MARBLE RIDGE

672401

RESOURCES

QUAD GROUP LIMESTONE

CONTENTS

LIST OF FIGURES

RESOURCES

QUAD GROUP LIMESTONE

INTRODUCTION

The Quad mineral claims and quarry lease are staked on a large crystalline Marble and Limestone outcrop.
Because of the multitude of uses limestone is amoung the most used industrial in B.C. Although Limestone is a relatively common mineral large high grade deposits are limited because of impurities during deposition and secondary mineral replacement during diagenis such as: Silicon,Iron,and Magnesium Other considerations are ease of access and distance of transport. The Limestone group meets all of the criteria of transortation and accessabilty being only 54Km from Quesnel on very good two lane allseason gravel road. Assays from surface samples have produced very good results of 98%-99% $CaCO_3$ in the marbles over a large area. (fig.)
Microcrystalline limestone sampled near fringe areas and fault zones showed dolomitic intrusion of up to 17.6%
From these results exist several possibilties for marketing
a) The high grade marbles of over 97% $CaCO_3$ are prime materials for industries such as Cariboo Pulp and Paper for kilning to CaO with an annual requirement of 20-30 thousand tonnes as well acid neutralization for mining and enviormental uses.

RESOURCES

QUAD GROUP LIMESTONE

INTRODUCTION

b) A 5-6 thousand tonne per year potential market in Forestry and Agriculture exsists for Dolomitic limestone finely ground to 20 mesh to 100 mesh which is widely used for soil conditioners to improve soil structure,nitrogen fixation, available microelements phosphate and increased cation exchange rates. Other products whould include large landscaping stone, stucco dash and decorative aggregates. A large Diorite-Granodiorite intrusion 100 meters to the North East generates a possibilty of a pyrometasomatic mineral deposit which are typically developed at contacts of Marble-Limestone and Diorite-Granodiorite itrusives. High temperture solution carrying ore components pass from igneous rock into the host Marble or Limestone, a few typical deposits of this class are:

1) Galena
2) Pyrite
3) Chalcopyrite
4) Bornite
5) Blende
6) Molybdenite
7) Gold

QUAD GROUP LIMESTONE

LOCATION AND ACCESS

The Quad Group of mineral claims are located 53 Km South 11° West from Quesnel on Narcosli Creek in the Cariboo Mining District map reference 93b 10e with access via the Garner Road west of the Fraser River. (fig.1)

STATUS OF PROPERTY

Two mineral claims Quad No.1 and Quad No.2 were staked by A.WATSON of 1482 Beach Cresent Quesnel B.C. on the 21st of April 1986 at 11:00 AM. An application for Quarry lease was submitted on April 10 1988 at the Williams Lake Minstry of Forest and Lands office which has been approved on April 5 1990 with atotal area of 4.486 hectares.

GEOMORPHOLOGY

The Quad mineral claims border on the West Fraser Plateau and the Fraser Basin. Topography varies from steep erosinal scarps to gently rolling plateaus formed primarly by dipping Hornblend-Andesite and Olivine-Basalts of the Miocene and Pleistocene glaciation which has generally modifed the valley profiles into the typical U shape. Bedrock of the area is predominantly faulted volcanic and sedimentary rock with scattered intrusive Granites,Granodiorites,and diorites and areas of thermal and dymathermal metamorphic rock.

RESOURCES

QUAD GROUP LIMESTONE

BEDROCK GEOLOGY

The formation of Calcite (Limestone-Marble) on the Quad group has a exposed physical size which can be trased 450 meters in length 80 meters in depth and varing inwith from 100-200 meters. The structure of the Marbles is massiive and trends generally South West, there are very few fractures or joints, there are however occasional wide spaced layers of Calcareous-Arenaceous sediment materials varing from 2-15 mm in thickness throughout the North East end of the formation indicating a steep dip of 70-80° East North East decreasing to 45° near the South West end where the mircocrystlline limestone formation is cross cut by North-South trending fault.

The Calcite formation varies from compact crystalline limestone on the South West end of the property to recrystallized marbles on the North East end where it appears that high temperature thermal metamorphism has resulted in the recrystallization of near pure limestones into a even grained granoblastic textured marble having the apperance of coarse grained white sugar.

QUAD GROUP LIMESTONE

BEDROCK GEOLOGY (cont.)

Thermal metamorphisum usually involves no mineral change in mineral composition of Calcite, but when changes do occur they are a result of additional minerals such as: Silicon,Aluminum, Iron,Magnesium,Chlorine,Fluorine,and Boron. Peliminary sampling taken at the surface over the recrystallized area would inacate that no siliceous,ferruginous of dolomitic remineralization has occured.

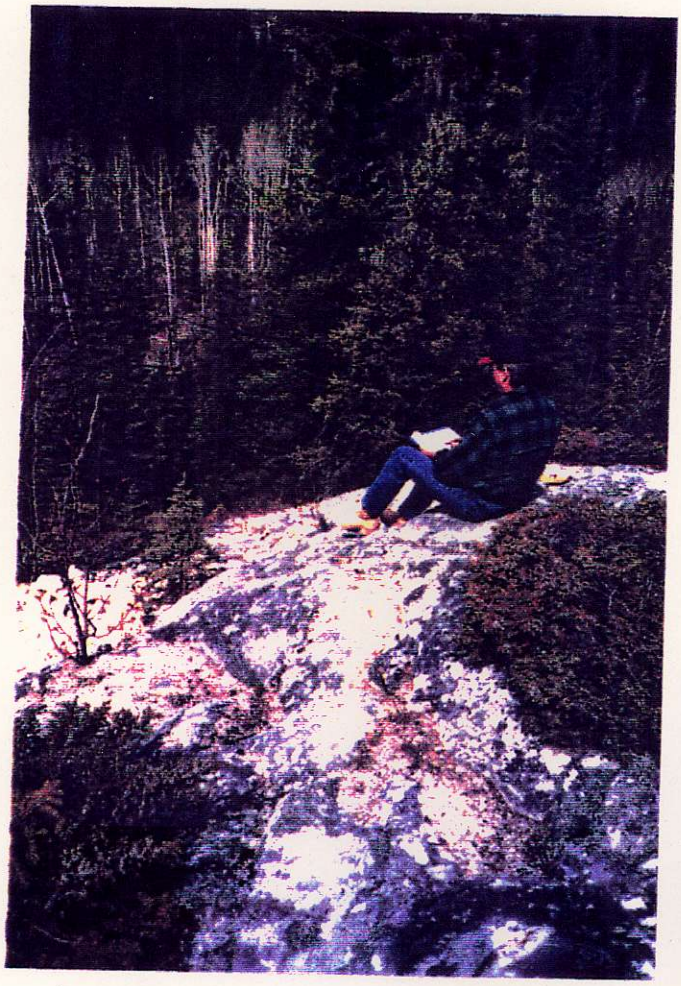
Dolomitic intrusion was noted in the limestones in areas of alteration near outer boundaries and faults with assay readings of up to 17%.

Fig.# 9

Marbles showing massive structure. Looking East

BEDROCK GEOLOGY (Marble)

Fig #10



80 meter high face of coarse crystalline marles looking West

Fig. # 11

Coarse crystalline marbles looking North East

BEDROCK GEOLOGY (Limestone)

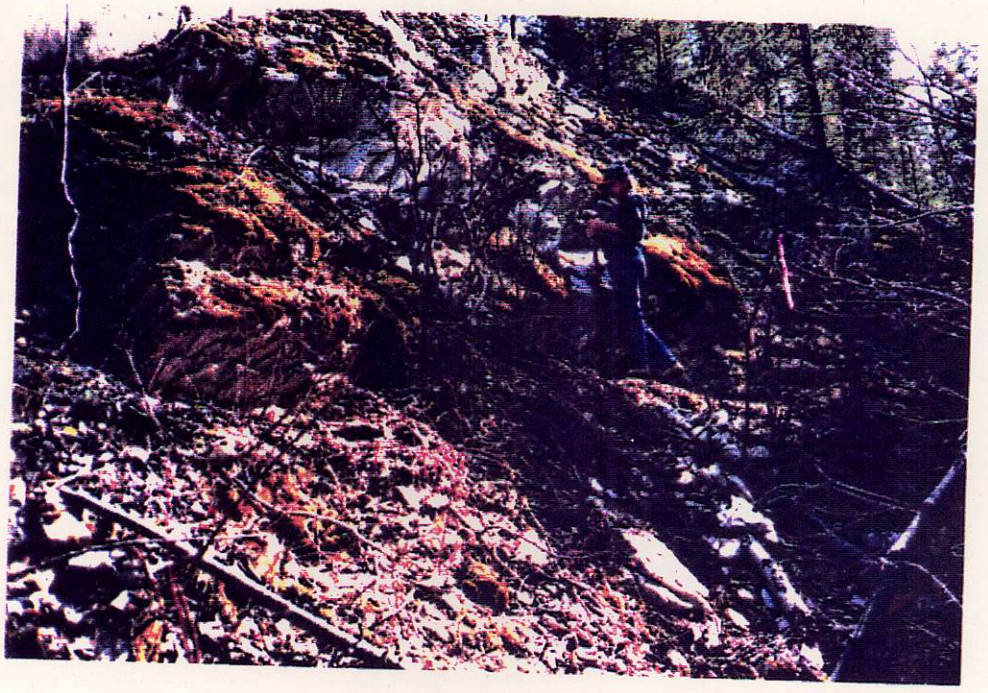


Fig. 12

Mircocrystalline Limestones dipping 45° NE in fault

Fig. # 13

Mircocrystalline Limestones, enterance of pit in the fault

RESOURCES

QUAD GROUP LIMESTONE

MINERALOGY AND CHEMICAL ANALYSIS

Marble and Limestone are both carbonate minerals composed mainly of the mineral Calcite which in its purest form would contain 56% CaO and 44% CO_2. This is not common because accessory minerals that may be mixed during deposition or intrude in diagenesis. Futher residuial impurties may also be deposited in surface materials from chemical erosion of water on surrounding rocks and minerals.

Surface samples of marble show almost no accessory minerals or impurties due to these processes, as verified by chemical analysis from Chemex Labs. Tests #1-2 cert# A8822507 (Fig.16)

Sample #1 .55 SiO_2 .17 Fe_2O_3 .56 MgO

Sample #2 .26 SiO_2 .02 Fe_2O_3 .40 MgO

For impurities well below Cariboo Pulp and Paper specifed limit.With sample #1 CaO of 54.97 or 96.99% $CaCO_3$

sample #2 CaO of 55.49% or 97.71% $CaCO_3$

In December of 1988 two samples were taken from Cariboo Pulp and Paper stock pile (samples#1+2) delivered from the Purden Lake area of grey mircocrystalline limestone and were analyzied with sample #3 of white microcrystalline limestone from the Quad limestone claims. THe results of #1+2 Showing very high impurities in MgO

Cert # A8728354

Sample #1 1.27 SiO_2 and 17.09 MgO

Sample #2 1.17 SiO_2 and 17.60 MgO

RESOURCES

QUAD GROUP LIMESTONE

MINERALOGY AND CHEMICAL ANALYSIS (Cont.)

These are well over specifications in impurities, with only 33% CaO or 78% $CaCO_3$

Sample #3 was slightly over in MgO but with in specifications in SiO_2 and Fe_2O_3 and a 53.47% CaO or 96.40% $CaCO_3$ content.

Sample #3 .50 SiO_2 .31 Fe_2O_3 1.33 MgO

Other surface tests from the Quad group have indicated low SiO_2, Fe_2O_3 and MgO impurities (Fig. 15) (Steel Brothers) although areas of high MgO intrusion have been noted near outer limits of the formation and areas of high tectonic pressures (fault zones) with magnesium oxide percentages of 15% to 17% these magnesium intrusions appear to be more prevalent in the limestones than in the marbles. there are at least two explanations for these high MgO contents which may be a result of Mg intrusion during tectonic activity or deposition of Mg ions from sea water.

Although suface marbles show almost no impurities it is speculated that samples of greater depth should result in near purity because of reduced surface leaching and subtantial reduction in residual impurities left in surface rock from chemical weathering of surrounding glacial tills and volcanic rocks.

RESOURCES

QUAD GROUP LIMESTONE

MINERALOGY OF PYROMETASOMATIC DEPOSITS

Rock type and mineral assemblage of sedimentary and metamorphic rocks of this area would indicate this limestone-marble formation to be of the Cache Creek Group of the upper paleozoic (240 - 360 my.) because of its apperent age and close proximity to a diorite-grano diorite intrusives of a younger age (trassic-jurassic 200my) indicates that high heat of up to 900°C and pressures of 10 Kb probably caused contact metaphosing of mircocrystlline limestones to coarse grained marbles. these conditions present a high likelihood of pyrometasomatic ore deposition if proper accessory minerals are introduced into the calcareous rock. Pyrometasomatic ore deposits occur especially in any zone resembling a roof to intrusion, and irregular in shape. (Fig #6) Minerallized soultions utilize any favorable paths through coarse grained structures, joints, bedding planes or contact zones.

Typical deposits of interest for commercial value would be metalic ore minerals such as:

1) Chalcopyrite
2) Molybdenite
3) Bornite
4) Galena
5) Gold

RESOURCES

QUAD GROUP LIMESTONE

RECOMMENDATIONS

Even though surface sampling has indicated the marbles are of sufficent high grade and apparent volumes for present reserves a two phase program should be implemented to establish a quarry plan for present and future expansion and reclamation of area.

PHASE 1

Preparation of Area

1) Detailed gridding and geological mapping of area.
2) Blasting and trenching with specified interval chip sampling to establish CaO content.
3) Up grading of main access road and extend drill access roads.
4) Preparation of quarry face and crushing site, including determining of soil hydrology and lagoon system

PHASE 2

Advanced Exploration

Magnetometer and refraction seismic survey data would be used to establish grade of materials to be quarried from core samples analyzed at specified intervals.

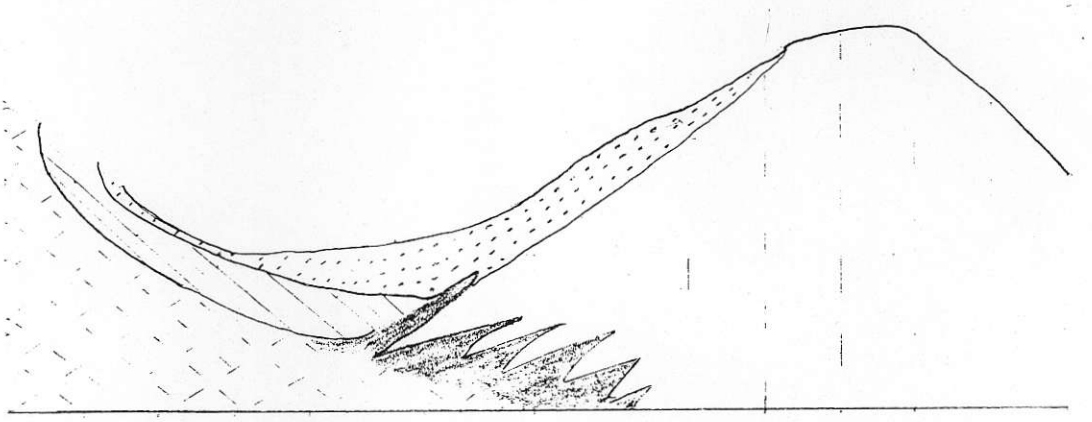
Core sample analysis would also be used to determine total reserves of both high grade material for CaO and dolomitized materials for soil conditioners and other industrial uses.

MARBLE RIDGE

Fig.# 6

RESOURCES

PYROMETASOMATIC MINERAL DEPOSITS



Coarse crained marbles

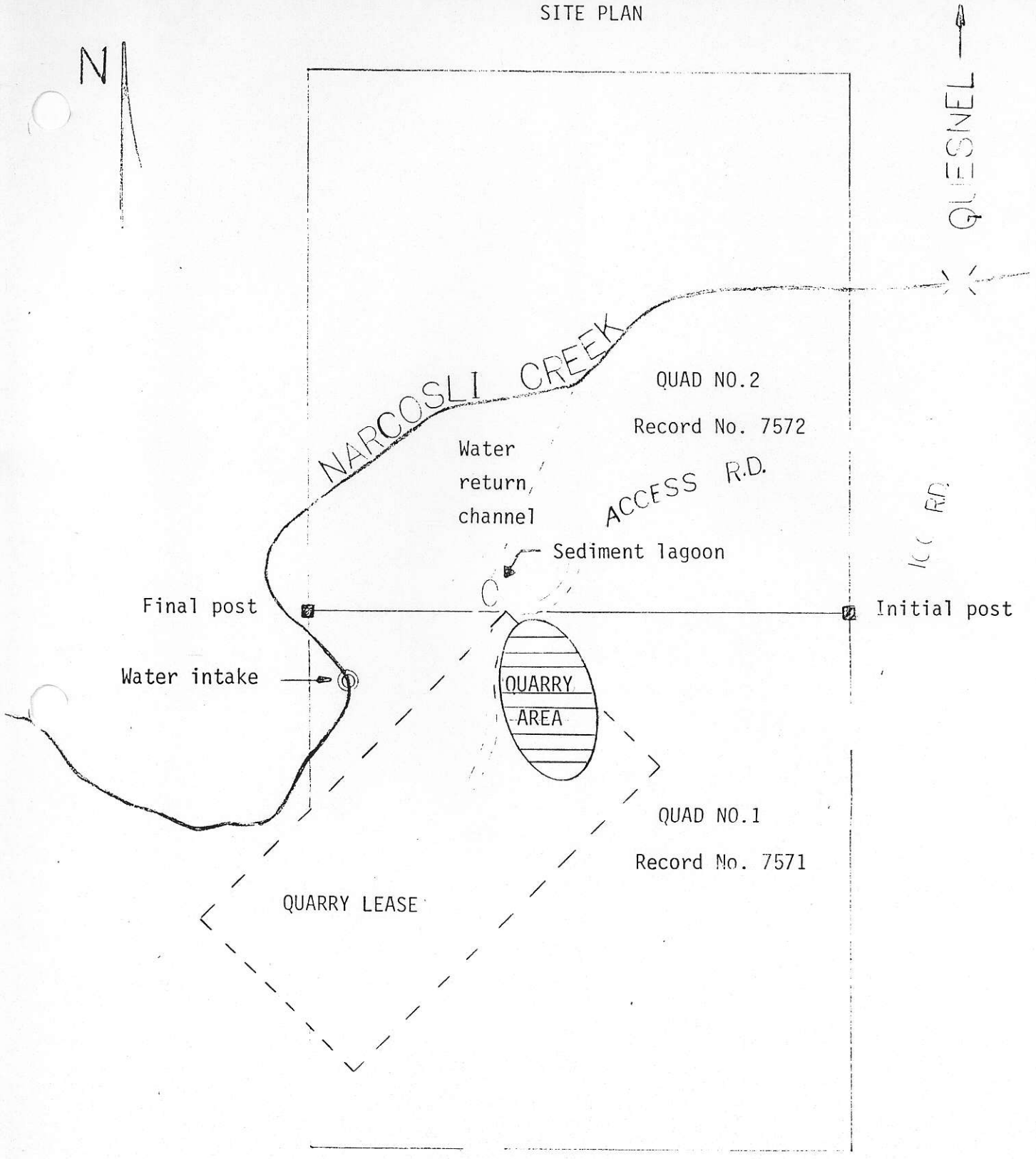
Hornfelsic rock

Intrusive diorite and granodiorites

Gravels and tillites

Mineralized zone

SITE PLAN

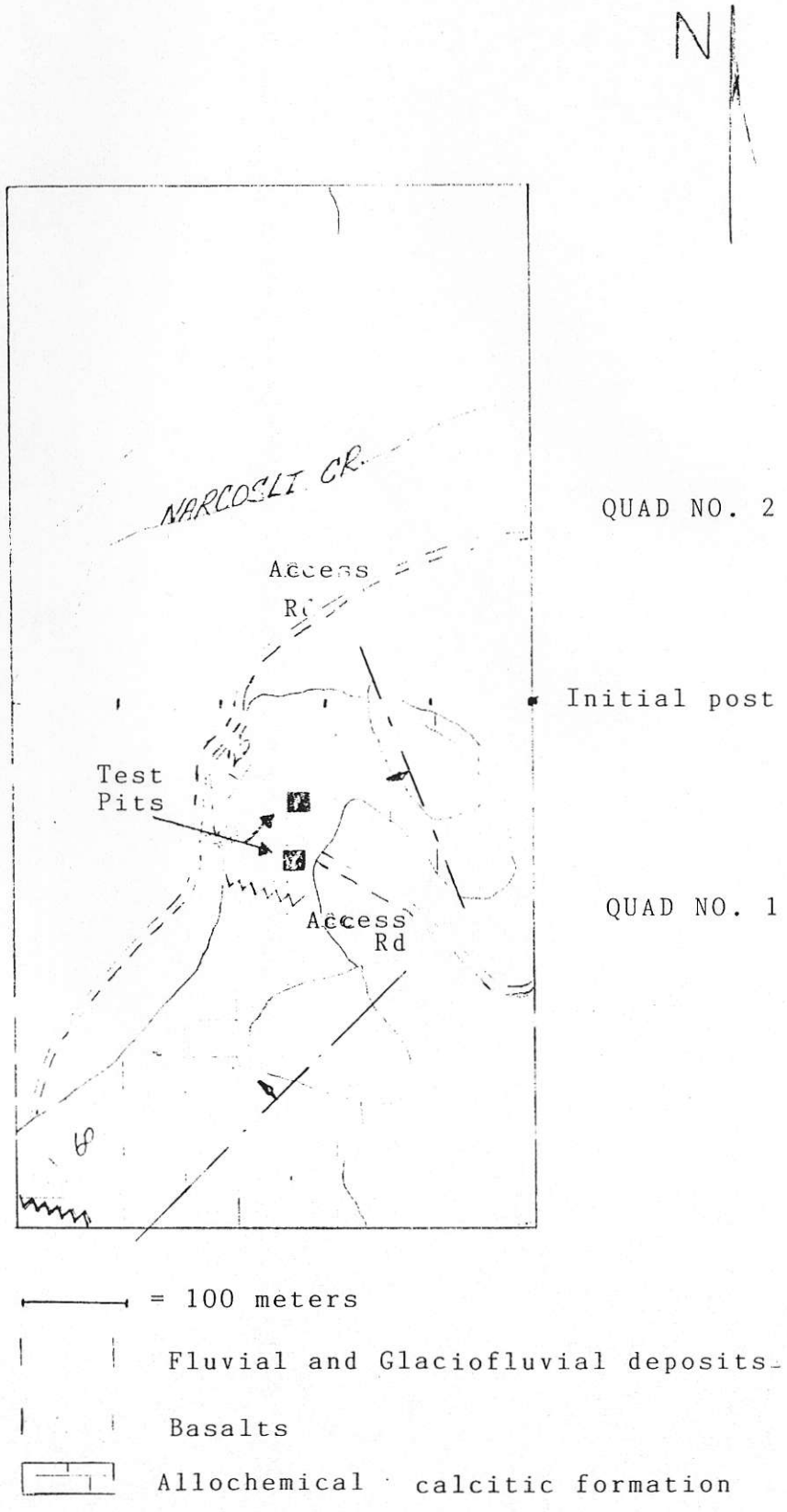


Water intake and sediment treatment lagoon located near Narcosli cr.

EXPLORATION AND FORMATION MAP

QUAD NO.1 and QUAD NO.2

Fig.# 5

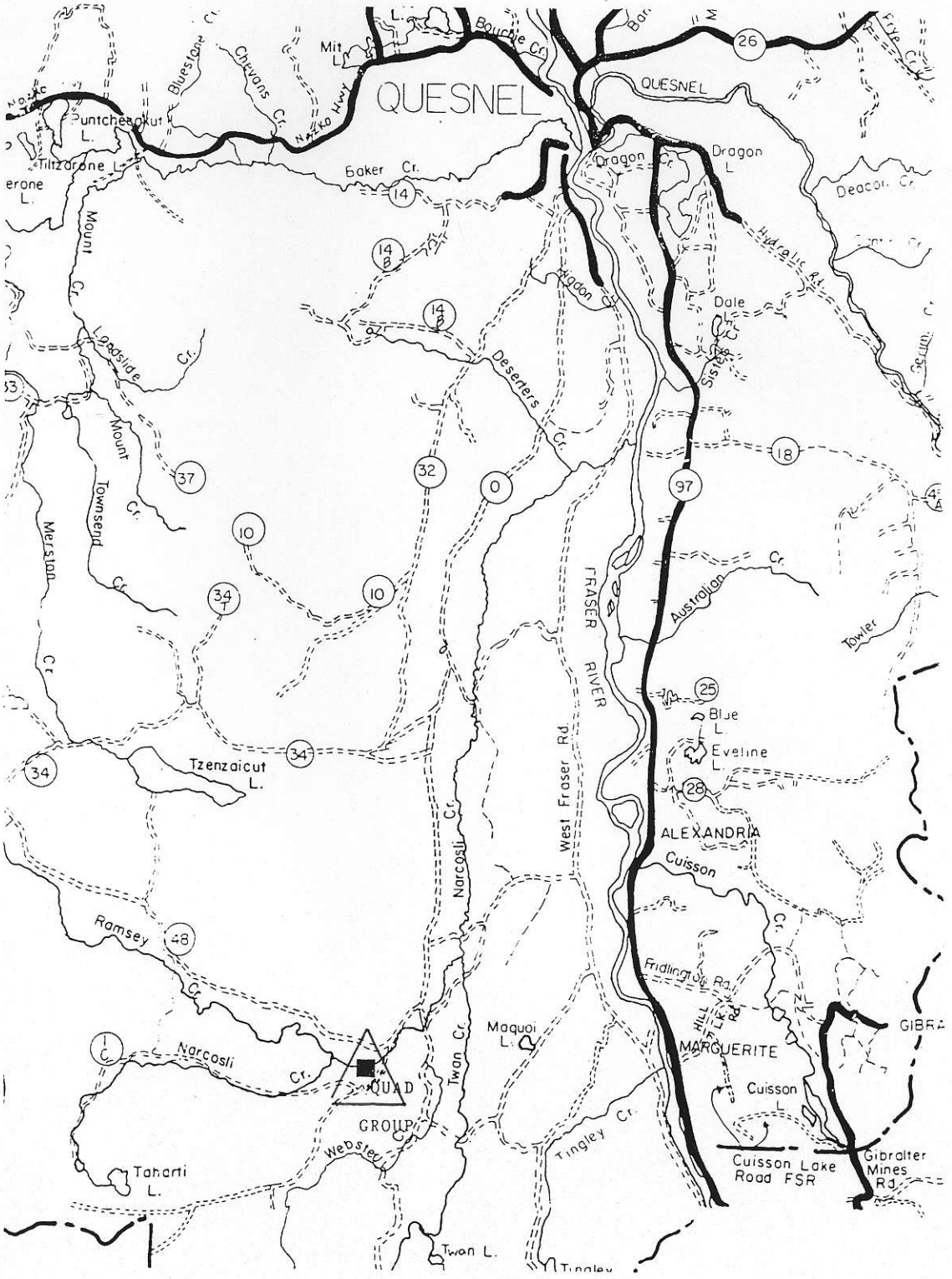


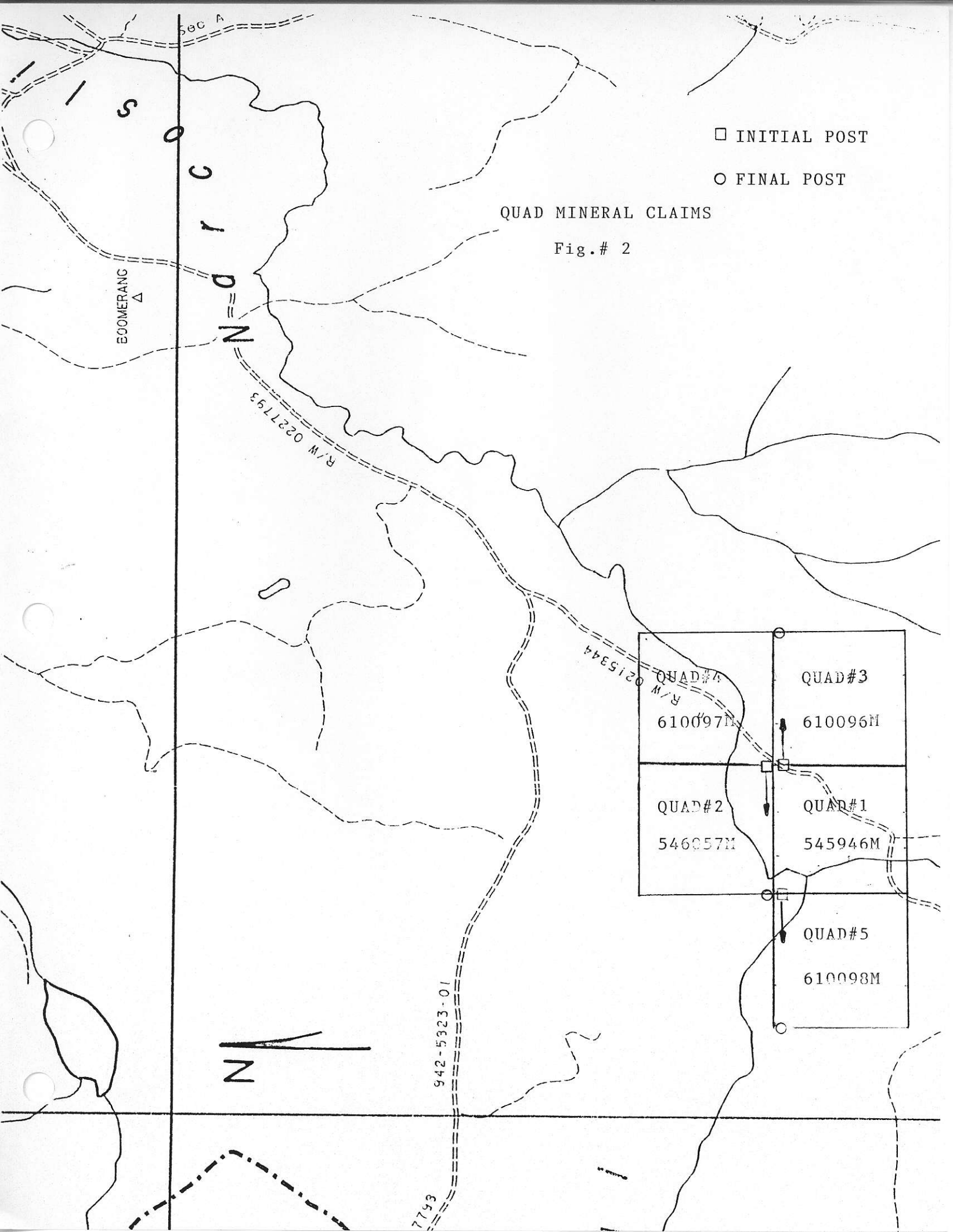
MARBLE RIDGE

RESOURCES

QUAD GROUP LIMESTONE

LOCATION MAP





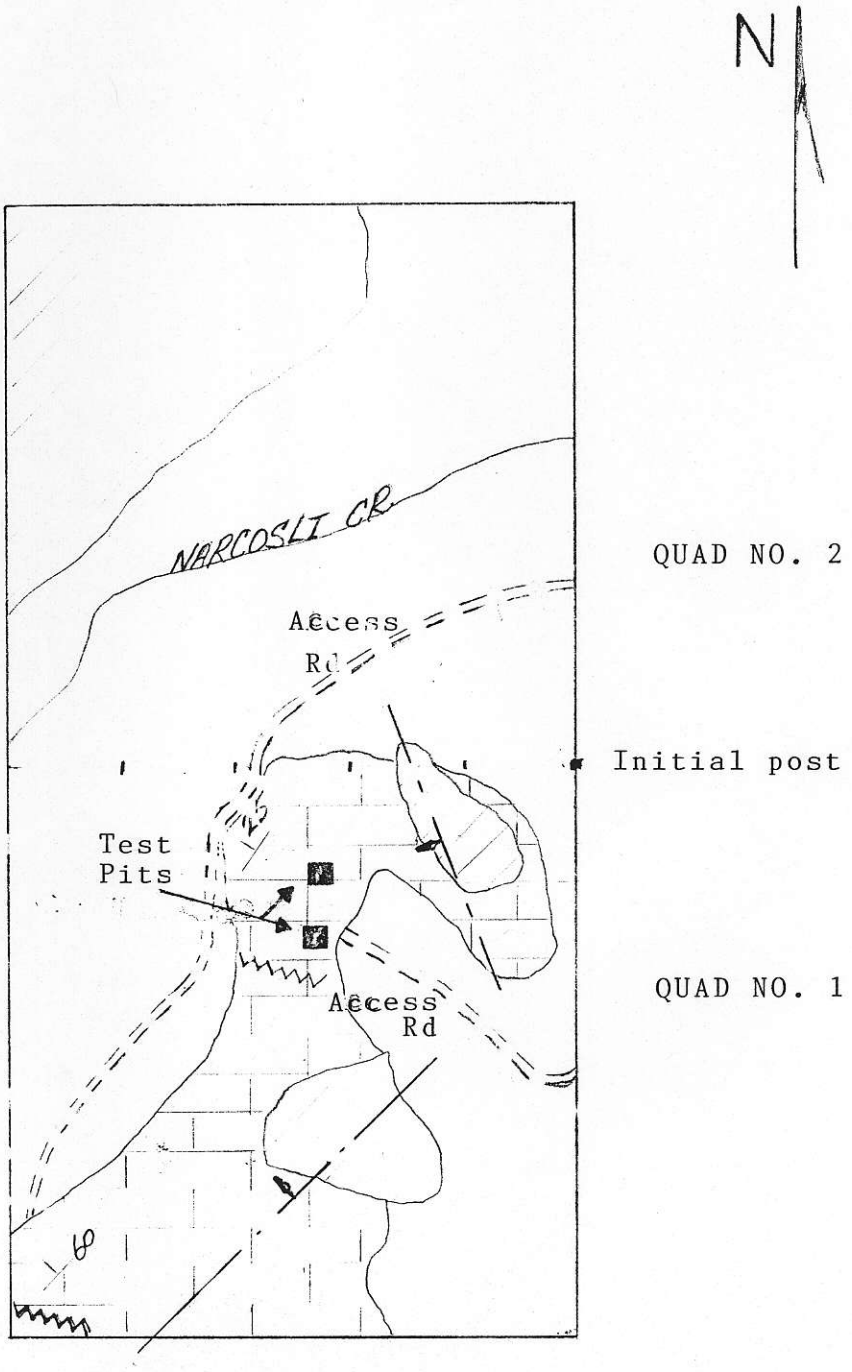
QUAD MINERAL CLAIMS

Fig.# 2

EXPLORATION AND FORMATION MAP

QUAD NO.1 and QUAD NO.2

Fig.# 5



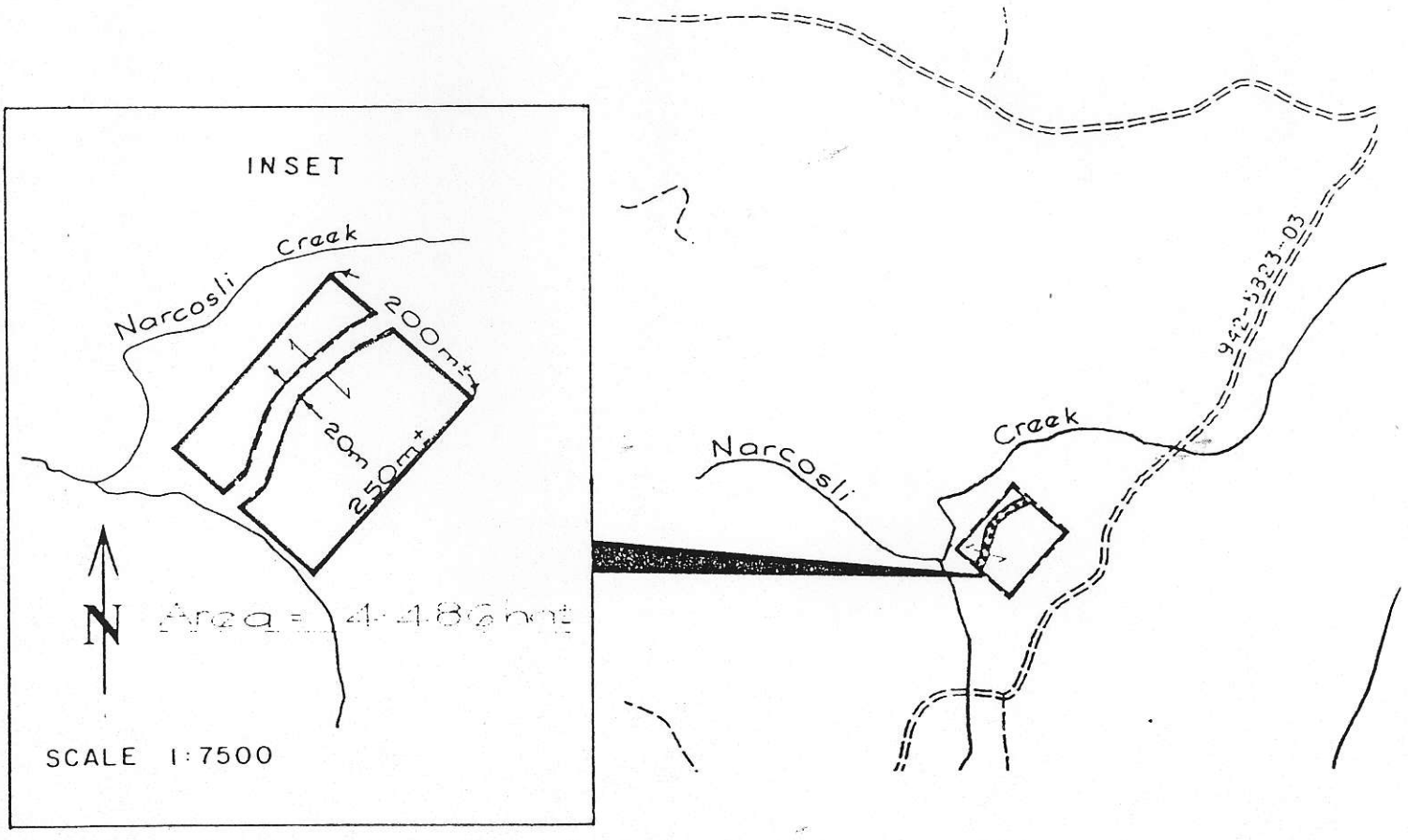
MARBLE RIDGE

RESOURCES

Fig.# 8

LIMESTONE QUARRY MAP

1.2 Sketch Plan



Scale 1:20000

MARBLE RIDGE

RESOURCES

AUGUST 21,1989

Projected Costs and Profits

3/4 in.	Lime Rock (Pulp Mill)	30,000 Tons
3/4 in	Decorator Rock	4,000 Tons
	Soil Conditioner	800 Tons
	Large Rock (Landscaping)	200 Tons
	Stucco Dash	--

Costs per Ton

Bulldozing	2.00 per Ton	on 34,000 Ton	= 68,000.00
Drilling	1.50 per Ton	on 34,000 Ton	= 51,000.00
Blasting	1.00 per Ton	on 34,000 Ton	= 34,000.00
Crushing	4.00 per Ton	on 34,000 Ton	=136,000.00
Loading	1.00 per Ton	on 34,000 Ton	= 34,000.00
Hauling	7.00 per Ton	on 34,000 ton	228,000.00
Total	16.00 per Ton		544,000.00

Cariboo Pulp and Paper	30,000 ton	810,000.00	at 27.00
Decorator Rock	4,000 ton	140,000.00	at 34.00
Soil Conditioner	800 ton	32,000.00	at 40.00
Large Rock	200 ton	10,000.00	at 50.00

Fig. # 15

#
STEELS VCR

STEEL LIME CGY
20 MAY 86

ATTN: J.B. JORDON

Platinum / Quick Lime
Sample

ANALYSIS OF LIMESTONE SAMPLE NO. 5BC

L.O.I.	44.5 PER CENT
SILICA	0.3
R203	0.2
CAO	52.8
MGO	2.4

Cariboo

Fig.# 14

September 26, 1988

Gentlemen:

We would be pleased to receive your quotations for 7,000 tons of Limerock to the following specifications:

1. Material quality - CaC03 - 97% MIN.
   Si02 - 1.00% MAX.
   Mg0 - 1.00% MAX.
   R203 - 0.50% MAX.

2. Material size - a) ½" to 3/4" ronnd hole screened and washed.
   b) Fines - 0% at screen site.
   c) Oversize - 0% at screen site.

3. Site visitation and testing by CPP personnel to be conducted at random upon notification.

Material required prior to freezeup, 1988.

Please submit your quotation in duplicate, to the attention of the undersigned, as soon as possible.

Thank you,

CARIBOO PULP & PAPER COMPANY

L.D. Ross
Purchasing Agent

LD/lh

Cariboo Pulp & Paper Company, P.O. Box 7500, Quesnel, B.C. V2J 3J6 Telephone: (604) 992-9231 Telex: 047-82538

Chemex Labs Ltd.
Analytical Chemists * Geochemists * Registered Assayers
212 BROOKSBANK AVE., NORTH VANCOUVER,
BRITISH COLUMBIA, CANADA V7J-2C1
PHONE (604) 984-0221

To: WATSON, ARCHIE
1482 BEACH CR.
QUESNEL, BC
V2J 4J6
Project :
Comments:

Fig.# 16

**Page No. : 1
Tot. Pages: 1
Date : 12-JAN-88
Invoice # : I-8728354
P.O. # :

CERTIFICATE OF ANALYSIS A8728354

SAMPLE DESCRIPTION	PREP CODE		SiO2 %	Al2O3 %	Fe2O3 %	MgO %	CaO %	Na2O %	K2O %	TiO2 %	P2O5 %	MnO %	BaO %	LOI %	TOTAL %	
SAMPLE 1	205	232	1.27	0.48	0.43	17.09	33.19	0.21	0.47	0.01	0.05	< 0.01	< 0.01	44.91	98.14	
SAMPLE 2	205	232	1.17	0.62	0.46	17.60	33.01	0.19	0.60	0.02	0.05	< 0.01	< 0.01	45.10	98.85	
SAMPLE 3	205	232	0.50	0.32	0.31	1.33	53.47	0.17	0.47	0.01	0.05	0.01	< 0.01	42.93	99.59	

CERTIFICATION :

Chemex Labs Ltd.
Analytical Chemists * Geochemists * Registered Assayers
212 BROOKSBANK AVE., NORTH VANCOUVER,
BRITISH COLUMBIA, CANADA V7J-2C1
PHONE (604) 984-0221

To: WATSON, ARCHIE
1482 BEACH CR.
QUESNEL, BC
V2J 4J6

Project :
Comments:

Fig.# 16

**Page No. :1
Tot. Pages: 1
Date :21-SEP-88
Invoice # :I-8822507
P.O. # :NONE

CERTIFICATE OF ANALYSIS A8822507

SAMPLE DESCRIPTION	PREP CODE	SiO2 %	Al2O3 %	Fe2O3 %	MgO %	CaO %	Na2O %	K2O %	TiO2 %	P2O5 %	MnO %	BaO %	LOI %	TOTAL %
SURFACE SAMPLE 1	205 232	0.55	0.21	0.17	0.56	54.97	0.09	0.98	0.01	< 0.01	< 0.01	< 0.01	42.02	99.60
SURFACE SAMPLE 2	205 232	0.26	0.14	0.02	0.40	55.49	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	42.22	98.66

CERTIFICATION : B.C.