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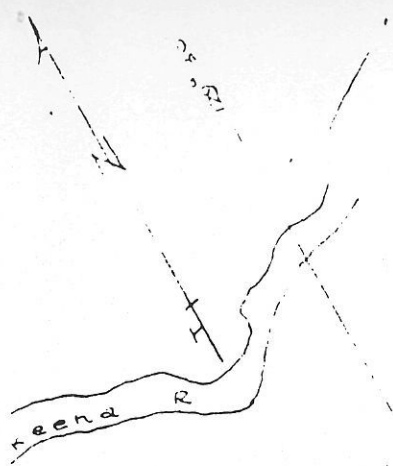
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REPORT
ON
THE CAMPANIA ISLAND SILICA DEPOSITS
BRITISH COLUMBIA
FOR
THE CANADIAN WESTERN SYNDICATE

By

Alfred R. Allen, P.Eng.

April, 1963



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THE CAMPANIA ISLAND SILICA DEPOSITS

CAMPANIA ISLAND

B. C.

INTRODUCTION

The silica deposits on Campania Island were examined by Mr. E.J. Stephen and the writer April 2 to 6 inclusive. 1963.

The purpose of the examination was to map and sample the deposits of quartz and silica sand, and to acquire available data pertaining to local mining and transportation problems.

In his report dated April 11, Mr. Stephen included the itinerary of the trip, field methods used, brief description of the deposits, road and barge-loading problems, and summary and conclusions regarding the feasibility of acquiring and shipping suitable quartz from Campania Island. The writer herewith reports on the geology, quantity and grade possibilities, and additional diamond drilling which will be necessary to supply the data required for specific grade and tonnage calculations.

LOCATION AND ACCESSIBILITY

Campania Island is located on the British Columbia coast, 400 miles north of Vancouver and 100 miles south of Prince Rupert. The island is approximately 4 miles wide and 15 miles long. Queen Charlotte Islands are located across Hecate Strait 100 miles to the west. West longitude $129^{\circ} - 20'$ and north latitude $53^{\circ} - 00'$ pass through Campania Island. Access to the island is by boat or aircraft.

A plan map of the area, C-1, is included with this report.

HISTORY

One mineral claim is held by location by Falconbridge Nickel Mines Ltd. to cover the quartz showings. Assessment work has been recorded and the claim is in good standing until June 1963. The quartz deposits have been mapped. One small open cut has been excavated near the north end of the large outcrop and a 30-foot hole diamond drilled vertically at the same location. It is stated that the Campania deposit is the only high grade quartz known to the exploration department of Falconbridge Nickel Mines Ltd.

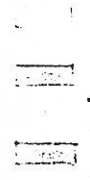
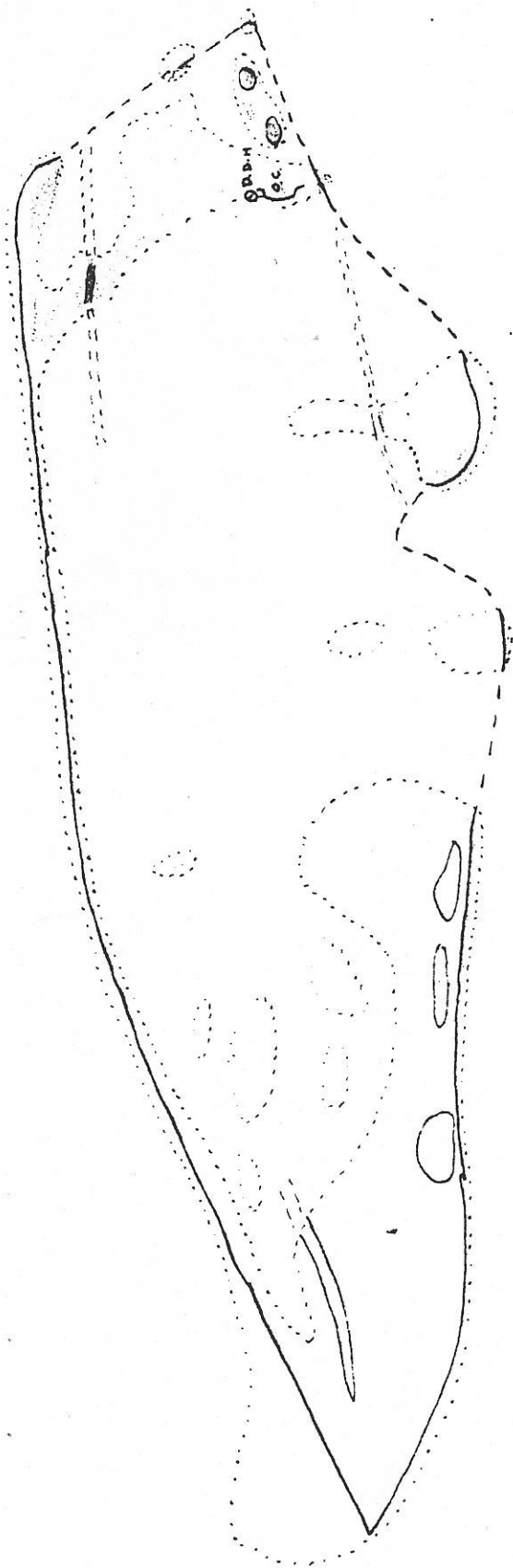
DESCRIPTIONS OF SILICA DEPOSITS

Campania Island is made up of Coast Range granite.

One major and two minor showings of white quartz occur about one-half mile from the west coast, 6 miles from the south end of the island. An unnamed westerly-flowing creek makes a "hairpin" bend to the south at the location of the quartz.

The major outcropping of quartz is dome-shaped. The long axis strikes 10 degrees west of north. The outcrop is 340 feet long and up to 100 feet wide. At the highest point it is 55 feet above the lowest exposure at the north end. About half of it is covered with a thin layer of overburden. It is best exposed on the north end and southeast half, although practically all of the west contact, and 60% of the east contact is exposed. Both walls appear to dip from 70 to 90 degrees. At the north and south ends it narrows to a point and dips fairly steeply under overburden.

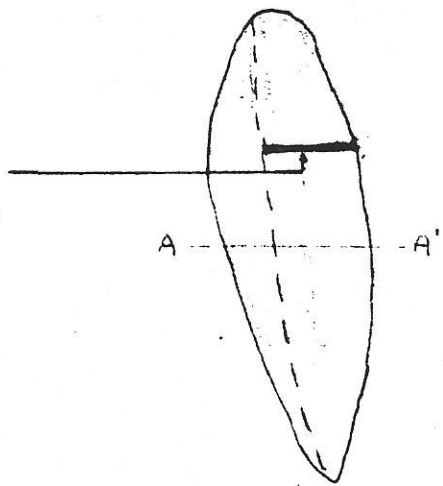
The quartz is white and translucent to opaque. No apparent variation was observed throughout the exposed part of the deposit. Numerous fracture and strain lines, in almost all directions, are evident in the



Arthur Allen



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Robert A. Allen

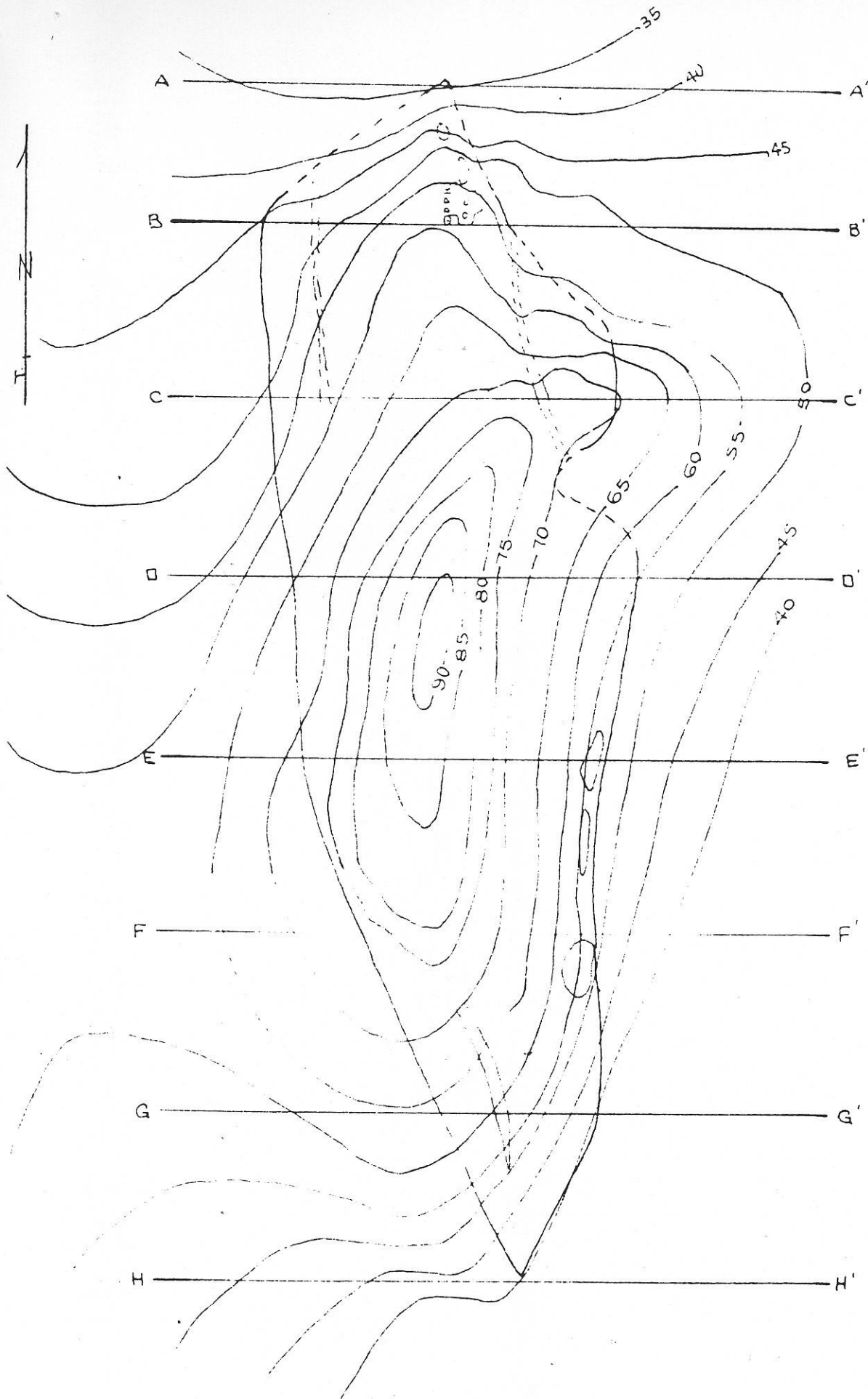
quartz. It appears to shatter easily. Only minor impurities were observed, these being a small area in which there are scattered flakes of white to greenish colored mica, and one very small flake of pyrite.

Inclusion of normal granite occurs throughout the quartz. These appeared to be most numerous near the southeast side and the north end. It is estimated that they would amount to less than 5% of the quartz body by weight.

At the contact, particularly near the north end, the granite has been altered and in place is a greenish-grey rock with the feldspars partially kaolinized, and considerable white mica present. This rock is softer than the fresh granite and might tend to spall off when left exposed on the wall of a quarry or stope.

Two hundred and twenty feet to the west of the major quartz outcrop there are several small irregular bodies of quartz exposed on a small ridge, but they are too small to be of any consequence.

Across the unnamed creek about 500 feet to the east, there are three exposures of quartz lying in a north-south line. The two northerly ones contain large fragments of granite, and disseminated feldspathic mineralization throughout, making them obviously sub-



W. A. Allan

grade quartz deposits. The south showing is 100 feet long, up to 30 feet wide, and domed to 10 feet above the muskeg and overburden. The west 10 feet of this outcrop is composed of a mixture of quartz and granite. The east 20 feet appears to be quartz similar to that of the main showing. This deposit appears to be of minor importance by virtue of the limited quantity and doubtful grade of much of the exposed material.

On the east shorelines of two lakes lying 1-1/2 and 2-1/2 miles to the east of the quartz deposit there are deposits of beach sand. The top one to 24 inches of this sand is light brown in color and is composed largely of feldspars quartz and mica. Below the top layer is a dark brown colored sand containing feldspars, quartz and mica along with considerable fine clayey material. Because of flooding in the test holes which were excavated the brown stratum was not exposed for more than 2 feet of thickness, hence it is possible there may be clean sand between this material and bedrock. On the east shore of the most westerly lake the sandy beach is estimated to be 1000 feet long. The exposed sand and that clearly visible under water is not more than 200 feet wide. On the east shoreline of the east lake there are two beaches separated by a large rock outcrop. The south beach has a sand deposit 120 feet long and about 50 feet

wide including that portion extending into the lake. The north beach has a sand deposit 100 feet long and 30 to 50 feet wide. Elsewhere on each lakeshore there is little or no sand. At the east end of each lake there is a narrow ridge of muskeg-covered bank which could be a sand dune. Between the lakes, and westerly across the island past the quartz deposits there are scattered areas of muskeg separated by granite hummocks and low ridges. Nowhere does it appear that the granite bedrock is likely to be covered by more than a thin layer of overburden and muskeg. It is doubtful, therefore, that there is a deposit of quartz sand of any sizeable tonnage at or near the quartz showings on Campania Island.

SAMPLING AND ASSAYS

The large outcrop of quartz, designated as deposit "A", was sampled at two locations, namely:

1. A chip sample across the deposit about 40 feet from the north end and through the small open cut and diamond drill hole collar. Three 20-foot samples and one 16-foot sample were taken by hammer and moil.
2. Sixty feet from the south end a 70-foot chip sample was broken up into three 20-foot samples and one 10-foot sample. Assay results, listed below, average 98.84% silica which is below the average of the 30-foot

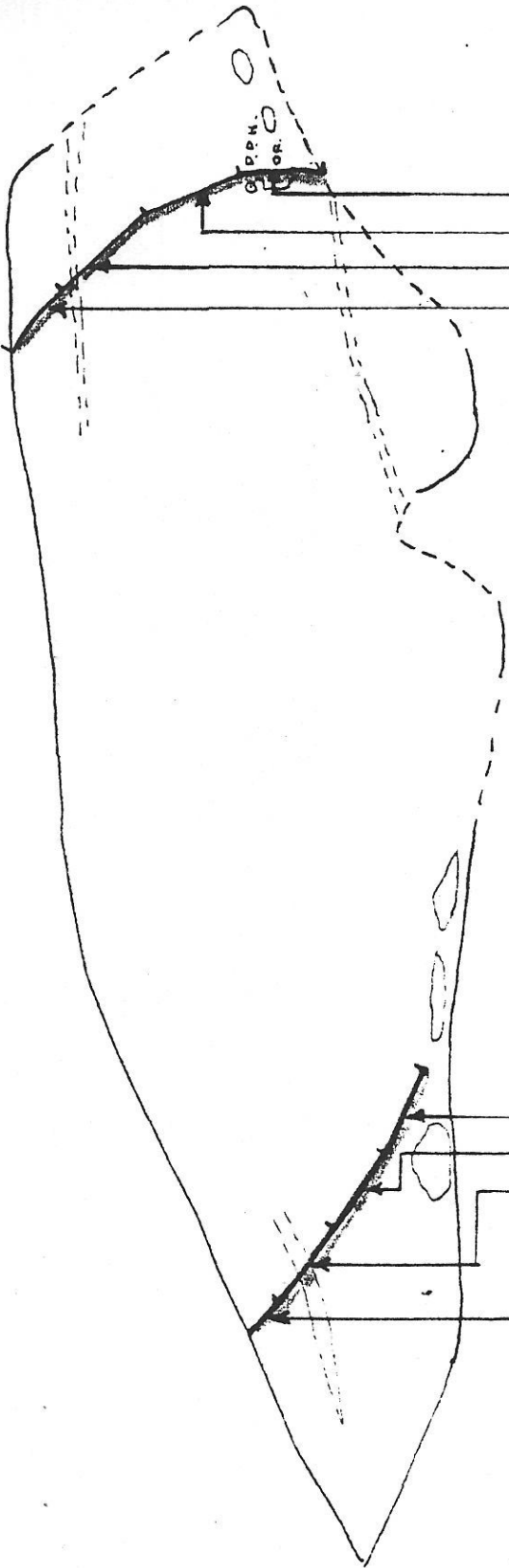
sample from the diamond drill hole. There is no apparent reason for this, unless the surface samples were contaminated by a small amount of soil and plant material.

The small showing to the east of the main outcrop, designated as deposit "B" was sampled by one chip sample 30 feet from the north end across the white quartz-part of the deposit. This sample is also slightly lower than the average of the diamond drill core samples from A.

Sample plans with assay results on deposits A and B are included with this report, map numbers, C-5 and C-6.

The assay results are as follows:-

Sample Number	Location	Width Feet	SiO ₂ %
15174	A deposit, N. end, to east contact	20	98.06
15175	" " " " west of 15174	20	99.28
15176	" " " " " " 15175	20	98.94
15177	" " " " to west contact	16	99.18
15178	" " S. end, to near east contact	20	99.48
15179	" " " " west of 15178	20	97.72
15180	" " " " " " 15179	20	99.32
15181	" " " " to west contact	10	98.78
15182	B " 30 feet from N. end, East 20'	20	99.18



3-10-72 2-10-72 6
2-10-72 2-10-72 110

11.74	30	98.09
11.72	30	99.28
11.75	30	98.94
11.72	30	99.18

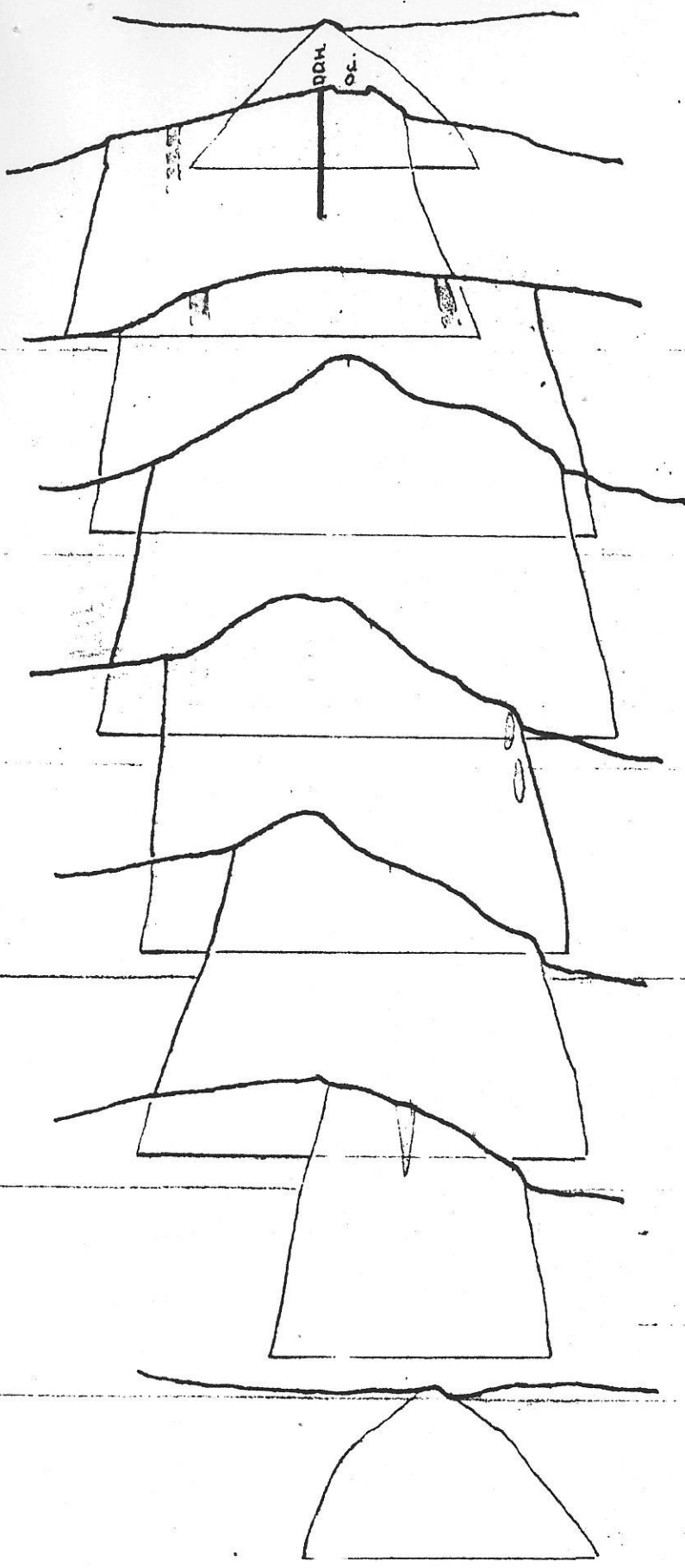
27.13
27.72
27.21
28.73

Arthur R. Allen

PRELIMINARY TONNAGE ESTIMATES

The deposits of quartz, designated as A and B were mapped by chain, Brunton compass and aneroid. From a N-S base line, sections were mapped along cross lines at 50-foot intervals and geological and topographic sketch plans made therefrom. These are included herewith as maps C-2, C-3, C-5 and C-6. Section A-A passes through the north end of the outcrop. Forty feet to the south, section B-B' passes through the small open cut and diamond drill hole. Sections C-C' to H-H' inclusive are spaced 50 feet apart, and H-H' passes through the south end of the exposed quartz. The sections are shown on accompanying Sheet C-4.

Aneroid readings were mapped as read. The approximate correction for sea level 10 + 90 feet, but this will require checking. Contours at 5-foot intervals were sketched. Sections in an east-west direction at right angles to the base line were drawn using the level of the south end of the exposed quartz on the surface datum. This was 40 feet by aneroid reading. The sections have been projected to zero aneroid reading, or 40 feet below the exposed south end of the outcrop, and this is considered zero datum level. The size and shape of the deposit is such that it is deemed in order to consider the projection of it to this depth fair and reasonable, and the calculated



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C'
D'
E'
F'
G'
H'

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PROFESSOR

UNIVERSITY OF CALIFORNIA
BERKELEY
"A" DEGREE
1911
April 1911 *april 1911*

tonnage in the category of proven reserves

Calculations for deposit A are as follows:-

1. Areas:

Estimated section areas, A	1,120	square	feet
B	4,576	"	"
C	6,608	"	"
D	8,464	"	"
E	6,560	"	"
F	6,016	"	"
G	3,056	"	"
H	1,858	"	"

Estimated plan area at zero datum, 37,300 square feet.

2. Tonnage:

To zero datum, using 10 cubic feet of quartz per short ton:-

North end	3,300
A - B	11,392
B - C	27,960
C - D	37,680
D - E	37,560
E - F	31,440
F - G	22,680
G - H	12,285
South end	4,645

Total estimate 188,942 short tons

For each additional foot of depth 3,730 tons, or if the deposit remains uniform for an additional 100 feet of depth, 373,000 tons. Pending additional test work, it appears reasonable to assume that there are 500,000 tons of quartz available from deposit A.

For deposit B the supply appears from present exposures to be definitely limited. Using the exposed

length of the good-grade quartz of 100 feet, the height above the muskeg of 10 feet, and width of 20 feet, there is available 2,000 tons of quartz. If, as in the A deposit this is considered uniform to a depth of 40 feet, the additional available quantity would be 8,000 tons. Hence it appears practical to consider that the B showing has 10,000 tons of quartz available.

The sand deposits do not appear to be sufficiently extensive to warrant consideration. An estimate of available tonnage, however, is as follows; using 20 cubic feet per ton, and a depth of 10 feet.

$$\text{Westerly lake: } \frac{1000 \times 200 \times 10}{20} = 100,000 \text{ tons}$$

$$\text{Easterly lake: } \frac{270 \times 50 \times 10}{20} = \underline{6,750 \text{ tons}}$$

$$\text{Estimated total: } \underline{106,750 \text{ tons}}$$

PRELIMINARY GRADE ESTIMATES

Samples taken by representatives of Falconbridge Ltd., are as follows:-

Sample Number	Width Feet	Location and Description	SiO ₂ %
-	10	Section B-B1 Core	99.96
-	10	Samples from a 30-foot hole	99.92
-	10	drilled with a "Packsack" drill	99.92
		Average:	99.94

Samples taken by E.J. Stephen and A.R. Allen

are as follows:

Sample Number	Width Feet	Location and Description	SiO ₂ %
15174	20	Deposit A, N. end, through O.C. & D.D. hole, E. Contact	98.06
15175	20	Deposit A, N. end west of 15174	99.28
15176	20	" " " " " " 15175	98.94
15177	16	" " " " to west contact	99.18
15178	20	" " S end, east side	99.48
15179	20	" " " " west of 15178	97.72
15180	20	" " " " " " 15179	99.32
15181	10	" " " " to west contact	98.78
15182	20	Deposit B, 30 ft. from N. end east half	99.18
Average for A deposit only			98.84

The weighted average of all samples is 99.03% SiO₂.

Sand samples, taken by the staff of Falconbridge Nickel Mines Ltd. are reported to assay up to 77% SiO₂, estimated to be equivalent to 38% quartz content. The sands were sampled as follows by A.R. Allen, but because of obvious lack of quantity, these were not assayed:-

Sample	Thickness	Location and Description
15183	Top 2 inches	East shore of westerly of two lakes, (unnamed). This is the clean white surface layer
15184	From 2" to 12" depth	Dark brown sand, with fine silt.
15185	From 12" to 18" depth	Brown silt, "hardpan"
Not numbered	Top 12 inches	Clean sand from south beach on east side of most easterly of two unnamed lakes. 6 bags of sand

ECONOMIC CONSIDERATIONS

Possible road and barge grid locations have been described in Mr. Stephen's report. The writer concurs fully with Mr. Stephen's description of these and his conclusions pertaining to same.

Mining quartz from the A deposit would present no particular problem. The following, pending further study and planning as additional data is acquired, appear to be the main points:-

1. The deposit may be quarried as deep below the ground surface as the mining inspector will permit, depending on conditions at the operation such as -
 - a) the slopes and condition of the walls of the quarry,
 - b) benching and primary and secondary breaking methods.
2. Sizing on the site would likely be advisable.
3. Hand sorting to remove granite would be necessary to maintain grade.
4. Pumping or syphoning would be necessary after the quarry floor is lowered below ground level.
5. Growth and overburden would have to be removed from the surface of the deposit and back from the edges of the quarry, to prevent contamination.

6. It would be necessary to mine and remove a sizeable amount of granite from both walls in order to maintain safe wall slopes.
7. If the quartz is as highly fractured at depth as it appears to be on the surface, and as decrepitation tests of surface samples indicate, it may be necessary to exert great care in both primary and secondary breaking and in crushing to prevent excess fines.
8. It is obvious that in test drilling and mining, bit wear will be considerably above normal.
9. It may be found necessary to use a 20% factor for losses due to granite which would have to be sorted out and discarded, "underbreaking" along the walls of the quarry in order to obviate the possibility of including wallrock and fines.

SUMMARY

Surface sampling, along with one short diamond drill hole, does not supply sufficient data for accurate grade and tonnage calculations. The results herewith summarized are, therefore, classed as preliminary estimates.

The A deposit contains 188,000 tons of quartz, and unless the quartz exhibits abnormal changes below surface, there should be 500,000 tons available to a depth of 140 feet.

The grade as indicated by sampling to date is marginal. The 70-foot surface sample across the south end, and the 75-foot surface sample across the north end of A deposit averaged 98.84% silica. On the north end, however, the combined average of the surface 76-foot and underground 30-foot samples is 99.15% silica. The highest assay, from 10 feet of the diamond drill hole, is 99.96% silica; and the lowest, from a 20-foot surface section on the south end, is 97.72% silica.

RECOMMENDATIONS

The Campania Island quartz deposit is one of the few known sources of high grade silica on the west coast of America. Although preliminary sampling indicates that a grade of 99.5% could not be attained, there is a possibility that the quartz will be found to be uncontaminated underground and a better than 99.0% silica supply might be feasible. On the premise that satisfactory markets can be acquired, and a reasonable deal finalized with Falconbridge Nickel Mines Ltd., the writer is of the

opinion that the A deposit should be tested by diamond drilling.

The diamond drilling program should be planned in three steps, as follows:

1. Limited drilling to check grade underground, holes 3 and 12 below.
2. Contingent on satisfactory results the drilling of holes 5, 7, 9 and 11 below
3. Completion of 15 holes totalling about 4,000 feet of drilling to supply sufficient data for grade and tonnage calculations:

The following diamond drill holes would complete these three stages.

No.	Section	From C.L.		Direction	Vert. Angle.	Length Feet	Sketch No.
		E	W				
1	A + 60 N	60		West	-60°	250	C-7
2	A + 60 N		50	East	-60	250	C-7
3	A	40		West	-60	250	C-7
4	A		40	East	-60	250	C-7
5	B	30		West	-60	250	C-8
6	B		60	East	-60	250	C-8
7	C		70	East	-50	250	C-8
8	D		50	East	-60	300	C-9
9	E	50		West	-60	300	C-10
10	F	50		West	-60	300	C-11
11	G	50		West	-60	250	C-12
12	H	50		West	-60	250	C-12
13	H		50	East	-60	250	C-12
14	H + 50 S	80		West	-60	300	C-13
15	H + 50 S		60	East	-60	250	C-13
	15 Holes					3,950	

In addition to the diamond drilling it may be advisable to acquire a bulk sample by excavating several trenches at least one foot deep across the A deposit.

Respectfully submitted,

Alfred R. Allen.

Alfred R. Allen, P. Eng.

Vancouver, B. C.

April 16, 1963.