

# Pacific Marble and Granite Ltd.

MARBLE FABRICATION

5249 REGENT STREET, BURNABY 2, B.C., CANADA PHONE 298-4168  
CABLE ADDRESS - PAMAGRA VANCOUVER

673048  
Knight Inlet  
92K/12

## Certificate

I, LUIGI G. MARCHESI, certify that:

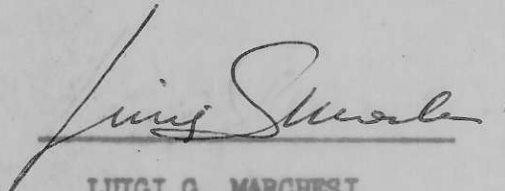
For the past ten years I have been active in developing marble and granite quarries in Italy as well as in Canada, where for more than twelve years I have dealt in marble in fabrication and contracting.

I am also an associate of the Giorgi Marble Co. S.p.a. of Carrara, Italy quarries and saw mills owner for white Carrara and coloured marble.

I hold no interest in the properties or securities of Knight Inlet Resources Ltd. (N.P.L.) or affiliates thereof, nor do I expect to receive any, directly or indirectly.

My report of July 9th 1971, entitled "Report on the Feasibility of Establishing a Quarry on the Marble Deposits of Knight Inlet Resources Ltd. (N.P.L.)", is based upon field examination on 23d May and 24th May 1971, and my extensive knowledge of and contacts in the marble industry in Canada and in Italy.

I consent to this Report being filed with the British Columbia Securities Commission in a Prospectus by Knight Inlet Resources Ltd. (N.P.L.).

  
LUIGI G. MARCHESI

EXCLUSIVE PRODUCERS AND EXPORTERS OF

WHITE . GREY AND SECHLT BLACK GRANITES . BLACK GOLDEN VEIN MARBLE . ROUGH BLOCKS . SAWN AND FINISHED SLABS

REPORT ON THE FEASIBILITY OF ESTABLISHING  
A QUARRY ON THE MARBLE DEPOSIT OF  
KNIGHT INLET RESOURCES LTD. (N.P.L.)

INTRODUCTION:

Since 1968 the writer has known about the extensive marble deposits of Knight Inlet Resources Ltd. (N.P.L.) located on the east slope of Matsiu Creek, approximately one and one half miles from Tidewater, at Knight Inlet, British Columbia. A preliminary report entitled "Independent Report on Crystalline Marble Deposit" dated 11th December 1968 was prepared by the writer at the request of P.B.M. Exploration & Development Co. Ltd., (N.P.L.), the predecessor in title to the marble deposit of Knight Inlet Resources Ltd. (N.P.L.). That report dealt briefly with the type and quality and saleability of the marble located in the Knight Inlet deposit.

In May 1971 representatives of Knight Inlet Resources approached the writer and requested that he examine the marble deposit in detail and advise on the feasibility of establishing a quarry on the deposit, and on the economics of profitably disposing of the product of the quarry.

On 23rd May and 24th May 1971 the writer and Peter Auxier, a Director of both P.B.M. Exploration & Development Co. Ltd. and Knight Inlet Resources Ltd. (N.P.L.) examined all working and outcroppings of the marble on the property with particular reference to the feasibility of establishing a quarry on the property. For a detailed explanation of the property, its location, all previous workings and the known size and location and type of the marble deposit, reference is made to the report of Alfred R. Allen, P. Eng., dated 30th October 1970 and updated on 15th March 1971.

The writer did not actively explore the property as his instructions were to determine the best location and type of quarry on the deposit which had already been mapped and established by Mr. Allen's report. There may well be additional quarry sites on the marble deposit, but additional funds would have to be expended on exploratory work, particularly trenching, to locate such sites, and it is the writer's opinion, as will be set forth later in this report, that there is a good and economically feasible quarry site on the already known and located areas of marble.

This report is essentially divided into two sections; one dealing with the feasibility of the actual

establishment of the quarry and the costs of bringing it into full production, and the other dealing with the marketing of the product and the potential profitability of the quarry on the basis of the production volume which the writer feels the quarry can economically produce and that the present market can absorb.

FEASIBILITY OF ESTABLISHING QUARRY:

In Mr. Allen's updating letter to Knight Inlet Resources Ltd. (N.P.L.) of 15th March 1971 annexed to his report of 30th October 1970, he recommends the expenditure of \$150,000.00, in two phases; the first phase in the amount of \$90,000.00 and the second phase in the amount of \$60,000.00. The writer agrees with the total estimated expenditure of \$150,000.00 on both phases, but is of the opinion that the program should not be split into two phases, since there is no point in establishing the quarry if funds are not available to carry on production on an economic scale for several months.

The marble formation is vast and has already been relatively well defined by the tunneling, trenching and drilling which has taken place. There is also a great variety of colours in the deposit, and it is clear that there are merchantable quantities of at least blue, white, cream or off-white, grey, green and tan or light brown marble. As was enumerated in the writer's report of 11th October 1968, the blue marble which is the predominant type is a premium marble of coarse grain with a very low water absorption rate which takes an excellent polish and is well suited to exterior building surfaces, as well as for interior and ornamental uses. The light blue colour is unique and is, in the writer's opinion, a colour which the market will receive very favourably. To the writer's knowledge, there is no blue marble of this light colour available on the West Coast of North America, and the production of it in Europe is extremely limited and always obtains a premium price.

The actual quarry site should be an open quarry, for reasons of economics, and also located so as to produce as much of the blue marble as possible, although all of the colours produced by this quarry will be in demand. It is the writer's opinion that an excellent quarry site is available approximately one hundred feet due south of the portal to tunnel No. 2. For the location of tunnel No. 2 reference is made to the map annexed to Mr. Allen's report

entitled "Claims; workings; drill holes; topographs and marble zone". One Hundred feet due south of the portal to tunnel No. 2 represents a point approximately 50 feet in elevation above the tunnel. At this point a trench of approximately twelve feet in depth should be dug and blasted, directly north-west along the hillside for approximately one hundred feet. This trench will be the initial quarry face and can be really described more accurately as a one quarter section out of the face of the hillside. The trench will approximately parallel the contour of the hillside, and will expose the marble sufficiently to ascertain the colour of the marble zone. The zone exposed will correspond to Section C-C of the map entitled "Vertical section showing marble zone" which is annexed to Mr. Allen's report. This is the zone intersected by Tunnel No. 2 and because of this is the best explored section of the marble deposit. The proximity to the road is convenient and the steepness of the mountain simplifies the removal of the overburden and waste rock. The marble should then be examined carefully and the section of the trench showing the greatest exposure of the best marble, including all the blue marble, should then be selected in an approximate length of seventy feet and the quarry face opened up by blasting and bulldozing in 6 to 8 feet steps down the hillside, removing the overburden and weathered marble so as to expose the deposit at sufficient depth below the surface to provide unweathered marble. During the process of the opening up of the quarry face, more chip and rubble marble should be removed and stockpiled and the balance of the undesirable material bulldozed over the edge of the quarry site so as to increase its working area. In addition, all overburden taken off should also be used as fill to expand the working area of the quarry.

The writer is unable to state on the basis of his examination whether or not the quarry will be able to produce large blocks of marble. It is quite possible that the quarry will do so but, initially, the aim of the quarry should be to produce rubble and chip marble as the surface fracturing will persist to a considerable depth due to the vertical stratification of the marble. The marble in the tunnel seems relatively solid, but the tunnel does not cut directly across the face of the marble, so that it is difficult to predict the percentage of solid blocks that the quarry will produce. Subsequently, in this report, an analysis will be made of the saleability of rubble and chip marble but suffice to say that it is the writer's opinion that the quarry will be feasible and profitable solely on the basis of producing rubble and chip marble and small blocks of marble.

Due to the stratification of the marble which the writer has observed in the various tunnels, it is the writer's opinion that the cleavage lines of the marble are parallel and that the marble will split easily into flat pieces ideally sized for stone masonry. By way of reference, the category of "rubble" in the ornamental stone trade refers to small blocks or chunks of marble suitable for masonry purposes such as fireplaces, and rough stone faces of buildings. "Chip" marble, on the other hand, is marble which is crushed and sized by screening into small chips which are used as stucco-dash and in making terrazzo floors, exposed aggregate architectural panels, and blocks of reconstituted marble. Large blocks of marble are naturally more valuable than small blocks or rubble or chip, but, on the other hand, large blocks are substantially more expensive to quarry and ship and far heavier equipment is needed to handle them. Having particular regard to the type and quality of chip, rubble and small blocks which will be produced from this quarry, there is no economic necessity to have the quarry produce large blocks. The quarry will, however, produce substantial amounts of excellent small blocks, as well as chip and rubble.

The marble body lies almost vertical and, as mentioned above, in layers banded or stratified regularly. The removal of the blasted marble on the quarry face will therefore prove to be easy, and the blasting will produce ideally sized rubble for the masonry trade.

In the writer's opinion the small blocks that would be available during the initial stages of quarrying would vary from 0.4 to 1.5 cubic metres. In the event that, as the quarrying proceeds, the rock surface and stratification shows promise of producing large blocks, then the method of quarrying would be varied from blasting after random drilling to set patterns of drilling and plugging and feathering as well as black powder blasting so as to quarry large blocks. At this point it would be essential to engage an experienced quarry master as the production of large blocks and the proper development of the quarry for that purpose could not be done by anybody without a considerable degree of skill and experience in assessing the grain and pattern of the deposit so as to produce blocks with consistent colour and grain. Such quarry masters are generally not available in British Columbia but can easily be hired in Italy and brought to British Columbia.

The cost of removing the fractured marble from the quarry site after it has been blasted and turned into rubble is normally very low as it is basically like blasting any rock formation into small sized pieces. Drilling the holes, spaced at about 18 inches, varying according to the stratification of the marble, and blasting the rock, would cost a maximum of \$1.00 per ton, subject only to the fact that if large quantities of non-utilizable rock were blasted the cost of saleable marble would rise. Some hand splitting would be necessary to size the larger pieces into thicknesses of four or five inches. Normally two men can trim and split about 6 to 7 tons of solid stone per day, but as in the case of this quarry, only about 20 per cent of the stone will require further splitting, and because the marble is, in the writer's opinion, one of the easiest to split that he has seen, it would be reasonable to expect two men to process about thirty tons per day after the marble has been properly blasted and bulldozed away from the quarry face. This operation would then cost another \$3.00 per ton of marble produced (due to the fact that only 20% of the rubble would require further splitting, as stated above).

The various colours of marble obtained would then require sorting, and this should be done on the site to avoid sending out undesirable material. This operation would cost approximately an additional \$2.00 per ton. As this is done, the marble could be placed on pallets and covered with wire or mesh. At the same time the marble should be sorted for size and the scraps kept for chip material. If this is done properly it will give the marble of all colours a great competitive edge on the market as much of the stone presently sold is transported in bulk, and consequently a certain proportion of the rubble is broken into pieces which are awkward to use. This would cost about \$1.00 per ton including pallets, and would ensure that the marble would be of the highest quality, and suffer no damage in transporting.

The marble would then be transported from the quarry site to the beach at Knight Inlet and deposited there in stock piles of individual colours.

The road now in existence from Tidewater to the quarry site will need additional improvements by way of culverts and gravel or stone rubble surfacing if a truck is to be used for transportation. It would appear to be necessary that a truck be used to minimize the cost of transportation. The distance from the quarry site to Tidewater is approximately one and a half miles and if a tandem truck with eight drive wheels is used, having a capacity of twelve tons, it would be able to transport from the quarry site to the beach at least ninety tons per day after being loaded by a suitable front end loader. The cost of loading and transportation to the beach will be approximately \$2.00 per ton. It will be essential that the truck be in excellent condition and have the highest standard air brakes available, due to the gradient of the road.

The cost of loading a barge at Tidewater at Knight Inlet and unloading it at an appropriate stock-piling site, preferably on industrial zoned land adjacent to a navigable arm of the Fraser River would not, in the writer's opinion, exceed \$1.00 per ton, and the writer has obtained a quote from Gulf of Georgia Towing Co. Ltd. of \$2.50 per ton for minimum shipments of 2,000 tons from Knight Inlet to the Fraser River. That figure of \$2.50 per ton includes arbitrage on the barge for four days at Knight Inlet for loading purposes and four days on the Fraser River for unloading purposes. The total cost of the marble rubble landed at Vancouver and segregated by colour, would be \$11.50 per ton.

It should be noted that all the estimates hereinbefore set forth are inclusive of all operating expenses, such as powder bits, fuel, small repairs to machinery, camp maintenance, wages, etc. but do not include overhead and administration for the company or maintenance of the stock piling site in the Vancouver area and in other areas, if necessary, and do not include any costs associated with advertising, distributing or selling the product from the stockpile site.

In the writer's opinion, a reasonable initial production for the quarry would be 90 tons per day, and that would require a crew of 10 men at the quarry, including a working foreman and cook. A figure of approximately \$2.00

per ton for contingencies and incidental expenses should also be allowed for, and the total production cost per ton landed in Vancouver would then be \$13.50 per ton.

Ultimately, in calculating the profitability of the quarry it will be necessary to allow for administrative expenses of the company, expenses of advertising and sale, etc.; as previously mentioned.

In general, the cost of producing large blocks of marble is about \$25.00 to \$30.00 per ton, for a normal producing quarry, and it is not economical to produce blocks if the cost exceeds that figure, unless the marble is of an exceptionally good quality, the writer refrains, nevertheless, from giving an estimate for this particular operation for this quarry as it is too early to assume that large sound blocks can be obtained from the quarry and, in any event, as stated above, the quarry will be economically feasible without them.

#### SALE OF MARBLE:

The volume of rubble marble sold in British Columbia is, in the writer's estimation, approximately 4,000 to 5,000 tons per year, a majority of which is imported. It is almost impossible to ascertain exactly the volume of chip material sold in British Columbia due to the wider variety of uses and users and the writer can say no more than that the volume certainly exceeds 5,000 tons per annum.

The price of rubble marble in the Vancouver area varies from approximately \$35.00 per ton to \$80.00 per ton, depending on the colour of the marble and the quality. For example, the cream marble and honey-white marble which would be available from this quarry can only be obtained from Washington State at the present time and sells for \$65.00 to \$70.00 per ton. The blue rubble marble, because of its attractive coloration and lack of any competition, would, in the writer's opinion, command a higher price. These prices, however, are retail prices and it is estimated that the average price received by the producers from a wholesaler for all the colours extracted from this quarry would average about \$35.00 per ton. Sales of 2,000 to 3,000 tons per year of rubble marble should be obtained in a British Columbia



market with proper selling and proven delivery capacity.

The sale of the blue marble rubble would, however, be substantial outside the Province as this is clearly an exportable item. Knight Inlet Resources Ltd. (N.P.L.) should expect to receive in excess of \$50.00 per ton for the blue marble rubble and the sales of the blue marble rubble on the export market on the western seaboard of the United States alone should exceed 3,000 per annum and might greatly exceed that figure if large individual contracts were bid for and obtained. The writer cannot particularize sales for the other colours of marble rubble on the Pacific Coast of the United States, but is of the general opinion that that marble would be competitive with the products presently consumed and the quarry's costs of production would enable it to compete in that market, because of the low rate for barging from Canadian waters to U.S. Pacific Coast ports.

The use of marble chips in North America is large and is constantly increasing. There are several producers supplying different colours of chips, mostly in the State of Washington. On the West Coast of North America blue marble chips have never been available and thus have never been introduced to the market. In the writer's opinion there would be an extremely large market for blue marble chips throughout the West, and it should certainly exceed 10,000 tons per annum. For the colours presently available on the market, the price of the chips ranges between \$30.00 and \$35.00 per ton, sacked in 100lb. bags. The cost of producing chips is, however, somewhat higher than that of producing rubble.

All the basic costs applicable to producing rubble marble are also applicable to producing chip marble, except for the cost of hand splitting, but in addition the chips must be crushed, screened and bagged. The cost of bagging is \$2.50 per ton, and the crushing and screening should be contracted out in Vancouver. The price of crushing and screening in Vancouver for quantities of 10,000 tons or more is \$2.00 per ton.

The cost of producing chip marble bagged and landed in Vancouver is therefore about \$15.00 per ton.

The local market in British Columbia could not absorb any considerable number of either small or large blocks of any of the types of marble that could be produced by this quarry, and in fact does not absorb any large quantities of any marble or other ornamental stone in block form. In general terms, the writer feels, however, that there would be an excellent international market available for small and large blocks, including not only the U.S.A. but also Japan. An extensive market survey would have to be made by a Japanese trading house for the Japan market and it would be necessary to ship several small and several large blocks to Japan. This quarry will, initially, only produce small blocks. Unfortunately small blocks produce a high proportion of waste, and a lower price is generally paid for them by the supplier because of this. It would therefore be more profitable to cut the small blocks into tiles or slabs locally in Vancouver and then export them as a finished product. Knight Inlet Resources could choose either to contract the cutting locally or enter into the manufacturing field itself. Pacific Marble & Granite Limited in Vancouver has offered Knight Inlet Resources \$80.00 per ton for the small sound blocks of blue marble. (Minimum dimensions of 3 feet by 2 feet by one and one half feet).

#### SUMMARY AND CONCLUSIONS:

A commercial marble deposit is covered by a Special Use Permit and Mineral Claims held and owned by Knight Inlet Resources Ltd. (N.P.L.) on the east slope of Matsiu Creek, approximately one and a half miles from Tidewater and Knight Inlet. The quality of the stone is excellent and a wide variety of colours are available, including a premium blue marble, which has no direct competition in North America.

The cost of quarrying the marble for rubble marble and small blocks should not exceed \$13.50 per ton, and the cost of quarrying chip marble should not exceed \$15.00 per ton.

The sale price received by the Company for all rubble marble sold in Vancouver should average \$35.00 per ton, and the blue rubble will command a price in excess of \$50.00 per ton, and for blue chip marble should be over \$35.00 per ton, and for small blocks should average at

least \$80.00 per ton. The volumes of marble that can be sold cannot be exactly estimated, but should be 2,000 to 3,000 tons for all colours of rubble marble in British Columbia, and approximately another 3,000 tons of blue marble rubble for the export market, and in excess of 10,000 tons for chip marble for the British Columbia and export market. The volume for small blocks cannot be estimated until the material is introduced in the market, but the great beauty and rarity of the blue marble should ensure a good demand.

It is therefore concluded that, by reason of the large quantity of marble available and the varied colours of marble and its excellent quality (all as enumerated in Alfred R. Allen P. Eng's report entitled "Report on Marble Deposit of Knight Inlet Resources Ltd. (N.P.L.)", and by reason of the markets available for the marble and the economics of production, that a quarry be established on the marble deposit of Knight Inlet Resources Ltd. (N.P.L.) and the quarry be brought into production on a scale of 90 tons per day.

In the event that the market available for the marble does not equal the approximate production of 25,000 tons of marble per annum which could be produced on the basis of 90 tons per day, then the quarry should be operated for as many months a year as required to satisfy the market and keep a stockpile of 5,000 tons on hand, as this is probably the most economical rate of production.

In the writer's opinion the quarry will be able to operate on the basis of 90 tons per day at a good profit.

#### RECOMMENDATIONS:

It is therefore recommended that the quarry be prepared for production on the Knight Inlet marble deposit in a single phase program as follows:

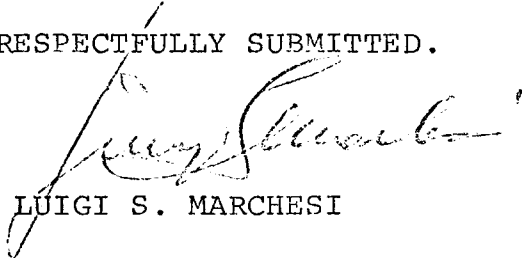
1. Acquire a small but seaworthy boat for transporting personnel and supplies from Kelsey Bay at Campbell River to Matsiu Creek - \$3,000.00.
2. Surface the road with local gravel and excess stone and rubble from the quarry site - \$10,000.00.
3. Rent equipment as follows, for 5 months, utilizing used equipment where possible:

- (a) 1 DC6 front-end loading bulldozer;
  - (b) 1 12-ton tandem truck;
  - (c) 1 generating plant;
  - (d) 1 compressor and air track drill;
- (estimated cost \$20,000.00)
- 4. Improve facilities for barge loading at beach - \$1,000.00.
  - 5. Construction of foundation for stiff leg derrick and mooring dolphins - \$10,000.00.
  - 6. Prepare quarry for production and extend road to quarry site - \$27,000.00.
  - 7. Commence marketing and sale promotion - \$8,000.00.
  - 8. Office overhead - \$8,000.00.
  - 9. Lease and prepare unloading and stockpiling site adjacent to Fraser River up to commencement of first sales of product - \$8,000.00.
  - 10. Purchase of other quarrying equipment and transportation - \$15,000.00  
To include at least
    - (a) Winch and boom
    - (b) Scale
    - (c) Radio Telephone
    - (d) Installation of air brakes on truck
    - (e) Fork Lift adaption for DC6 front-end loading cat.
    - (f) Plugs, feathers, hammers and miscellaneous quarrying equipment.
  - 11. Operating capital fund - \$25,000.00
  - 12. Contingencies - \$15,000.00

The estimated capital requirements as per the above total \$150,000.00 and are calculated on the basis of bringing the quarry into full production. After full

production has been arrived at, such items as rental of equipment, marketing and sales promotion, office overhead, will constitute a continuing expense to the company and will naturally be met out of general revenue received by the company for the sale of its product.

ALL OF WHICH IS RESPECTFULLY SUBMITTED.



LUIGI S. MARCHESI

President of Pacific Marble  
and Granite Ltd.)

VANCOUVER, BRITISH COLUMBIA.  
12TH JULY 1971.

REFERENCES

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