# CONTINUING INVESTIGATION OF THE RANCH CLAIMS BONANZA LAKE AREA, VANCOUVER ISLAND BRITISH COLUMBIA

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# CONTINUING INVESTIGATION OF THE RANCH CLAIMS NEAR BONANZA LAKE VANCOUVER ISLAND BRITISH COLUMBIA

## SUMMARY

Geologic sampling and sample analysis was undertaken at the Ranch Claims on northern Vancouver Island during 1998-1999. The purpose was to obtain details of the quality, chemical nature, brightness and other aspects of the white, crystalline limestone deposit which is present on the claims.

The Ranch Claims consist of one modified grid and one two post mineral claim, located in the Nanaimo Mining Division on mineral title map 92L/7W. The claims are located approximately 40 km southeast of Port McNeill, the major town in the area.

Rocks in the area include Karmutsen Formation volcanic rocks of Triassic age, Quatsino Limestone of Triassic age, Parsons Bay Formation, clastic rocks of Triassic age, Batholithic intrusive rocks of Jurassic age, sparsely mineralized skarn of Jurassic age, and unconsolidated sedimentary cover rocks of Pleistocene and Quaternary age.

A significant deposit of White crystalline limestone is present on the Ranch claims. The deposit is formed from the Quatsino Limestone of Triassic age. The limestone has been intruded by plutonic intrusive rocks, which appear to have recrystallized and bleached the limestone into white calcite marble. Skarn has formed along the contact between the limestone and granitic intrusive.

The rock in the deposit is white, off white and light grey in color and is generally pure crystalline calcite marble. The rock contains small amounts of stylolites, pyrite and iron oxide stain.

The hanging wall of the deposit is intrusive rock which appears to dip steeply to vertical, and cuts off the limestone deposit to the south. An embayment of the granitic rock into the limestone along the skarn formation is also possible. The limestone in the deposit is shallow dipping, and the footwall with Karmutsen Volcanics is possibly a low angle fault.

The portion of the deposit of current interest is triangular in plan view, is up to 1000 meters in length, outcrop width varies from 0 to 250 meters, and the deposit is exposed over a vertical range of 100 meters.

Surface exposures and projections allow constraints to be placed on the potential reserves which may be present. Based on the previously defined shape and vertical extent, a possible in place reserve of perhaps 8,000,000 tons is present. White limestone is also present in the northern part of the claims but because of extremely rugged terrane is not accessible, and at present is not considered a resource.

Sampling and visual observations suggest moderate to high brightness and high purity. Dry grind analysis indicate the rock is of high purity with acid insols generally less than 0.5%, and MgCO3 content off less than 3%. Brightness generally ranges from 90-92, and yellow index is very low, nearly always less than 1. Dry grind brightness may be slightly depressed by smearing of trace amounts of pyrite which is disseminated in some of the rock and or occurs within stylolites.

Flotation of composite samples reduced acid insolubles by as much as 50%, to as low as 0.21%. Tint values were slightly increased, but are generally low. Brightness on 270 mesh was increased as much as 1.5 points to greater than 93.3. Flotation yield ranged from 81-90%. Beneficiation by flotation produces a high purity, high brightness ground limestone product suitable for all ground calcium carbonate applications including paper.

## CONTINUED INVESTIGATION OF THE RANCH CLAIMS BONANZA LAKE AREA, VANCOUVER ISLAND, BRITISH COLUMBIA

## INTRODUCTION

Surface sampling and laboratory analysis was undertaken at the Ranch group of mineral claims during 1998 and 1999. The claims are located in the Bonanza Lake area on northern Vancouver Island British Columbia. Outcrop sampling was accomplished by Howard Brown and lab analysis was completed by OMYA Inc., for OMYA St Armand (Industrial Fillers) of Montreal Quebec (Fig. 1), the owners of the claims.

The claims contain a potentially significant deposit of white, high purity, crystalline limestone.

The purpose of the sampling was to obtain details of the variation of quality, brightness, chemical composition, and beneficiation techniques to be utilized in processing of the limestone ore to produce the highest quality products from the deposit.

The work satisfies the assessment requirements for the claims.

## PROPERTY STATUS

The Ranch property consists of one modified grid and one two post mineral claim. The claims are located in the Nanaimo Mining Division on mineral title map 92L/7W. Figure 2 is a claim map.

TABLE 1. RANCH GROUP CLAIMS

| CLAIM NAME | RECORD NO. | UNITS | EXPIRATION |
|---|---|---|---|
| Ranch | 309545(5) | 6 | 11 May 03* |
| Hopsing | 305183 | 1 | 15 Aug 03* |

* Upon acceptance of this report for assessment credit.

All the claims are registered in the name of OMYA St. Armand (formerly Industrial Fillers Ltd.) of Montreal Quebec.

## LOCATION AND ACCESS

The Ranch property is located along the southwest end of Bonanza Lake. Port McNeil, the closest town is about 40 Km (by road) to the northwest. Accommodations and supplies are available at Port McNeil.


Figure 1. Index map showing location of the Ranch Claims.

The property is accessed from Port McNeil by following B.C. Highway 19 south for 10 Km., and Telegraph Cove Road east for 14 Km. Bonanza Lake and the claims are then reached by following the major South Main logging road (Timber West) which runs along the Kokish River and the east side of Bonanza Lake, to where Branch Road 81 crosses the Bonanza River, and provides access to the claims. Branch Roads 81B, 81C, and other unnumbered logging roads provide access onto most of the claim area.

## PHYSIOGRAPHY AND CLIMATE

The Ranch mineral property occurs on part of a steep east facing side hill, which forms the divide between the Bonanza Lake-Kokish River drainage, and the Steele Creek-Nimpkish Lake drainage. Elevations on the claims range from about 200 meters at Bonanza Lake to nearly 700 meters. Slopes range from steep and rugged to inaccessible vertical cliffs.

Lower elevations on the claims are covered by dense second growth fir, and upper slopes are covered by thick first growth fir and cedar. Fairly recent clear cut logging has removed timber from the southwest portion of the claims.

The claims are within the coastal rainforest climatic zone. Precipitation is heavy, occurring as rain during winter, spring, and summer months. Winter snow accumulates at higher elevations.

## SUMMARY OF REGIONAL GEOLOGY

The northern Vancouver Island region is primarily composed of thick island arc type intermediate volcanic rock sequences, and limestone and clastic rocks of Triassic and Jurassic age, which have been intruded by Mesozoic age batholithic rocks. Figure 3 is a regional geologic map of the area surrounding the Ranch Claims.

A thick sequence of andesite and basalt of the Triassic Karmutsen Formation is overlain by limestone of the Quatsino Formation, also of Triassic age. The Quatsino is overlain by the Parsons Bay Formation, a mixed clastic sedimentary sequence of latest Triassic age, which is in turn overlain by the Bonanza Group, composed of intermediate to felsic volcanic rocks of Lower Jurassic age.

All of the previous rocks have been intruded by Upper Jurassic batholithic intrusive rocks of the Island intrusive series, and which range from diorite to quartz monzonite in composition. The intrusive rocks are thought to be responsible for the formation of skarns, and bleaching and recrystallization of susceptible limestones of the Quatsino Limestone to form white, high calcium, crystalline limestone deposits in the Bonanza Lake area.

## LOCAL (PROPERTY) GEOLOGY

Accessible portions of the Ranch property were previously mapped at a scale of 1:5000 on an orthophoto topographic base map, in order to define the white, high purity crystalline limestone

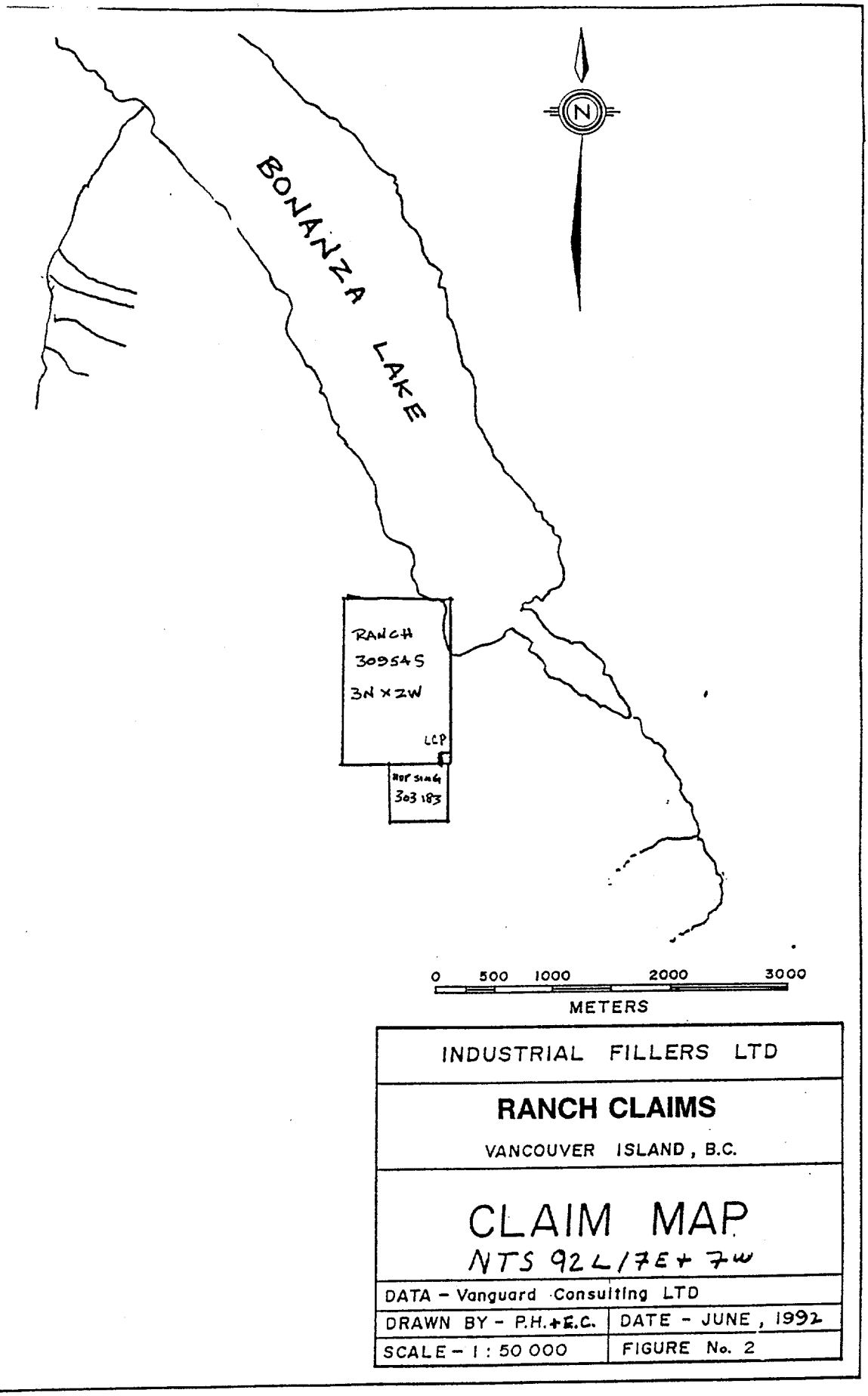


Figure 2. Claim map of the Ranch Claims.

deposit on the property (Brown 1994).

The property contains Triassic Karmutsen volcanic rocks, which are overlain by grey and white Quatsino Limestone of Triassic age, which in turn is overlain by Parsons Bay Formation. These rocks have been intruded by hornblende, biotite granodiorite of the island intrusive series. Thin intermediate dikes were also noted to cut the limestone. Sparsely mineralized skarn has formed along the contact between granitic intrusives and the Quatsino Limestone.

Eight map units were defined, and a brief description is included in Table 2, from oldest to youngest.

TABLE 2. DESCRIPTION OF MAP UNITS RANCH PROPERTY

| UNIT NUMBER | AGE | DESCRIPTION |
|---|---|---|
| UNIT 1 | Triassic | KARMUTSEN FORMATION Buff to greenish grey and black weathering, dark green and black to grey, fine to medium grained, occasionally porphyritic andesite and basalt flows. Occasional pyrite is present, especially near the top of the formation. Upper contact may be a fault or non conformable in the southern part of the claims. |
| UNIT 2 | Triassic | QUATSINO LIMESTONE MIDDLE MEMBER(?) Dark grey weathering, dark grey fine grained crystalline limestone. |
| UNIT 3 | Triassic | QUATSINO LIMESTONE UPPER MEMBER(?) Grey to buff weathering, massive white to very light grey, pure, crystalline limestone. The rock is recrystallized to fine to medium grained white calcite marble, with some grey clouds and streaks. Occasional streaks of limonite and or oxidized pyrite and stylolites were noted. |
| UNIT 4 | Triassic | QUATSINO LIMESTONE GREY LIMESTONE LAYER(S) Grey weathering, medium to dark grey limestone layer(s), interbedded within the white marble member. |
| UNIT 5 | Triassic | QUATSINO LIMESTONE UNDIFFERENTIATED Areas of Quatsino Limestone which because of inaccessibility are undifferentiated. |

| | | |
|---|---|---|
| UNIT 6 | Triassic | PARSONS BAY FORMATION Brown, black, rusty brown and grey weathering thinly interbedded clastic sediments including argillite, mudstone, siltstone, shale, muddy limestone, and chert. Pyrite noted along bedding planes and in black shale. Rocks are often colored red brown by oxidation of pyrite. Outcrop appears to be a screen engulfed by intrusives. |
| UNIT 7 | Jurassic(?) | ALTERED MAFIC DIKE Dark olive green to black altered mafic (diabase) dike(s). |
| UNIT 8 | Jurassic | ISLAND INTRUSIVES Buff weathering, medium grained, hornblende and biotite granodiorite batholithic rocks, and greenish fine grained intrusives near some contacts. |
| UNIT 9 | Jurassic (?) | SKARN Garnet, epidote, quartz skarn with sulfide mineralization including; pyrite, chalcopyrite, sphalerite and coarse grained hematite rosettes and patches. Skarn occurs along contact between granitic intrusives and Upper Quatsino Limestone. |
| UNIT 10 | Pleistocene-Quaternary | Glacial drift, alluvium, talus, soil, fill, stream channel and or lake deposits and or other recent unconsolidated sediments |

Geologic structure in the claim area has several complications. The stratigraphic section appears to be upright, however, part of lower part of the Quatsino Limestone is missing, and the dark grey Quatsino is in contact with the underlying Karmutsen volcanics, suggesting that the contact at the top of the Karmutsen Formation is unconformable or a low angle fault, as part of the lower part of the Quatsino Formation is missing.

Most dips are shallow to the west, however dips adjacent to the granitic contact are steep to the west or near vertical, suggesting that the contact with the granite is generally steeply dipping. The granite contact cuts off the Quatsino limestone and Karmutsen volcanics to the south. The presence of mineralized skarn along the hanging wall contact with the Quatsino Limestone indicates that the contact was originally intrusive, but it is possible that it may have undergone some later fault movement. As noted the granitic intrusive contact appears to be steeply dipping, however the thickest portion of the apparently lenticular shaped skarn formation along the contact with the Quatsino Limestone could reflect an embayment of the granitic intrusive into the Quatsino Limestone.

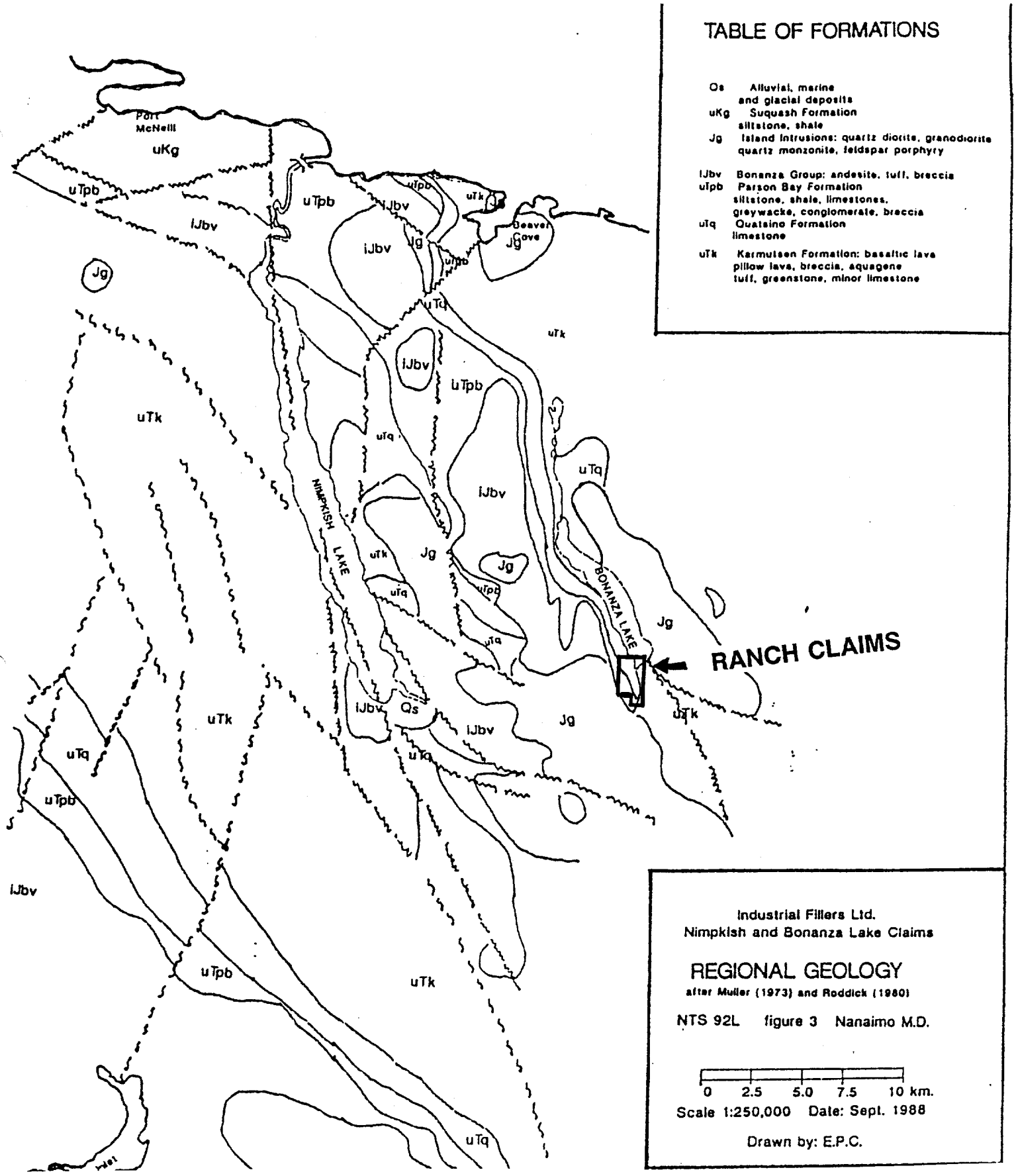


Figure 3. Regional geologic map of the area surrounding the Ranch Claims.

## WHITE CRYSTALLINE LIMESTONE DEPOSIT

### DESCRIPTION

A significant deposit of white crystalline limestone is present on the Ranch claims. The deposit is formed from the Quatsino Limestone of Triassic age. The limestone has been intruded by batholithic rocks, which may be responsible for bleaching and recrystallization of susceptible layers of the limestone, to form pure, white crystalline limestone (marble).

Geologic mapping suggests that the deposit is formed in the Upper part of the Quatsino Limestone. The footwall of the white limestone is dark grey limestone of the Quatsino.

The limestone deposit trends north northwest, and is discontinuously exposed along strike for 2000 meters on the Ranch claims. The northern 800 meters of the limestone forms inaccessible cliffs, and no information on quality was obtained. The limestone dips shallow to the west and thickness of the limestone may be up to 300 meters.

The southern 1/2 (1800 meters) of the limestone band is moderately accessible, and for purposes of this discussion forms a deposit of considerable economic interest. Logging has established several roads which traverse along and across the white limestone deposit, allowing several discontinuous exposures, in addition to the natural cliff exposures.

Observations and sampling indicate rock of the deposit is thick bedded to massive, white, slightly off white, and very light grey in color, and is generally pure, crystalline limestone marble, with small amounts of stylolites, pyrite and iron oxide stain. Samples collected and analyzed for this report were collected along a traverses from hanging wall to footwall.

Samples and exposures suggest a good quality stone suitable for high brightness ground limestone products, particularly with beneficiation by flotation. Samples of other Quatsino Limestone deposits suggest that beneficiation by flotation and fine grinding produces a high brightness, high purity product.

### NATURE OF CONTACTS AND STRUCTURE OF THE DEPOSIT

The hanging wall contact of the white limestone deposit is granitic intrusive rock and exposures and map patterns suggest the contact to dips steeply southwest, to near vertical. The contact is discordant, and cuts across the strike of the limestone at an acute angle, and cuts off the deposit to the south. The contact between the limestone and the granitic rock is clearly intrusive, as indicated by significant skarn development but may in part also have undergone some later fault movement. As noted the granitic intrusive contact appears to be steeply dipping, however the thickest portion of the apparently lenticular shaped skarn formation along the contact with the Quatsino Limestone could reflect an embayment of the granitic intrusive into the Quatsino Limestone.

The white limestone deposit appears to be generally shallow dipping. The footwall contact of the white limestone deposit is dark grey Quatsino Limestone which is underlain by Karmutsen volcanics. The contact with grey Quatsino is conformable, however the underlying contact with Karmutsen may be an unconformity or a low angle fault, as some of the Quatsino Limestone appears to be cut out along the contact, before both Quatsino and Karmutsen are cutoff by the cross cutting and younger intrusive granitic rocks.

## FORMATION OF THE LIMESTONE DEPOSIT

Several processes contributed to the formation of the white, high purity limestone deposit. Limestone is a common rock type, found all over the earth, but white, high purity crystalline limestone deposits are uncommon in nature, are found only in restricted areas, and require several geologic processes over a long period of geologic time to form.

Among the processes are:

1) Deposition of originally pure limestone in high energy agitated, shallow marine environment.
2) Post depositional changes including metamorphism and/or magmatic processes to bleach and recrystallize the rock, and disperse any impurities which may have been present.
3) Structural controls including folding, faulting and orogenic processes to place the rocks in desirable structural settings.
4) Uplift and erosion.
5) Preservation thru geologic time.

Because all the geologic processes are required, deposits of high calcium white crystalline limestone are relatively uncommon in nature, and are vastly different from common limestone. Deposits of high purity, high brightness crystalline limestone suitable for high quality filler and extender applications are limited and only occur in restricted areas.

## USES AND SPECIFICATIONS OF HIGH BRIGHTNESS, HIGH PURITY LIMESTONE

High purity white crystalline limestones have a large number of uses and are classified as white fillers and extenders with value added characteristics. The products are finely ground, high brightness, high purity limestone, and are the whitest, purest, and most valuable per ton of all limestone products.

Desirable characteristics are high brightness (white color), low tint, uniform fine particle size, freedom from grit, and chemical purity. Color and purity are of utmost importance in virtually all applications. Limestone suitable for white fillers and extenders is limited to a minimum of 98% $CaCO_3$, and a maximum of 2% combined $MgCO_3$, $SiO_2$, and all other impurities combined. Brightness requirements range from low 90's to greater than 95. Tint values are generally below 2.0.

The greatest uses of fillers and extenders are paint, paper, rubber products, putty, pottery, a variety of plastics, food, flooring, PVC pipe, white ink, tooth paste, wire coating, glue, caulking compounds,

resins, and polyesters. Uses in the housing industry include ceiling and wall textures, dry wall mud, joint compounds, stucco, and fiberglass roofing shingles.

As can be seen, for most uses, white fillers and extenders requires not only the most pure limestone, but also the whitest color of all limestones. The restricted nature of the deposits and the fact that products are shipped as far as 2000 miles from currently mined sources, indicates a large demand by our society for these valuable products.

## DIMENSIONS OF DEPOSIT AND POTENTIAL RESERVES

The shape of the deposit as presently known, appears to be triangular in plan view, up to 1000 meters long, up to 250 meters wide, tapering down to 0 to the south, and exposed from 0 to over 100 meters vertically. The hanging wall dips near vertical, and the footwall dips shallow to the west.

Drilling is necessary to test the nature of contacts, quality of the rock and continuity at depth, however the surface exposures appear to place certain constraints on the quality and potential quantity of potentially open pit minable white limestone resources available in the deposit.

White limestone is also likely present in the north part of the claims, but due to extremely rugged and cliffy terrane, is not accessible. This rock is at present not considered a potential reserve.

## POTENTIAL RESERVES

Not enough geologic information is available at present to allow the limestone deposit to be placed in the category of reserves, however, surface exposures and subsurface projections appear to place certain constraints on the potential resources which may be present. Based on the previously defined triangular plan view shape of 1000 meters length (3000 feet), 0 to 250 meters width (0 to 750 feet), and 0 to 100 meters vertical extent (0 to 300 feet), apparent steeply dipping hanging wall, and shallow dipping footwall, the deposit appears to have a triangular pyramidal shape, and a potential in place resource of perhaps 8,000,000 tons is possible.. The rock could be mined by open pit methods, with only small quantities of overburden.

As previously noted white limestone may also be present in the north part of the claims, but because of the rugged and cliffy nature of the area and lack of information on this rock at present it is not placed in the potential resource category.

## OUTCROP SAMPLING

Eight 15 lb outcrop samples were collected along traverses from the hanging wall to the footwall exposures on the southern (accessible) portion of the deposit. Samples were trimmed to include only fresh rock with no surface discoloration or soil included. A former logging operation borrow pit is present, in a portion of the deposit and facilitated parts of the sampling. Table 3 is a description of the samples based on visual observation. Samples were sent to the OMYA lab in Proctor Vermont

for analysis. Analysis included dry grind assay as well as flotation analysis of the ground samples.

Table 3. Description of outcrop samples

| SAMPLE NUMBER | LOCATION AND DESCRIPTION |
|---|---|
| R-98-1 | Location approximately 8 feet from hanging wall contact with granite. Light grey medium grained speckled calcite marble containing small amount of pyrite. |
| R-98-2 | Location 20 feet below hanging wall contact with granite. Fine grained white calcite marble. Rock is quite white and contains trace pyrite and chlorite. Trace iron oxide stain on fracture surfaces. |
| R-98-3 | Location along road 25 feet from skarn contact. Fine grained white to off white calcite marble with some light grey mottling and or streaks. Some of the rock has less than 1 percent of disseminated pyrite both oxidized and unoxidized. The oxidation of pyrite has formed some iron oxide stain. Some of the rock has no pyrite. |
| R-98-4 | Location about 85 feet stratigraphically below the hanging wall contact. Rock is generally quite white medium to medium fine grained calcite marble, with occasional traces of pyrite, and minor iron oxide stain on fractures. |
| R-98-4 | Location 120 feet below hanging wall Very light grey to white, fine to medium grained calcite marble, with occasional minor light grey streaks. Trace pyrite in some of the rock, and some iron oxide stain on fracture surfaces. |
| R-98-5 | Location 150 feet below hanging wall south end of borrow pit. White to very light grey, fine to medium grained calcite marble, with occasional minor light grey streaks. Trace pyrite in some of the rock, and some iron oxide stain on fracture surfaces. |
| R-98-6 | Location 135 feet below hanging wall middle of borrow pit. White to very light grey, fine to medium grained calcite marble, with occasional minor light grey streaks. Trace pyrite in some of the rock, and some iron oxide stain on fracture surfaces. |
| R-98-7 | 180 feet below hanging wall north end of borrow pit. Very light grey to white, fine to medium grained calcite marble, with occasional minor light grey streaks. Trace pyrite in some of the rock, and some iron oxide stain on fracture surfaces. |

| | |
|---|---|
| R-98-8 | Road cut 220 feet below hanging wall. White to off white and very light grey calcite marble, trace iron oxide stain on fractures. |

## LAB ANALYSIS OF SAMPLES DRY GRIND RESULTS

The samples were analyzed in the OMYA Vermont Lab. Samples were dry ground to standard OMYA Durcal 5 finess grind (100% -270 mesh and approximately 90% -325 mesh), and were analyzed for %$CaCO_3$, %$MgCO_3$, %$Fe_2O_3$, % acid insols, brightness with Red Green and Blue filters, Tappi brightness and Tint index. The results are shown on Table 4.

Overall all the samples except one were greater than 95% $CaCO_3$. All samples except two had less than 0.7% acid insols. All had less than 0.2% iron oxide. $MgCO_3$ was slightly elevated for the Bonanza Lake area, and most samples had between 2.5 and 3.6% $MgCO_3$. At the north end of Bonanza Lake, the Magnesium content is slightly lower. However The Quatsino in the Benson Lake area contains Magnesium carbonate content commonly 4-5%. Green filter brightness for most samples was between 90.1 and 92.6. The higher quantity of grey resulted in lower brightness. In addition smearing of the trace quantities of pyrite also lowered brightness. Tint index was quite low, with all samples except one with tint less than 1.0, indicating a very low yellow index which is very desirable.

## LAB ANALYSIS FLOTATION TESTS

Samples were composited and flotation tests were performed on the two composited samples. The results which are included on Table 5 indicate Flotation significantly reduced acid insolubles by as much as 50%, to as low as 0.21%. Tint values were slightly increased, but are generally low. Brightness on 270 mesh was increased on average by as much as 1.5 points to greater than 93.3. Flotation yield ranged from 81-90%. Future work will include refinements to the flotation in order to improve product recovery.

Beneficiation by flotation improved the overall quality of the ground limestone, and produces a high purity, high brightness high purity product suitable for all high brightness high purity calcium carbonate applications including paper.

TABLE 4. DRY GRIND ANALYSIS OF RANCH AND HOP SING SAMPLES

## GEOLOGY DEPARTMENT

### BRITISH COLUMBIA

RANCH & HOP SING CLAIMS

| | | CHEMICAL ANALYSES | | | | | BRIGHTNESS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| LAB # | SAMPLE ID | CaCO3 % | MgCO3 % | Fe2O3 % | Acid Insols % | Fineness | Rx | Ry | Rz | Tappi | Index |
| 99-0179 | R-98-1 | 98.93 | 0.44 | 0.06 | 0.56 | -270 | 80.17 | 79.88 | 78.47 | 78.32 | 2.06 |
| 99-0180 | R-98-2 | 94.09 | 3.54 | 0.16 | 2.20 | -270 | 90.25 | 90.13 | 89.82 | 89.66 | 0.39 |
| 99-0181 | R-98-3 | 96.26 | 1.89 | 0.21 | 1.63 | -270 | 85.13 | 84.88 | 84.13 | 83.96 | 1.06 |
| 99-0182 | R-98-4 | 93.41 | 5.95 | 0.15 | 0.48 | -270 | 91.57 | 91.43 | 91.05 | 90.88 | 0.48 |
| 99-0183 | R-98-5 | 95.69 | 3.51 | 0.13 | 0.66 | -270 | 90.87 | 90.67 | 90.23 | 90.06 | 0.61 |
| 99-0184 | R-98-6 | 95.62 | 3.60 | 0.11 | 0.66 | -270 | 92.30 | 92.17 | 91.99 | 91.83 | 0.25 |
| 99-0185 | R-98-7 | 96.99 | 2.81 | 0.12 | 0.07 | -270 | 92.09 | 91.81 | 91.01 | 90.89 | 1.10 |
| 99-0186 | R-98-8 | 97.51 | 2.16 | 0.06 | 0.26 | -270 | 92.78 | 92.60 | 92.04 | 91.93 | 0.72 |

TABLE 5. FLOTATION ANALYSIS OF COMPOSITE SAMPLES RANCH AND HOP SING CLAIMS

# GEOLOGY DEPARTMENT

Report # **99-000073**

## CHEMICAL ANALYSES

## BRIGHTNESS

| LAB # | SAMPLE ID | CaCO3 % | MgCO3 % | Fe2O3 % | Acid Insols % | Fineness | Rx | Ry | Rz | Tappi | Index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **BRITISH COLUMBIA** RANCH & HOP SING CLAIMS | | | | | | | | | | |
| | OUTCROP SAMPLES | | | | | | | | | | |
| 99-0179 | R-98-1 | 98.93 | 0.44 | 0.06 | 0.56 | -270 | 80.17 | 79.88 | 78.47 | 78.32 | 2.06 |
| 99-0180 | R-98-2 | 94.09 | 3.54 | 0.16 | 2.20 | -270 | 90.25 | 90.13 | 89.82 | 89.66 | 0.39 |
| 99-0181 | R-98-3 | 96.26 | 1.89 | 0.21 | 1.63 | -270 | 85.13 | 84.88 | 84.13 | 83.96 | 1.06 |
| 99-0182 | R-98-4 | 93.41 | 5.95 | 0.15 | 0.48 | -270 | 91.57 | 91.43 | 91.05 | 90.88 | 0.48 |
| 99-1086 | Composited in equal parts | | | | 0.99 | | | | | | |
| | Flotation Yield 90% | | | | 0.44 | -270 | 89.04 | 88.43 | 86.24 | 86.11 | 3.08 |
| 99-0183 | R-98-5 | 95.69 | 3.51 | 0.13 | 0.66 | -270 | 90.87 | 90.67 | 90.23 | 90.06 | 0.61 |
| 99-0184 | R-98-6 | 95.62 | 3.60 | 0.11 | 0.66 | -270 | 92.30 | 92.17 | 91.99 | 91.83 | 0.25 |
| 99-0185 | R-98-7 | 96.99 | 2.81 | 0.12 | 0.07 | -270 | 92.09 | 91.81 | 91.01 | 90.89 | 1.10 |
| 99-0186 | R-98-8 | 97.51 | 2.16 | 0.06 | 0.26 | -270 | 92.78 | 92.60 | 92.04 | 91.93 | 0.72 |
| 99-1087 | Composited in equal parts | | | | 0.31 | | | | | | |
| | Flotation Yield 81% | | | | 0.21 | -270 | 93.75 | 93.34 | 91.87 | 91.76 | 1.95 |

# APPENDIX 1
# STATEMENT OF COSTS APPLICABLE TO ASSESSMENT WORK

## STATEMENT OF COSTS DIRECTLY APPLICABLE TO ASSESSMENT WORK

| | |
|---|---|
| FIELD WORK COSTS | |
| Geologist sample collecting 1 day @ $400/day | $400 |
| Geologist travel time Vancouver to Port McNeill and Return 1 day @ $400/day | $400 |
| Meals and lodging | $100 |
| Rental 4 wd vehicle/fuel (2 days) | $100 |
| RT Travel from Vancouver to Port McNeill | $250 |
| Sample shipping (85 lbs) | $ 50 |
| OFFICE COSTS | |
| Analysis of lab results, report, map preparation and copies 2 days @ $400/day | $800 |
| Sample shipping to lab in Vermont | $ 30 |
| LABORATORY COSTS | |
| Sample preparation (split, crush, riffle) 8 samples | $600 |
| Pulverize, Sieve, Dry grind analysis chemical and brightness | $1440 |
| Flotation analysis chemical and brightness | $600 |
| SUBTOTAL COSTS DIRECTLY APPLICABLE TO ASSESSMENT | $4770 |
| + 10% ADMINISTRATIVE OVERHEAD | $ 477 |
| TOTAL COSTS DIRECTLY APPLICABLE TO ASSESSMENT | $5247 |

# APPENDIX 2
# SUMMARY OF AUTHORS PROFESSIONAL EXPERIENCE

**HOWARD J. BROWN, OMYA (CALIFORNIA) INC.**
**SUMMARY OF PROFESSIONAL EXPERIENCE**
**April 10, 1999**

Graduate of California State University, Northridge, receiving a Bachelor Degree in in 1975.

More than 22 years professional experience in positions of responsibility as an Exploration and Mining Geologist/Mining Engineer in the mining industry in Western North America. Experience includes Uranium, Gold, and a large variety of Industrial Minerals during the last 20 years.

Currently employed by OMYA (California) Inc. since 1979. Previously employed by Noranda Exploration, and Freeport Gold Co. (FMC).

I have participated in over 110 industrial mineral evaluation and exploration projects in North America, ranging from local to regional in extent from British Columbia to Southern Mexico. Projects have included all phases of conceptual model development thru discovery and orebody delineation, of both metallic and a large number of industrial mineral deposits.

More than 15 geologic mapping, sampling and drilling projects involving white crystalline limestone deposits in British Columbia.

Mine permitting experiences include preparation and approval of Plans of Operations and Reclamation Plans, application and permitting for several large scale currently active industrial mineral mines, and preparation and approval of comprehensive phased reclamation plans for large scale multi-mine operations in several states, and thru several regulatory agencies at Federal, State and Local levels.

Mine design and engineering experience includes all mine development aspects of ten (10) currently operational mines including, compliance with regulations, geotechnical analysis, geology and reserve definition, mine engineering and planning including conceptual and detailed short and long term engineering design, equipment selection, economics, and reclamation planning.

Mine management and production experience includes long and short term production and development planning, scheduling, mine mapping, equipment selection, inventory calculations and management, cost analysis, and budget preparation.

Author of more than 22 published papers and abstracts on a variety of geological and economic geology topics for various professional societies and technical journals.

Considered by peers to be an expert on Paleozoic stratigraphy and geology of the Mojave Desert region, of southern California, and an expert on limestone limestone deposits in western North America.

PLATE 1

# GEOLOGIC MAP OF THE RANCH AND HOPSING CLAIMS BONANZA LAKE AREA VANCOUVER ISLAND

GEOLOGIC MAPPING AND DRAFTING H. J. BROWN, PSC, 6-94

BONANZA LAKE

NOT MAPPED

NOT MAPPED

LCP
RANCH
309545
3N X 2W

HOPSING
303183

5578500 N
659500 E
5576000 N
659500 E

RANCH AND HOPSING CLAIMS

METERS
100 50 0 100 200 300 400 500

SCALE: 1:5000

CONTOUR INTERVAL 10 METERS
PHOTO FLOWN AUGUST, 1989
N.T.S.: 92L/7W

Digital data by HUGH HAMILTON LIMITED

**ROCK UNITS**

| OUTCROP | INFERRED | DESCRIPTION |
|---|---|---|
| 10 | 10 | GLACIAL DRIFT, ALLUVIUM, TALUS, SOIL, FILL, STREAM CHANNEL OR LAKE DEPOSITS OR OTHER UNCONSOLIDATED SEDIMENTS OR BEDROCK COVER |
| 9 | 9 | **SKARN** GARNET, EPIDOTE SKARN WITH SULFIDE AND IRON OXIDE MINERALIZATION |
| 8 | 8 | **ISLAND INTRUSIVES** BUFF WEATHERING HORNBLENDE AND BIOTITE GRANODIORITE AND ALTERED INTRUSIVES NEAR CONTACTS |
| 7 | 7 | **ALTERED MAFIC DIKE** DARK OLIVE GREEN DIABASE DIKE |
| 6 | 6 | **PARSONS BAY FORMATION** RUSTY BROWN, BLACK AND GREY THIN BEDDED CLASTIC SEDIMENTS |
| 5 | 5 | **QUATSINO LIMESTONE UNDIFFERENTIATED** |
| 4 | 4 | **QUATSINO LIMESTONE GREY LIMESTONE LAYER(S)** MEDIUM TO DARK GREY LIMESTONE LAYERS INTER-BEDDED WITHIN WHITE MARBLE MEMBER |
| 3 | 3 | **QUATSINO LIMESTONE UPPER MEMBER** MASSIVE WHITE TO LIGHT GREY CRYSTALLINE LIMESTONE |
| 2 | 2 | **QUATSINO LIMESTONE MIDDLE MEMBER** DARK GREY FINE GRAINED LIMESTONE |
| 1 | 1 | **KARMUTSEN FORMATION** GREENISH GREY TO BLACK OCCASIONALLY PORPHYRITIC ANDESITE AND BASALT |

**SYMBOLS**

- STRIKE AND DIP OF BEDDING OR FOLIATION
- CONTACT, APPROXIMATELY LOCATED
- HIGH ANGLE FAULT APPROXIMATELY LOCATED
- LOW ANGLE FAULT APPROXIMATELY LOCATED
- ③ SAMPLE LOCATION 1998
- LOGGING ROADS