

# TALC AND SILICA INVESTIGATIONS IN THE NORTHERN BAIE VERTE PENINSULA AND WHITES RIVER AREA

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Mineral Deposits Section

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## ABSTRACT

*Talc-carbonate occurrences associated with altered ultramafic rocks were investigated in two areas of the Baie Verte Peninsula. The most promising deposit, located at Deer Cove on the Point Rousse Peninsula, was identified by Noranda Exploration Limited in the mid-1980s during a gold exploration program. The talc is part of a talc-carbonate unit in a fault zone separating blocks of a dismembered ophiolite sequence (Point Rousse Complex).*

*A zone of talc-carbonate rocks associated with altered ultramafic rocks of the Betts Cove Complex was investigated northwest of Snooks Arm. Three specific sites were sampled to determine whether talc of acceptable amounts and quality can be recovered; the results will determine whether follow-up work is warranted.*

*A large quartzite unit located north of Deer Lake, in the southeastern Long Range inlier, was mapped and sampled as a potential source of industrial silica. Analyses of 23 chip samples averaged 97.0 percent silica, and also contained low levels of impurities, such as aluminum and iron. The deposit, which potentially contains large reserves, could be suitable for a range of products such as ferrosilicon, flux silica, and certain grades of glass.*

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## INTRODUCTION

The 1998 talc project was initiated to assess talc occurrences on the Baie Verte Peninsula (Figure 1). Although known and documented, recent work related to gold and base-metal exploration by mining companies has added additional information on these occurrences. Of particular significance, is the deposit at Deer Cove where processing tests have shown that a gold-quality talc product of high brightness could potentially be recovered. Also in the Red Cliff Pond region, near Snooks Arm, talc associated with altered ultramafic rocks may be more extensively distributed than previously realized.

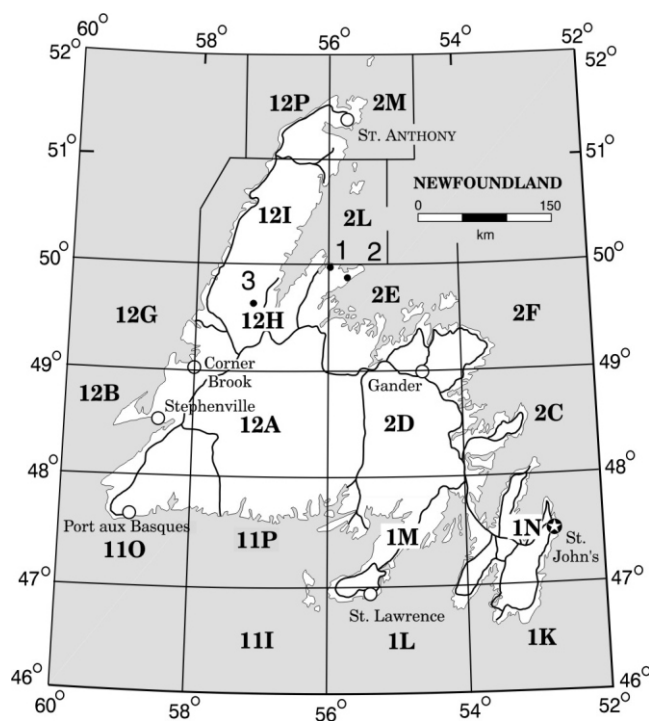
Talc, in its pure form has the formula  $\text{Mg}_3\text{Si}_4\text{O}_{10}(\text{OH})_2$  and is composed of 64.46%  $\text{SiO}_2$ , 31.89%  $\text{MgO}$  and 4.75%  $\text{H}_2\text{O}$ . However, commercial grades of talc rarely approach this theoretical purity. It has a Mohs hardness of 1, is platy, and naturally hydrophobic. As an industrial mineral it is a very versatile commodity having a myriad of industrial applications. It is particularly useful in the paper industry, where it is used to control the build-up of pitch, as a filler, and in coating formulations. Talc also serves many smaller markets, including highly specialized niches such as cos-

metic and pharmaceutical applications, and markets for low-grade material such as roofing granules and sealants. It also serves as an additive in soaps, lubricants, and pigments, and is used to make talcum powder. The four principal markets for talc, accounting for around 80 percent of the market, are paper, paint, ceramics, and plastics. The paper industry is the single largest consumer of talc, generally using a 300 mesh material having a range of brightness varying between 80 to 96 percent. According to Sims (1997), markets expanded steadily in the 1990s, as new applications and cultivating niches within existing ones were found, and this trend is likely to continue into the future. Global annual production of talc is about 7 million tonnes.

The southeastern part of the Long Range Precambrian inlier has attracted attention as a potential source of industrial minerals and building stone. Commodities of interest include a variety of rock types including marble (for dimension stone and mineral filler), granite, granitic gneiss, and gabbro. Less well-known is this region's potential for hosting industrial-grade silica. The present project includes a brief reconnaissance assessment of a silica deposit located near Whites River about 20 km northwest of Cormack.

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**Figure 1.** Study areas, 1998. (1) Point Rouse Peninsula (2) Red Cliff Pond area (3) Whites River area.

## DEER COVE TALC DEPOSIT

### LOCATION AND ACCESS

The deposit is located on the Point Rouse Peninsula, 14 km northeast of the town of Baie Verte. Access to the area from the Trans-Canada Highway is via Routes 410 (Dorset Trail), 414 (La Scie Highway) and 418 (Ming's Bight access road). A 7-km all-season gravel road, which exits Route 418 near the community of Ming's Bight, leads northward to the property. The area can also be reached by boat from several nearby communities although landings can be difficult in less than ideal weather conditions because of the exposed nature of the peninsula.

### GEOLOGICAL SETTING

The Deer Cove talc deposit occurs within altered ultramafic rocks of the Cambro-Ordovician Point Rouse Complex (Figure 2). The complex comprises a dismembered ophiolite sequence conformably overlain by mafic pillow lavas and volcanogenic sediments (Norman and Strong, 1975). These fault-bound ophiolite remnants form part of a steep, south-southwest-trending structural zone of discontinuous ophiolite occurrences (Baie Verte Brampton Line) that defines the boundary between Dunnage Zone oceanic rocks to the east, and ancient continental margin gneisses and schists of the Humber Zone to the west (Williams *et al.*,

1988). The fault zones separating blocks are marked by either serpentinized peridotite or talc-carbonate rock. The talc-carbonate deposit at Deer Cove occurs along the trace of the main thrust separating the Deer Cove block from adjoining ophiolite blocks to the south and east.

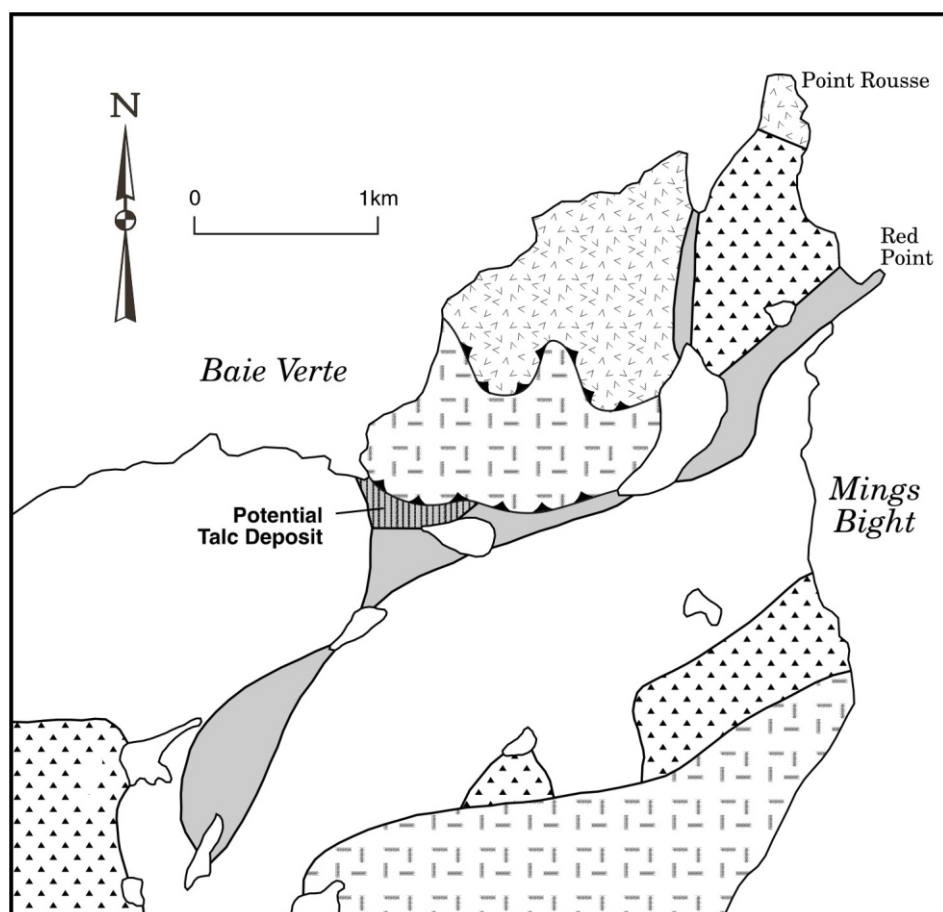
### PREVIOUS WORK

Evidence of the first industrial interest in talc and soapstone on the Baie Verte Peninsula is prominently displayed in soapstone cliffs at Fleur de Lys, where, prehistoric people quarried the stone to make utensils such as oil lamps, thus initiating the first documented mining activity on the Baie Verte Peninsula. Talc associated with serpentine in the Fleur de Lys and Mings Bight areas was noted by early workers such as Fuller (1941) and Watson (1947). Watson mentioned talc-carbonate mineralization along Trimms Brook (now known as the Trimms Prospect) and also the zone between Deer Cove and Red Point on the Point Rouse Peninsula.





In more recent times, Norman and Strong (1975) studied and mapped ophiolite rocks of the Point Rouse Complex and provided a foundation for the intense gold exploration that was soon to follow in that region. Hibbard's (1983) comprehensive memoir on the geology of the Baie Verte Peninsula included a descriptive list of ophiolite-hosted industrial mineral deposits on the peninsula, including the talc.

Prior to Noranda's recognition of the commercial possibilities of Deer Cove talc in the mid 1980s, there was little industrial or economic interest in such occurrences. In 1980, Anglo American Clay Corporation staked a talc occurrence 1.6 km southwest of the community of Ming's Bight on Route 418. This occurrence (exposed by a rock cut) is adjacent to the well known Trimms Prospect talc showing on the east side of Trimms Brook. Anglo American Clay produced a 1:5000-scale map of the showing and collected a total of 15 chip samples (13 kg each) along the length of the zone. Mineralogical analyses for 13 of the samples indicated an averaged content of 44% talc, 38% magnesite, 4% dolomite and 14% chlorite. This included 2 samples from a chlorite zone, the exclusion of which would raise the talc content to 50 percent. Anglo American Clay recommended exploratory diamond drilling of the talc zone but there was no follow-up and their claims were dropped (Anglo-American Clays Corp., 1980).

Noranda Exploration Limited carried out preliminary processing studies involving fine grinding and flotation tests of both rock- and drill-core samples of the Deer Cove Talc deposit in the 1980s. The results of the tests concluded that a good-quality talc product (minimum 25 percent talc) could be recovered. The dry brightness of the product (averaging 92 percent) was also extremely good (IMD Laboratories, 1988).



## EARLY ORDOVICIAN OR OLDER Point Rouse Complex

-  Talc and talc carbonate alteration zones
-  Ultramafic rocks, gabbro and diorite
-  Sheeted diabase dykes
-  Pillow lava, mafic pyroclastic rocks, volcanogenic sedimentary rocks, diabase dykes, minor chert and marble

**Figure 2.** Geology of the peninsula between Baie Verte and Mings Bight showing location of talc prospect. Geology after Norman (1973).

### DESCRIPTION OF DEPOSIT

The talc at Deer Cove is part of a talc-carbonate rock unit that forms a discontinuous belt between Deer Cove and Red Point. East of Deer Cove Pond, the proportion of carbonate in the rock increases. Norman and Strong (1975) using X-ray diffraction methods determined that the carbonate component consists mainly of magnesite and minor

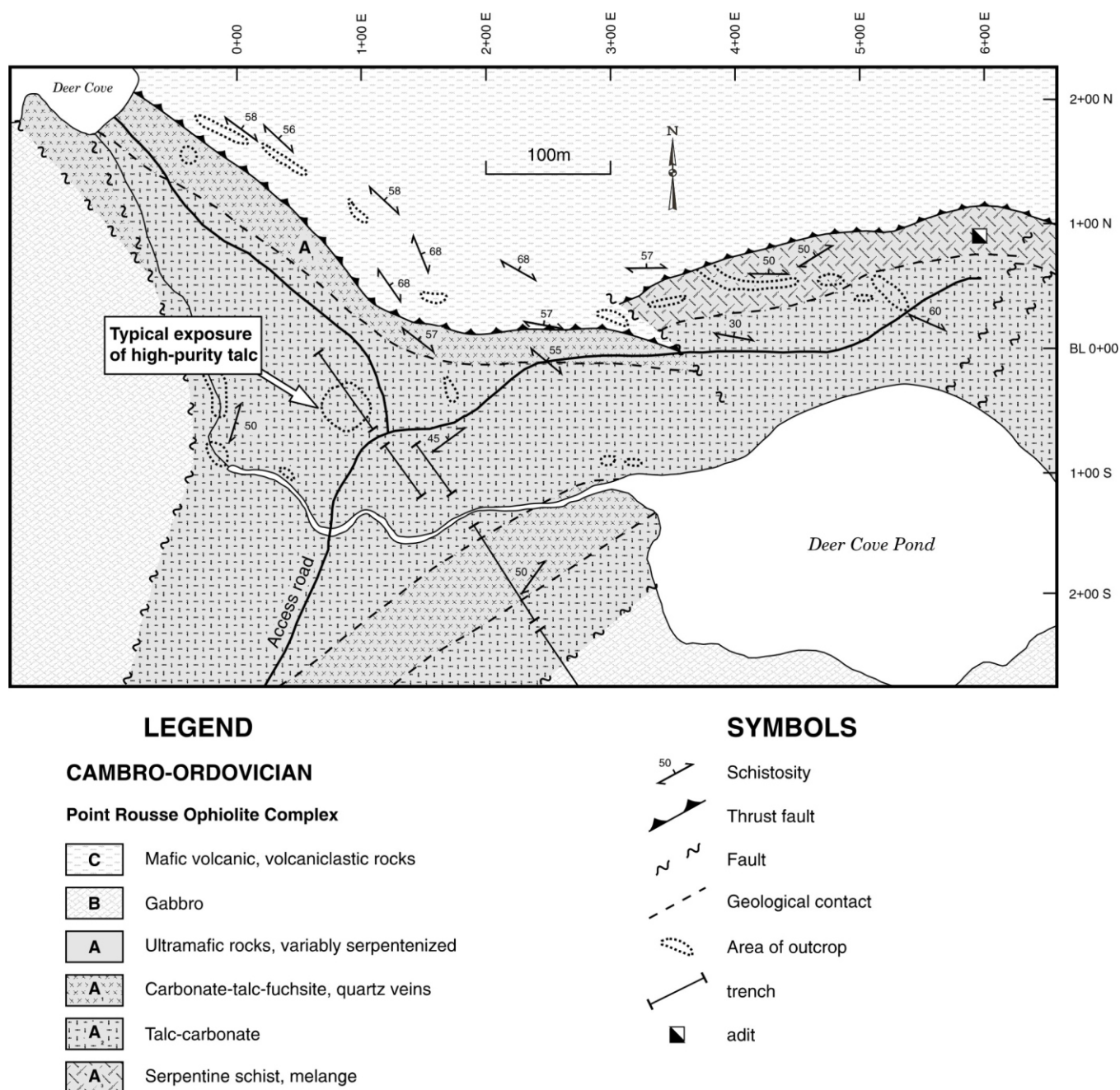
amounts of calcite and dolomite. Talc is generally more abundant in the highly sheared zones and is especially evident between Deer Cove and Deer Cove Pond, where it comprises a number of low rounded hills and weathered exposures (Figure 3). It also occurs along the adit access road and in the lower ground adjacent to the north shore of the pond (Plates 1 and 2).

On the weathered surface, the talc-carbonate rock varies from a pale brown due to the presence of magnesite to dark grey with the increasing talc content. Fresh surfaces of the talc-rich rocks may be greenish-white, whereas carbonate-rich portions are pale brown. In many places, the talc-rich zones exhibit a high degree of lubricity (commonly referred to in the industry as "slip"). This is caused by minute flakes of talc produced by weathering and shearing. This effect is particularly noticeable to drivers who attempt the slippery hill leading down to Deer Cove.

A penetrative cleavage of variable strike ( $090$  to  $120^\circ$ ), and moderate to steep northwesterly dip is exhibited in the talc-carbonate rock. The orientation follows the direction of the Deer Cove thrust fault, and is also probably influenced by local folding.

A typical exposure of high-purity talc is found on a small rounded hill at the juncture of the roads to Deer Cove and to the adit. It is 50 by 65 m and has a height of about 6 m and a thin (<1 m)

overburden cover. The weathered surface, best seen on the sides, is a mottled greenish brown having darker stains, whereas the fresh surface has a more pronounced green tint. A trench, running in a northwest direction across the hill and down its northwest slope into a bog, has exposed about 30 m of talc. A representative sample collected by Noranda and subjected to fine grinding and flotation tests by IMD Laboratories (1987) showed a talc content of 35.3 percent.



**Figure 3.** *Geology of the Deer Cove and Deer Pond area. Geology after Graves (1985).*

## POTENTIAL RESERVES AND TALC QUALITY

As a result of the present program and the work of Noranda, the presence of significant amounts of talc at Deer Cove are indicated, although there has been no program designed to delineate talc specifically. Noranda's main focus was a gold deposit consisting of auriferous quartz veins in volcanic rocks, sheeted dykes, and gabbro immediately above the thrust contact and talc carbonate zone (Figure 4). A tunnel was driven by Noranda northward along the gold zone for several hundred metres and this area was the site of

extensive core drilling. However, only the collars and surface projections of drillholes relevant to the present report are shown in Figure 4, along with the talc content for selected representative (10 m) sections of core for each hole. Similarly, the site locations and talc content of three talc samples taken from outcrops, are also shown.

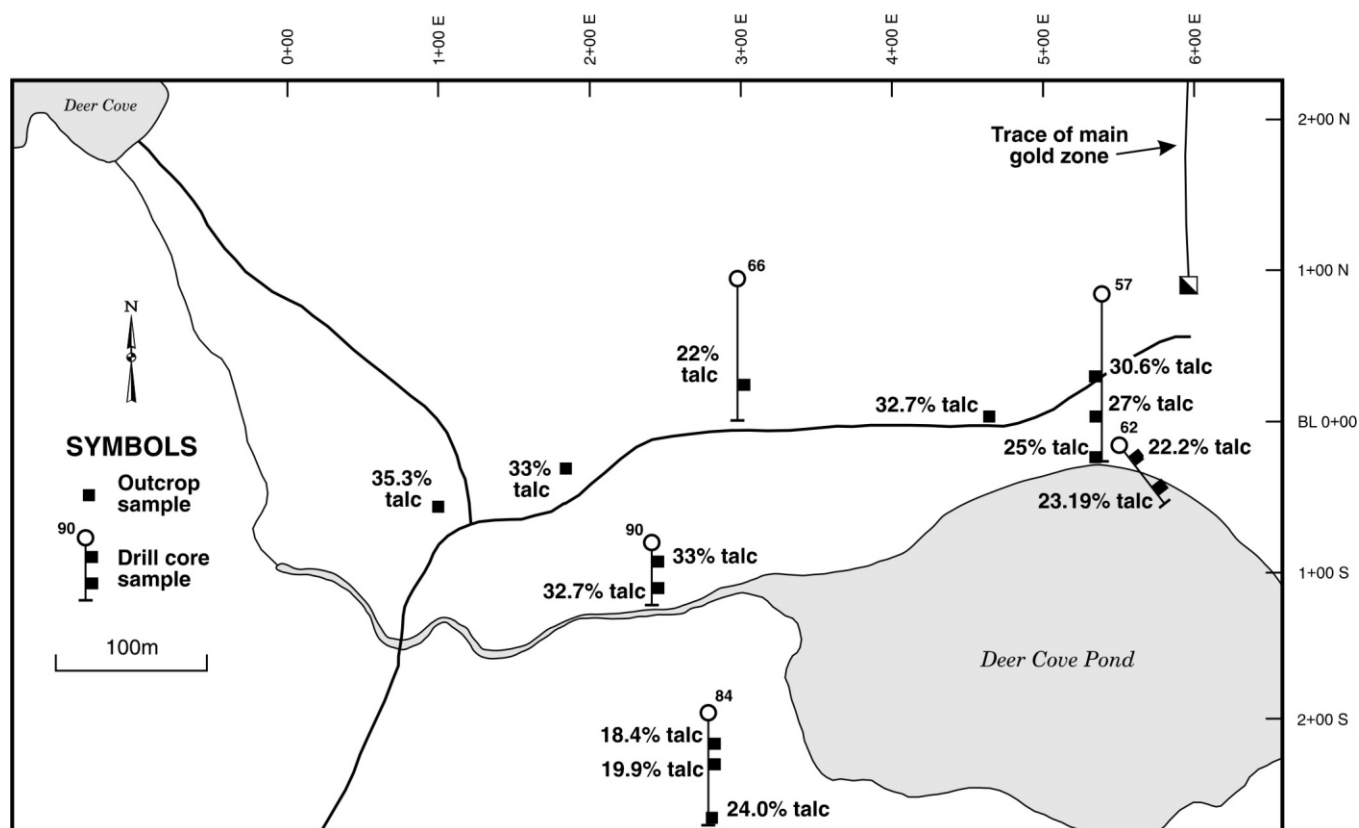
Work to date shows an area in excess of 56 000 m<sup>2</sup> underlain by talc-carbonate rock grading more than 30 per cent talc. Using a specific gravity of 2.7 g/cm<sup>3</sup> and assuming a conservatively shallow depth of 20 m, approximately 3



**Plate 1.** View west along talc-carbonate zone, towards Deer Cove.



**Plate 2.** Talc-carbonate deposit at Deer Cove.



**Figure 4.** Sample sites on the Deer Cove talc prospect showing talc content. Drill-core samples represent 10 m representative sections. Analyses by IMD Laboratories Limited (1987, 1988).

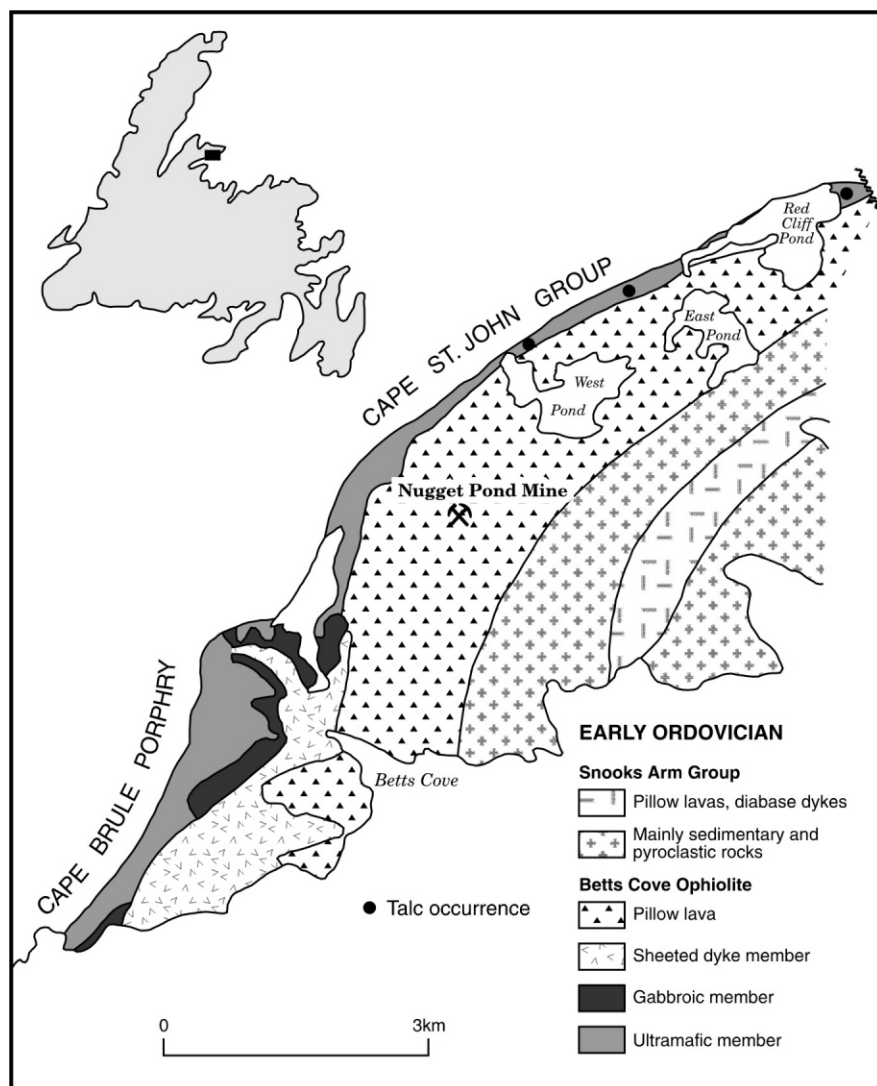
million tonnes are indicated. The next step would involve a drilling program designed to define more precisely, the size, quality, and mineralogy of the deposit.

Preliminary test work of fine grinding and flotation showed that a good-quality talc product could be recovered. Furthermore, the talc product has a very good dry-brightness index of 92 percent, an important factor in filler considerations.

## RED CLIFF POND TALC

A zone of talc-carbonate mineralization was investigated and sampled in three sites located along a southwesterly trending zone of talc-carbonate located about 1 km north-west of Snooks Arm (Figure 5). Detailed mapping and rock sampling by Inco Gold Limited, outlined the zone in altered ultramafic rocks of the Betts Cove Complex (Beischer, 1988). The talc-carbonate unit can be traced along strike for





**Figure 5.** Locations of talc and carbonate zones sampled between Red Cliff Pond and West Pond. Geology after Swinden et al. (1990).

several kilometres and is up to 300 m wide. The talc occurs as crystal masses and as green and white platy crystals on shear planes. It varies in content from minor amounts up to more than 20 percent. Impurities include magnesite, hematite, and quartz. The latter sometimes consists of barren, white veins, up to 30 cm wide. The soft, talc-rich rocks are easily identified in the field because of their distinctive dark rusty-brown-weathered surface and contrasting light grey to white streak, when scraped.

Field work in 1998 examined and sampled three specific sites. These sites are located at, 1) between Red Cliff Pond and the Snooks Arm Road, 2) northwest of East Pond (Plate 3), and 3) near West Pond (Figure 5). The samples will be subjected to preliminary processing studies to determine whether or not talc of acceptable amounts and quality can be recovered. The results will determine if follow-up work is warranted.

## WHITES RIVER SILICA DEPOSIT

### LOCATION AND ACCESS

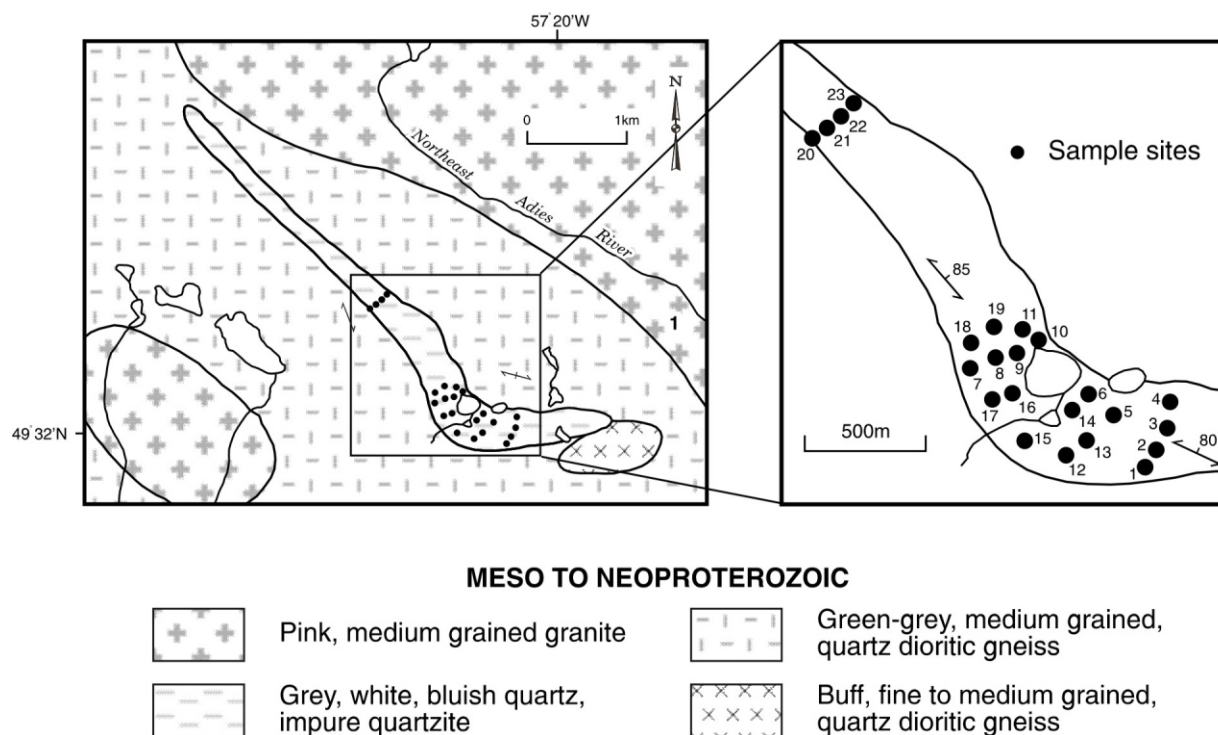
The Whites River silica deposit (informal name used for the purposes of this report), is located approximately 92 km north of Corner Brook (Figure 1). Logging activity in the Whites River and Upper Humber River regions have resulted in the construction of woods roads close to the property. A 20-km-woods access road from Cormack crosses Whites River to within 3 km of the deposit. Also, the main woods trunk road into the Upper Humber River region from the Sops Arm Highway is situated within 4 km of the deposit at its nearest point.

### GEOLOGICAL SETTING

The area of interest is located west of White Bay on the southeast side of the Long Range Precambrian inlier. The dominant rocks of the area consist of a basement gneiss complex, part of which is metasedimentary, intruded by gabbro, anorthosite and granitic rocks. The silica unit of this report, as mapped by Owen (1986), consists of massive banded quartz interlayered with gneiss and flanking the southwestern margin of a large body of granite (Figure 6) The same granite unit also outcrops just west of the quartz.



**Plate 3.** Sampling talc and carbonate zone, East Pond, west of Snooks Arm.



**Figure 6.** Whites River silica deposit showing numbered chip-sample locations. See Table 1 for sample analyses.

## DESCRIPTION

The deposit is 5 km in length and up to 300 m wide and is expressed topographically as a series of small hills atop a northwesterly trending ridge that attains an elevation of just over 600 m. The southeast part of the deposit is especially suited for potential quarry sites because of the lack of significant overburden, a favourable topography, and the presence of nearly continuous outcrop.

The quartzite unit, which has a steep but variable northeasterly dip, is grey and has a distinctive bluish tint, and is massive and coarse grained (Plate 4). Minor impurities consist of some hematite-stained fractures, and a very finely disseminated dark mineral, possibly magnetite. Rare thin slivers of mica are also present. During the sampling process, thin white bands (cm scale) of an unidentified mineral, possibly barite, were observed at one or two sites. Pyrite, associated with a minor fault zone, was noted at one sample site.

The southeast part of deposit is cut by a northwest-striking, subvertically dipping diabase dyke that is traceable across the width of the deposit (approximately 300 m at that location). This type of potential dilution was observed at one location only and probably could be easily avoided in a selective quarrying operation.



**Plate 4.** Massive, white quartzite, Whites River silica prospect.

## PRESENT WORK AND RESULTS

A total of 24 representative chip samples of the quartzite were collected. These were collected from 6 lines along the width of the vein at different intervals along its strike. An effort was made to obtain representative fresh samples at each sample site. Sample locations were plotted on air photographs in the field and all mineralogical and geological features were noted. Most of the work was concentrated along its southeast half, which is the widest and

**Table 1.** Geochemical analyses of samples from the Whites River silica deposit

Sample #	Field No.	SiO <sub>2</sub> %	Al <sub>2</sub> O <sub>3</sub> %	Fe <sub>2</sub> O <sub>3</sub> Total %	MgO %	CaO %	Na <sub>2</sub> O %	K <sub>2</sub> O %	TiO <sub>2</sub> %	MnO %	P <sub>2</sub> O <sub>5</sub> %	Cr ppm	Zr ppm	Ba ppm	L.O.I. %	Total %
1	5948879	97.54	1.16	0.37	<0.01	<0.01	0.02	0.42	0.063	<0.001	<0.01	<100	131	342	0.35	99.89
2	5948881	98.60	0.39	0.13	<0.01	<0.01	<0.01	0.05	0.037	<0.001	<0.01	<100	188	195	0.35	99.51
3	5948882	97.63	0.40	0.29	<0.01	<0.01	<0.01	0.04	0.067	<0.001	<0.01	<100	144	57	0.25	98.63
4	5948883	96.11	1.00	0.83	<0.01	<0.01	0.13	0.18	0.152	<0.001	<0.01	<100	276	127	0.35	97.73
5	5948884	97.61	0.44	0.05	<0.01	<0.01	<0.01	0.06	0.010	<0.001	<0.01	<100	78	44	0.23	98.36
6	5948885	95.82	1.68	0.41	<0.01	<0.01	0.02	0.18	0.098	<0.001	<0.01	<100	146	303	0.33	98.50
7	5948886	98.55	0.56	0.17	<0.01	<0.01	<0.01	0.09	0.028	<0.001	<0.01	<100	29	1883	0.35	99.70
8	5948887	97.57	0.40	0.09	<0.01	<0.01	<0.01	0.04	0.035	<0.001	<0.01	<100	126	3995	0.27	98.36
9	5948888	98.01	0.79	0.11	<0.01	<0.01	<0.01	0.13	0.018	<0.001	<0.01	<100	37	383	0.44	99.46
10	5948889	98.29	1.20	0.27	<0.01	<0.01	<0.01	0.21	0.058	<0.001	<0.01	<100	118	863	0.32	100.31
11	5948891	97.73	0.64	0.11	<0.01	<0.01	<0.01	0.08	0.045	<0.001	<0.01	<100	22	418	0.29	98.85
12	5948892	96.77	1.05	0.28	<0.01	<0.01	<0.05	0.40	0.061	<0.001	<0.01	<100	90	604	0.36	98.94
13	5948893	96.78	0.75	0.67	0.02	0.02	<0.01	0.12	0.154	<0.001	<0.01	<100	195	94	0.37	98.87
14	5948894	96.77	0.73	0.38	<0.01	<0.01	<0.01	0.17	0.072	<0.001	<0.01	<100	220	387	0.37	98.44
15	5948896	96.88	1.03	0.41	<0.01	<0.01	0.16	0.24	0.063	<0.001	<0.01	<100	90	289	0.27	99.02
16	5948897	95.63	0.98	0.73	<0.01	<0.01	<0.01	0.26	0.418	<0.001	<0.01	<10	1465	323	0.29	98.28
17	5948898	97.27	0.42	0.33	<0.01	<0.01	<0.01	0.03	0.082	<0.001	<0.01	<100	82	46	0.27	98.36
18	5948899	97.12	1.39	0.38	<0.01	<0.01	0.03	0.07	0.087	<0.001	<0.01	<100	129	247	0.40	99.45
19	5948901	95.98	1.62	0.57	<0.01	<0.01	<0.01	0.05	0.096	<0.001	<0.01	<100	87	122	0.33	98.60
20	5948902	96.82	1.02	0.47	<0.01	<0.01	0.03	0.12	0.063	<0.001	<0.01	<100	85	234	0.39	98.89
21	5948903	95.73	1.41	0.40	<0.01	<0.01	<0.01	0.08	0.078	<0.001	<0.01	<100	153	90	0.49	98.15
22	5948904	96.57	0.98	0.08	<0.01	<0.01	<0.01	0.10	0.015	<0.001	<0.01	<100	93	32	0.50	98.20
23	5948905	96.32	1.33	0.35	<0.01	<0.01	<0.01	0.21	0.040	<0.001	<0.01	<100	67	235	0.50	98.70
Average		97.04	0.92	0.34	<0.01	<0.01	0.02	0.15	0.080	<0.01	0.01	<100	176	491	0.35	98.79

NOTE: Sample # keyed to sample location # in Figure 6.

possibly most significant in terms of potential industrial uses.

The assay results from the chip samples are shown in Table 1. Having a SiO<sub>2</sub> content averaging over 97 percent and relatively low aluminum and iron, they indicate a significant industrial silica resource having potential uses in ferrosilicon production, and metallurgical (flux) applications, and possibly lower grades of glass. Although lower in quality than the high-purity silica deposits at Labrador City, the silica is comparable in grade to the La Scie deposit and some of the higher grade quartzite deposits of the Random Formation in eastern Newfoundland.

## SUMMARY

Talc mineralization associated with altered ultramafic rocks on the Baie Verte Peninsula was investigated in 1998. The most promising deposit is located on tidewater at Deer Cove on the Point Rousse Peninsula near Ming's Bight. Data presently available suggest a talc-carbonate zone averaging more than 30 percent talc underlies the Deer Cove-Deer

Cove Pond area. Furthermore, processing tests carried out by Noranda Exploration Limited showed that a good-quality talc product having a high brightness index (92 percent) could be recovered. This is an important feature when considering industrial filler applications in paper and other products. The deposit needs more precise definition of its size and quality, work which will necessarily require a detailed core-drilling program.

In the Snooks Arm area, a talc-carbonate unit was traced between Red Cliff Pond and West Pond, a distance of 7 km. Three talc-rich zones were sampled to determine whether talc of acceptable grade and quality can be recovered. Follow-up studies will depend on the results of this initial work.

The Whites River silica deposit, located in the Long Range Precambrian inlier, was also mapped and sampled. The deposit is significant because of its potential large reserves, favourable topography for quarrying, and apparent good quality silica. Woods roads within 3 km of the deposit lead to both the Sops Arm Highway and to Cormack.



## ACKNOWLEDGMENTS

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*Note: Geological Survey file numbers are included in square brackets.*