Property File
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PRELIMINARY REPORT

on

CAMPANIA SILICA

CAMPANIA ISLAND

PRINCE RUPERT M. D., B. C.

by

Jas. J. McDougall

INTRODUCTION AND SUMMARY:

The following is a brief preliminary report describing a silica deposit located on the north coast. Included also is a description of nearby silica sands of possible importance. As the deposits are near the Coast it is felt that they deserve more attention than has yet been given them. Any possible marketing of the silica sands would involve very detailed economic study although much of the lode silica could be marketed in Vancouver at the present date.

LOCATION, ACCESS AND HISTORY:

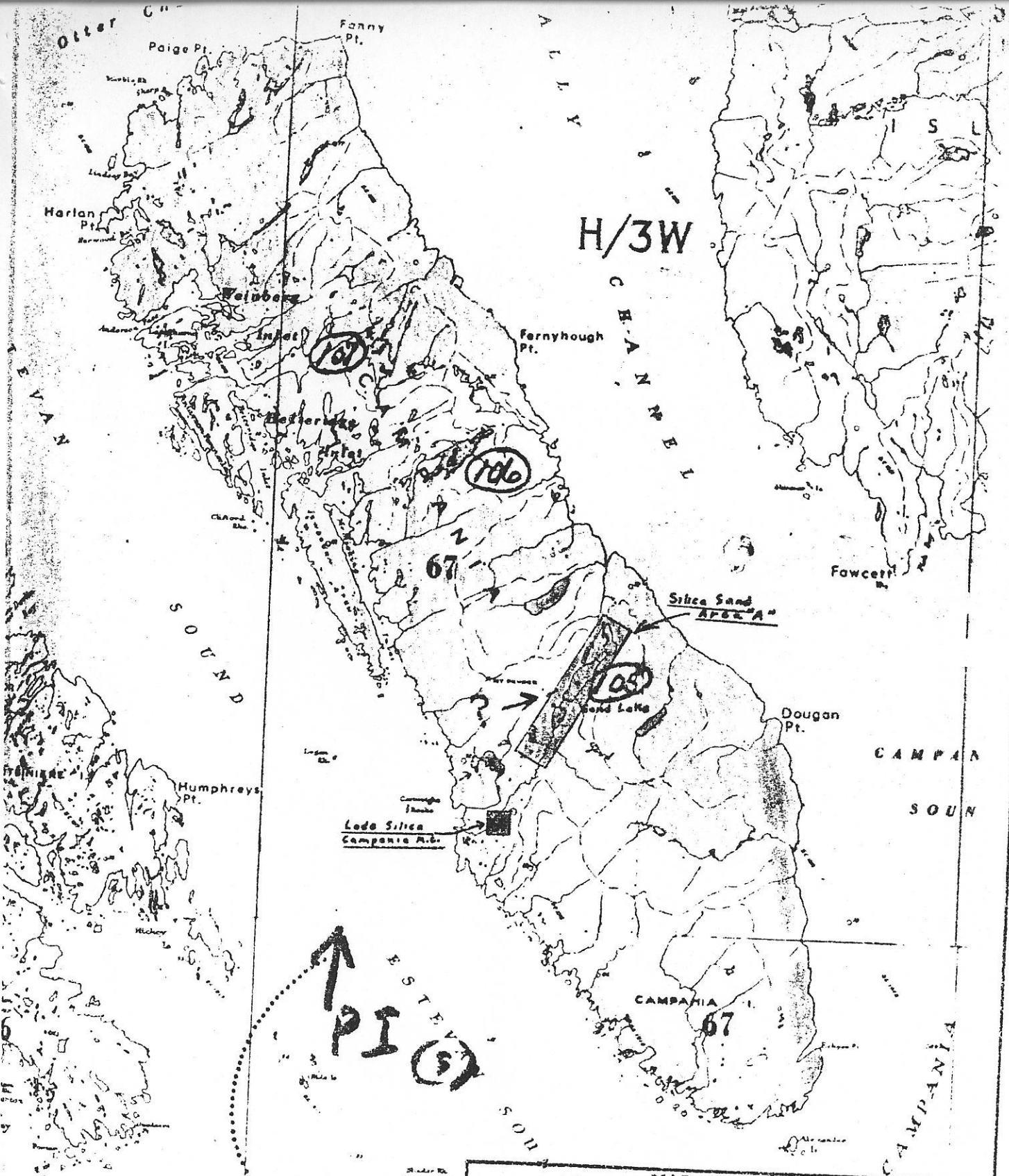
The silica deposits of interest as shown on Map 81 #1 are located about 1/2 mile inland on the West Coast of Campania Island. This is one of a number of large islands in Hecate Strait off the Coast of Northern B. C., and is in many respects similar to Banks Island, previously described. It is about 100 miles south of Prince Rupert and 400 miles northwest of Vancouver. The Island is partially protected from the full lashing of the Pacific by the Estevan Group Islands about 4 miles to the west across Estevan Sound.

The uninhabited body of land is about 18 miles long in a northwest direction and from 4 to 5 miles wide. Vegetation is sparse to non-existent except on the south and southeast coasts where moderate stands of timber exist. Several mountains with maximum elevations of 2400 feet form the background of the Island and rise sharply about a mile inland from the West Coast. Between the base of the mountains and the sea a low, rolling coastal plain exists and it is about half way across this plain that our lode silica is located. The silica sands are spread over an area of several square miles but are best exposed along lakes situated in low valleys cutting the mountain range mentioned.

Docks suitable for barge loading could be built on a small bay less than 1/2 mile from the lode deposit. This could be used for the silica sands as well or the latter could be handled from the better protected deeper water seaways on the east coast (see Map C S #2).

The lode silica deposit was found during late June by Super-Cub pilot Stan Bridcut and prospector Meade Hepler while on a flight outlined for them as part of our Hecate Island prospecting project. Bridcut remarked about the unusually white sands on the beaches of some of the lakes and checks later revealed a very high quartz content. The Campania mineral claim (probably the only ground ever staked on the Island) was located to cover the two known lode silica outcrops. While the helicopter was in the area for a few days in October the Packsack drill


MAP BI #1
General Geological & Location Map of Banks Island & Area Adjoining
J. McDougall - Ventures Ltd. - Jan. 1961
Scale - 1" = 20 Miles
LEGEND
Granitic Rock, Jurassic-Cretaceous
Older Undivided Metasediments Hornfelsic Schists, Minor Marble etc.
Mining Property - (V) Ventures Ltd.
Note - Inland Extent of Coastal Fringe Mapping Greatly Exaggerated
Surf Point Gold
Noble Mtn. Gold Prospect
Blacky Claims (V)
Bank Gold (V)
Campania Claims (V)
Limestone Quarry
Surf Inlet Gold
Southeaster Gold
Tasu (V) Cu-Fe
Ikeda Cu-Fe
Harriet Hbr. - Fe
Vancouver 310 Mi.
PRINCE RUPERT
QUEEN CHARLOTTE ISLANDS
HECATE STRAIT
CAAMAÑO SOUND
LAREDO SOUND
MILBANKE SOUND
Banks Island
Principe Channel
Douglas Channel
Pitt
Porcher Island
Princess Royal Island
Aristazabal Island
Moresby Island
Masset
Skidegate Inlet
Sandspit
Cumshewa Inlet
Louise Island
Lyell Island
Juan Perez Sound
Rose Harbour
Kunghit Island
Cape St James



MAP CS #2

Showing Location of Campania Silica
Scale - 1" = 2 miles,
J.J.McDougall,
Ventures Ltd. 1960

- Prince Rupert Schists and Crystalline Metasediments
- Silica Prospect.
- Highly Siliceous Granitic Rocks
- Normal Coast-Range Qtz.-Diorite

was ferried in and a vertical 30 ft. hole put down on the north end of the more westerly outcrop (see Photo #1). Several days were spent prospecting elsewhere on the Island using the Super-cub. Drilling was done by Jim Robertson and Norman Anderson. Alex Smith made a rapid helicopter check for possible silica sand deposits on the Coast itself.

GENERAL GEOLOGY:

The geology of Campania Island is simple though unusual. As quite accurately shown on Map H 1 it is composed largely of unusually well-jointed granitic rock. Dolmage has divided the Jurassic intrusives into quarts diorite on the easter flank and granodiorite on the west. The development of east-west jointing is remarkable and the majority of streams on the Island follow this course.

Minor areas of metasediments were noted by the writer during reconnaissance flights and are plotted approximately on Map GS #2.

The granitic rock of local interest in this case is either granite or quartz diorite. It is coarse-grained, almost pegmatitic, and has an unusually high quartz content of 30-40%. Coarse, white feldspar constitutes most of the remainder. Minor amounts of muscovite and mafics are present. (Clusters of large mica flakes were once reported near the west coast but we have not as yet located anything of interest along these lines).

The two quartz bodies constituting the lode silica property occur as elongate northerly trending lenses with-

in the quartz-rich granitic rock. As all contacts are obscured it is not known whether such are gradational or sharp and the origin must remain temporarily in doubt. However, as we have not yet located an intermediate grade body in the only 50% overburdened area, and as suitable structure is possible judging from flexures shown by the myriad of joints, an intrusive origin rather than a segregation is postulated for the quarts. The presence occasionally of grains of molybdenite may help substantiate the intrusive theory.

DESCRIPTION OF PROPERTY

(a) - Silica Lode:

Two sizeable mounds of quartz outcrop about 1/2 mile inland along an unnamed creek located about 6 miles from the southern tip of the Island. Although the Island is not topographically mapped the elevation of showings probably does not exceed 100 feet.

The zone westerly of the showings (Deposit "A") is between 70 and 100 feet wide and has a length of between 200 and 300 feet. It appears as a dome-like protuberance 60 to 70 feet high bounded on all sides by overburden. Deposit "B" is located a few hundred feet east of "A". It has an exposed width of 50-70 feet and is probably also 200 to 300 feet long, although its central portion is not exposed. However unlike "A" it rises only a few tens of feet above ground level. Continuation under overburden of both showings is quite likely along strike for a distance possibly equal to

that already exposed. It is doubtful, however, if widths much greater than those presently shown can be expected as confining granite is near at hand.

The quartz is a mottled, milky white with no visible impurities save for the occasional flake of molybdenite. It is extremely hard to drill with the thirty foot hole completed using up 15 bits. On its grey-weathered surface it is difficult to distinguish from the granitic country rock but the occasional fresh undercut cliff gives it away.

ASSAYS AND RESERVES:

Assay sheets and spectographic analyses are enclosed. The deposit is practically pure quartz having an average silica content over the 30 foot test section of about 99.94%. Assuming conservative lengths of 200 feet and widths of 70 and 50 feet, combined tonnage present to ground level is in the order of 75,000 tons. A combined factor of 4,000 tons probably per vertical foot exists which, to open-pit depths of 100 feet, and including indicated ore gives a tonnage of about 475,000.

CONCLUSIONS AND RECOMMENDATIONS

This is one of the larger deposits of good grade silica known on the Coast. It can be mined and hauled to Vancouver cheaply.

Silica of this grade has many uses but demand at present is limited. Ground silica is not as much in demand by the glass industry as is that obtained from natural silica sands. The jaggedness of the grain is apparently an

important factor. However, at present indications are that at least a 1000 ton lot of silica with a grade such as that from Campania could be sold in Vancouver for $25.00 per ton. This is used for decorative purposes in the building trade which unfortunately is now in the doldrums. Continuing demand is uncertain.

It is recommended that the B.C. Research Council be asked to make a short report on the marketing possibilities of such material in the Vancouver and Seattle areas. Washinton State has published results of some such surveys. Rod McCrea of Vancouver had the Research Council examine a high-silica quartzite deposit in north-central Washington with marketing in mind and results may still be available.

Work on the ground, besides a preliminary transit-stadia survey, should include several 100 foot holes designed to at least partially substantiate reserve figures. This should be done with the portable Longyear drill we contemplate purchasing and in conjunction with work undertaken at Banks Island. The area is generally snow-free year-round and for this reason the better part of the summer months could best be spent elsewhere. The writer would suggest late October when the helicopter might be free as such would greatly facilitate the work. However the drill could well pull itself to location from nearby lakes or from the Coast.

Sufficient work has been done to satisfy assessment requirements for 3 years. At least one more claim should be staked to guarantee coverage of the zone.

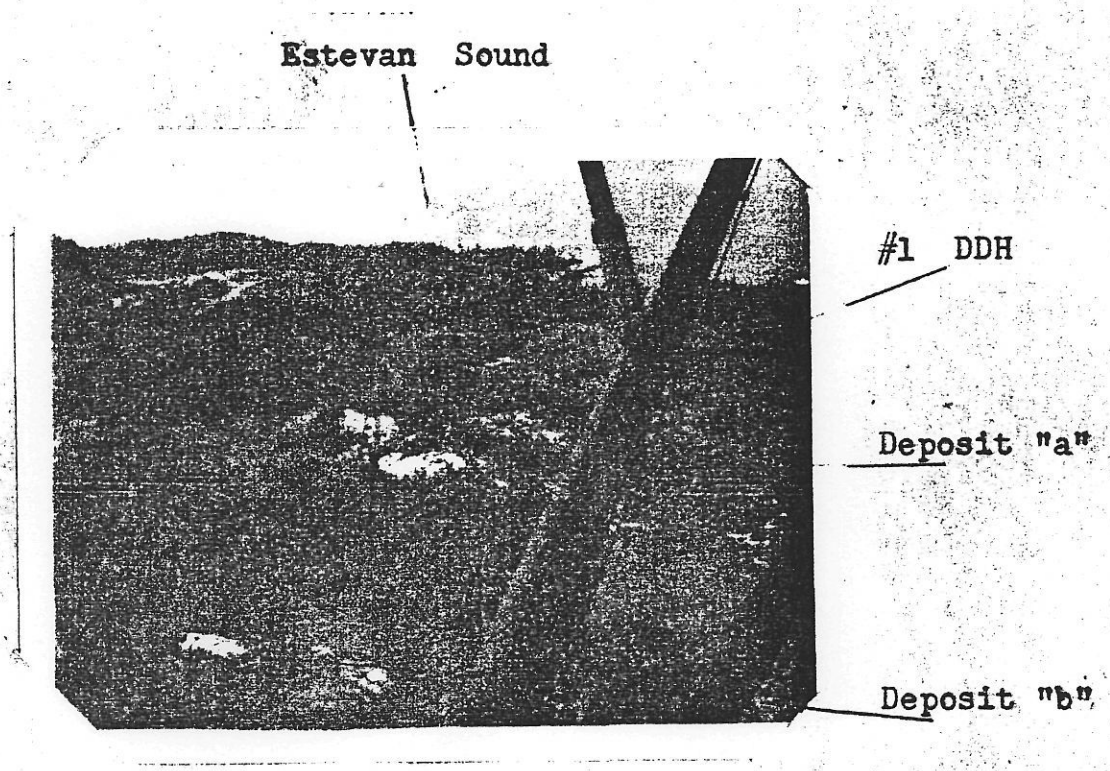


Photo CS #1 - Looking West at Campania Silica Deposit

(b) - Silica Sand Deposits:

Description of Property

The silica sands under discussion are the result of direct mechanical disintegration of the quartz-rich granitic rock which composes most of the country south of Mt. Pender. They have been distributed under the influence of fresh water and are best exposed in shallow creek cuts and around the shores of several small lakes.

The grain size is coarse and the particles are only slightly rounded. Because of the unusually high quartz and feldspar content and the near absence of mafics and clay the sands are very white in color (the whitest ever noted by the writer in B. C.).

Microscopic examination shows the sand to be composed of 30 to 50% free-quartz and the remainder largely of an as yet unidentified white feldspar or mixtures of feldspar and quartz. The mafic content is very low being probably no greater than 1%. Occasional grains of feldspar contain limonitic coatings but not enough to impart color to the overall mass.

The thickness and true areal extent of the sands is unknown at present as light soil or vegetation covers most low areas where sand is likely to exist. Creeks are slow and sluggish and thus cuts made by them are too shallow to be of much help. On the sea-coast the sand has been so much diluted with high mafic run-of-the-mill material as to be hardly distinguishable from ordinary beach sand.

ASSAYS AND RESERVES:

The tonnage potential is unknown and could well be in excess of 10 billion tons providing the deposits are more than a few feet thick. The better exposed and clearer material around any one of half a dozen or so lakes has a factor of about 500,000 tons per vertical foot assuming a mantle-like deposit. Thus to reasonably assured depths of 5 feet 2,500,000 tons is indicated.

The possibility exists that most of the sands may be limited to the vicinity of the present beaches. If such is the case there is still several million tons of material readily available.

The only assay made of the sands to date shows an SiO_2 content of about 77%. Assuming the feldspar to have a composition containing 65% SiO_2, to satisfy this assay the quartz content would have to be in the order of 38%. A small sample has been sent to Lakefield labs for beneficiation tests but no results are available.

CONCLUSIONS AND RECOMMENDATIONS:

Several lines of approach are available for economic appraisal or the feasibility of utilizing silica sands such as those described. This would involve a far deeper study than possible at present and only a rough guide can be presented here. This would be based on two general primary considerations - (a) value of sands without beneficiation and - (b) economic feasibility of extracting quartz from the sands.

Without beneficiation the sands have only one good

potential use, that of an abrasive in such processes as sand blasting. The possibilities in this field are suggested by the sharp nature of the grains and the remarkable overall similarity to that presently being imported from the Eastern U.S.A. The latter costs around $14.00 per ton in Vancouver.

Beneficiation tests carried out some years ago by the Industrial Minerals Branch of the B.C.Department of Mines(1) suggested that it might be economically feasible to upgrade the silica content of some of our coastal sands to meet the requirements of industry. Although very inefficient high grade product at laboratory level were obtained using oil flotation. Conclusions resulting from these tests are presented in photo-copy form as an appexdix to this report. Given a higher grade material to start with, which the writer contends the Campania sands to be, an economic "break-through" could well be possible without relying on feldspar and mica by-products.

The best grade silica sand deposit in California has only a slightly higher quartz content than these under discussion. A photocopy of a summary(2) concerning these sands is included in the appendix.

The market for any such product would have to include the Pacific Coastal region of the U.S. as the foreseeable requirements of B. C. are not great. A small glass factory designed to start soon in Burnaby could be a potential customer.

(1) Preliminary investigation into possibilities for producing silica sand from B.C. Sand Deposits . . . B.C.Dept. of Mines, 1941.

(2) Bulletin 176, Division of Mines - "Mineral Commodities of California", 1957.

At present the Coastal States import considerable quantities of quartz sands. As mentioned, such is preferable to massive silica. Recently attention has been focussed on quartzite deposits in North Central Washington and at least one new property is being readied for production.

Recommendations are that if Lakefield lab tests indicate a good separation to be possible the B.C.Research Council be engaged to study the economics involved in beneficiating and marketing of the quartz sands.

Field work of advantage could take the form of augerholes in the better exposed areas. This would at least indicate whether or not existing estimates are within reason.

No ground has yet been staked to cover any part of the sands. Such would come under the Provincial Land Act rather than the Mines Act.

The writer is quite certain that these deposits, whether of value or not, will not go much longer undetected. We are not the only ones keeping an eye open for such material on the Coast. For the last two years the hundreds of people taking the prospecting course given by the B. C. Chamber of Mines have been especially advised by the engineers of the B.C.Department of Mines to keep a sharp eye open for silica sands. As the Campania sands appear closer to the type sought than any yet seen by the writer, it is felt that staking of at least the better deposits (i.e. "a" on Map CS_2) should not be delayed if any interest at all is forthcoming.

Vancouver, B. C.
February 10th, 1961

Jas. J. McDougall, Geologist

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CAMPANIA SILICA

Dear Sirs:

We have made a qualitative spectrographic analysis on samples of Drill Core submitted and report as follows:

MARKS: D.D. 5201

Silicon ..... MAJOR CONSTITUENT

MINOR CONSTITUENTS

Aluminum	0.01%	CAMPANIA #1 DDH 0-10 ft.
Iron	0.001%	
Calcium	0.001%	
Barium	0.001%	
Magnesium	0.0005%	
Sodium	0.0005%	99.96% SiO_2
Copper	0.0001%	
Titanium	0.0001%	

Molybdenum, Silver, Vanadium, Lead, Manganese, Potassium, ... Faint traces

Strontium, Chromium, Cesium ... Very faint traces

D.D. 5202

Silicon ..... MAJOR CONSTITUENT

MINOR CONSTITUENTS

Aluminum	0.01%	#2 DDH #1 10-20 ft.
Magnesium	0.01%	
Sodium	0.01%	
Iron	0.01%	
Molybdenum	0.01%	
Calcium	0.01%	SiO_2 99.92 %
Copper	0.005%	
Barium	0.001%	
Titanium	0.0001%	

Vanadium, Silver, Lead, Manganese, Potassium, Strontium, Chromium, Cesium .... Faint traces

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MARKS: D.D. 5203

Silicon.....MAJOR CONSTITUENT

MINOR CONSTITUENTS

Aluminum.....	0.01%	" #3 20-30 ft. " SiO_2 99.92%
Magnesium	0.01%	
Sodium	0.01%	
Iron	0.01%	
Calcium	0.01%	
Copper	0.005%	
Titanium	0.001%	
Barium	0.001%	

Molybdenum, Vanadium, Silver, Lead, Manganese, Potassium ..... Faint Traces

Strontium, Chromium, Cesium ..... Very faint traces

(b) SiO_2 Content Silica Sands 77.74 %

Respectfully submitted,
G.S. ELDRIDGE & CO.LTD.
per Robt. C. Farrell

RCF*jl

deposits including those of Oyster River, Kye Bay, Savary, Harwood, Hernando Mary and Cortes Islands. Pre-requisites for satisfactory treatment are:

(a) A sufficient proportion of quartz in the sand to make processing worth-while.

(b) A minimum of rock fragments and iron-coated grains.

(c) Clean, fresh surfaces on mineral grains, or, in other words, absence of pre-activation and excessive slimes.

(2) Efforts to recover silica sand from Qualicum River sand were only partly successful. This was attributed to prior activation of grain surfaces by such metal ions as aluminium and iron, derived from natural solutions. This phenomenon appears characteristic of most bank sands in varying degree with the result that each deposit must be investigated separately.

(3) Deleterious coatings may be removed from sand grains by "attrition milling" thus exposing clean mineral surfaces to reaction with reagents. The elimination of individual peculiarities of sands in this way gives rise to cleaner, more selective separations as well as greater consistency and predictability of results. However, the degree of processing necessary to effect de-activation of certain sands may be too costly for commercial application.

General Discussion of Sands:

The technological feasibility of producing silica sand from impure sand has been established by test-work described. Much work remains to be done, however, to prove the process applicable to the commercial production of silica sand. This can only be carried out on a larger scale than that permitted by equipment at the writer's disposal.

Chief features to be Investigated are:

(1) Most suitable sands: Samples tested by

the writer are representative of only a small proportion of the sand deposits of the Province, many of which undoubtedly contain more quartz. The higher the proportion of quartz in the crude sand the higher the overall recovery, hence the lower the treatment cost on the finished product. In addition to high quartz content, however, a sand must be free from excessive slimes, pre-activated grains, and in large measure from rock fragments. Further its size range should conform approximately to commercial specifications.

Perhaps the most vital consideration is location. Silica sand at best is a low-priced commodity and will not stand high freight charges. If, in addition to these, the sand must bear beneficiation costs, proximity to consuming centres becomes of paramount importance.

(2) Processing Details: Working details can only be determined by testing of a specific deposit on a larger scale. The flow sheet accompanying the section on Qualicum Beach sand is offered merely to indicate the essential steps required in the case of a particular sand sample. For Qualicum Beach sand it was necessary to divide the process into two stages to eliminate interfering material from the final feldspar-quartz separation. Sands may be found, however, in which a sufficiently pure quartz tailing may be obtained by direct removal of feldspar.

Gravity-tabling might be dispensed with, or combined with, agglomerate-tabling in certain cases. In general, however, maximum elimination of impurities appears advantageous before agglomeration. In this connection separation of undesirable constituents magnetically might be suggested as an initial step. This would require a free-flowing feed, which could only be obtained from many deposits by artificial drying. Again, about one-third of feed would be removed, a large part only weakly magnetic, which would require large machine capacity.

The cost of magnetic separation, considerably higher than that of gravity-tabling, would be multiplied several times when charged against the final product. Further, it is possible by agglomerate-tabling to recover silica sand sufficiently pure for sand blasting and foundry use. By restricting magnetic separation

to the final stage, therefore, dual drying is avoided and cost of processing charged only against the material actually treated.

Not only may operating details depend upon the nature of the original sand, but also upon the scale of production. For example, if required capacity is too great to be handled on one gravity-table, overall efficiency would be improved by prior classification of minus 20 plus 100-mesh feed into two or more size fractions, followed by parallel tabling of each.

(3) Economic Factors: Chief consumers of silica sand in British Columbia are steel foundries. Small amounts are also used for sand-blasting, special plasters, etc. None is produced locally. Imports in 1940 totalled nearly 2,000 tons from the United States, largely from Illinois and California. Delivered prices ranged from $10 to $14 per ton. Prior to the war, Belgium was the chief source of supply, sand coming in as ballast and selling for $6. to $8. per ton.

The market for silica sand in Alberta is relatively large, mainly for use in the manufacture of glass. Here again the source of supply is the United States. Delivered prices are slightly less than those for British Columbia, owing to shorter rail haul from producers in Illinois and Minnesota. Washington also consumes a fairly large quantity of silica sand but none is produced in the State.

The economic feasibility of processing impure sands to meet the above markets cannot be accurately judged from the test-work done. The following illustrative example, based on results with Qualicum Beach sand, is intended to clarify further discussion and not to be accepted as a final estimate of practical costs:

Example:

Assumptions - mining cost - 25 cents per ton.
overall recovery of silica sand - 10 per cent. of crude sand.
capacity of plant - 100 tons crude sand per day.