserve of high-purity white marble that because of its topographic relief is particularly amenable to quarrying. Preliminary results of chip samples from outcrops are promising, although quantity and grades of material await physical and chemical tests of the drill core.

Coles Pond (south) deposit

White marble is exposed on the east side of Coles Brook in an area that has been stripped of overburden by road construction. Bedding features are not evident in the marble, but the presence of thin dolomite beds in the section indicate a near vertical dip.

The marble was tested by a single drillhole, which was inclined at 45° and drilled in a southeast direction. The drillhole intersected high-purity white marble interbanded with chlorite-carbonate schist. The schist bands range up to 2 m wide and are widely separated. Also present are impure sections of white marble that contain thin bands of chlorite up to 1 cm wide. The cumulative total intersections of pure white marble is 17 m.

Approximately 300 m to the southwest of the drillhole location, the apparent extension of this zone of white marble is exposed on both sides of a woods road. It also outcrops about 150 m north of the hole, at the site of an abandoned sawmill, thus indicating a strike length of at least 450 m. This particular area needs additional work to determine the full dimensions and quality of the marble deposit.

Calcite deposit

A deposit of coarsely crystalline, white calcite is exposed in Coles Brook (Figure 4). The calcite is also exposed about 100 m along strike to the north, along a woods road. The occurrences in the brook consist of coarsely crystalline calcite aggregates, which form cliffs along the brook's southeast bank. Calcite crystals up to 7 cm wide form rhombohedral profiles on the surface of the outcrop. Calcite also occurs in narrow vein-like structures in the bed of the brook. The road occurrences consist of small flat outcrops of coarsely crystalline calcite on both sides of the road.

The deposit was tested by a drillhole collared on the southwest side of the road, and inclined steeply (70°) westward. Core recovery was poor, particularly in the upper sections. The top 5.4 m of core consist of coarsely crystalline calcite; from 5.4 m to 8.4 m, the core was ground up and lost. The recovered upper 5.4 m of core consist of crystal aggregates of calcite. These are generally white, but are locally stained light green and blue. High-calcium marble containing several impure zones of multi-colored chlorite-carbonate schist was intersected from 8.4 m to 16.9 m. White marble in which a bluish-gray tint increases downward was encountered from 16.9 to 28.2 m. The drillhole ended at 41 m in interbanded bluish-gray limestone and marble and light-gray marble.

The calcite deposit is a unique but significant occurrence that has been tested in only a very cursory manner. More work is required to determine the nature and dimension of the deposit.

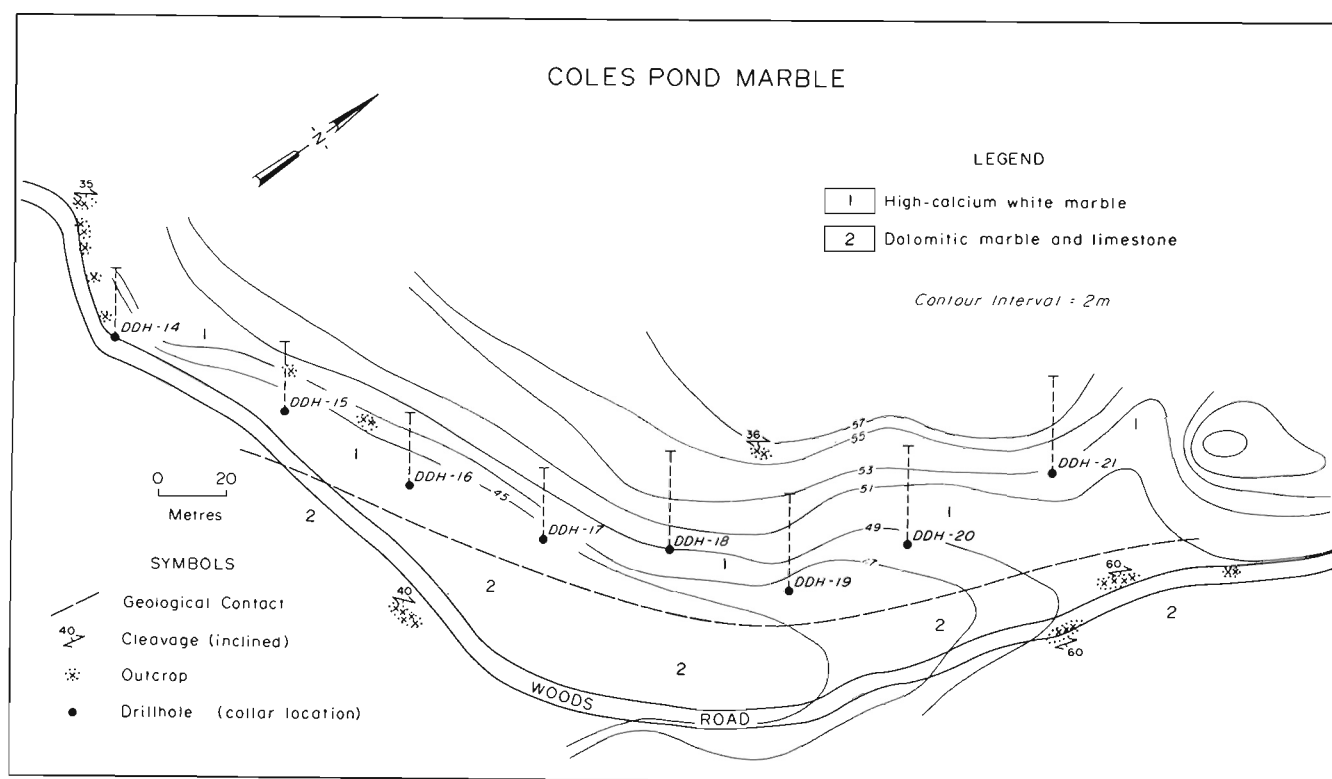


Figure 5. Plan of Coles Pond marble (north deposit) showing geology, relief and location of drillholes.

SUMMARY

Significant deposits of high-purity white marble, with potential for use as mineral filler, have been identified near Roddickton. The marble deposits occur along a belt extending from Canada Harbour for 35 km northward to Coles Pond. Other deposits are likely to exist along this zone. Further tests of drill core will determine whether or not the deposits can be considered for sources of filler-grade stone of a quality requiring minimum processing.

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