MAMMOTH
GEOLOGICAL LTD.

604 Noowick Road, R.R.1,
Mill Bay, B.C. Canada V0R 2P0

Phone : (250) 743-8228 Fax : (250) 743-8228
email : mammoth@cow-net.com

INITIAL ASSESSMENT

OF THE

RENFREW CREEK PROPERTY

Victoria Mining Division
Vancouver Island, B.C.

FOR

MAMMOTH GEOLOGICAL LTD.

By; R.Tim Henneberry, P.Geo.
November 30, 1999

SUMMARY

The Renfrew Creek Property presently consists of 4 units, totaling 100 hectares. The property was staked as a potential source of white limestone for aggregates and industrial fillers.

The property was briefly explored during staking. Previous exploration consisted of quarrying test blocks to test the suitability of the stone for marble dimension stone.

The property is underlain by steeply dipping, thickly bedded, white to grey-white limestone of the Triassic Quatsino Formation. The stone outcrops as a distinct knob of ± 400 metres by 400 metres on the west side of upper Renfrew Creek.

A program of mapping, sampling and diamond drilling is recommended. Total cost is estimated at $150,000.

The cost of the exploration program completed during staking is $900.

TABLE OF CONTENTS

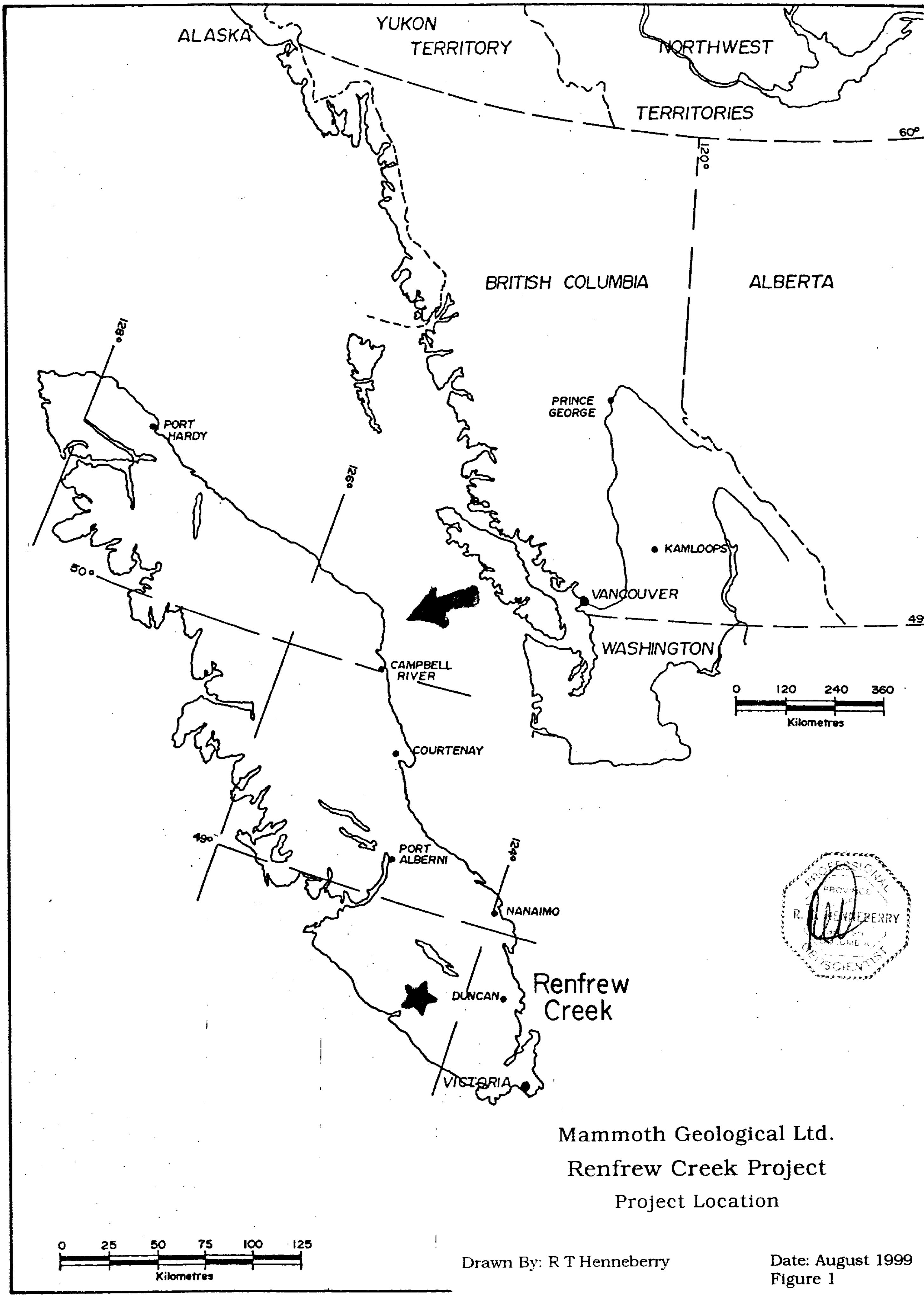
LIST OF FIGURES

APPENDIX

INTRODUCTION

The purpose of this report is to document the observations made of the limestone on the Renfrew Creek property. A preliminary examination was made on December 2, 1998.

The exploration target is limestone for aggregate and / or white limestone fillers and extenders. A literature search for a south island source of white limestone identified targets in the Gordon River and Renfrew Creek areas. A search of mineral titles showed the Gordon River sources to be staked, so the Renfrew Creek limestone was acquired by staking.



Mammoth Geological Ltd.

Renfrew Creek Project

Project Location

Drawn By: R T Henneberry

Date: August 1999

Figure 1

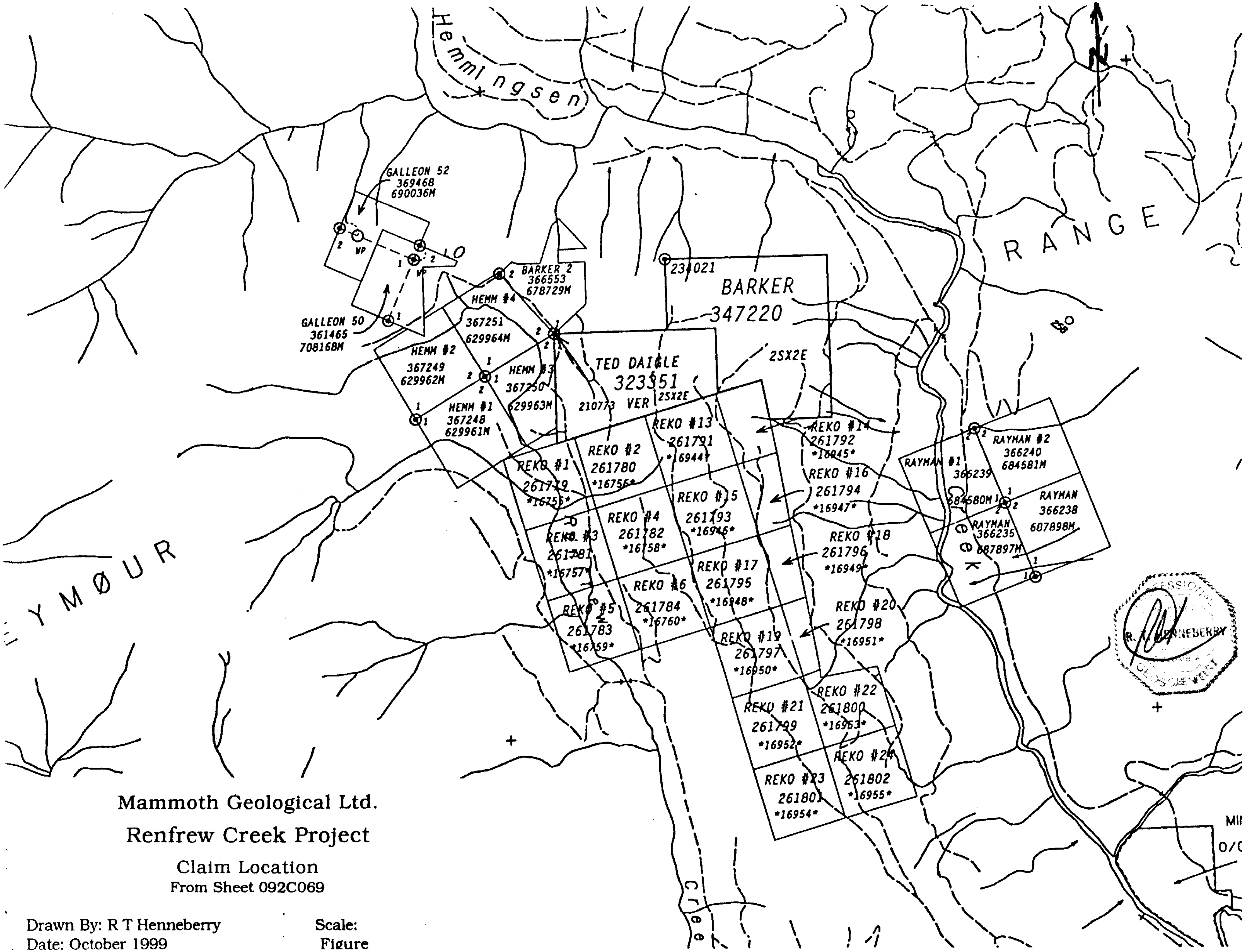
SOUTHERN VANCOUVER ISLAND CARBONATE PROJECT LOCATION, ACCESS

The southern Vancouver Island carbonate project lies near the west coast of southern Vancouver Island, between latitudes 48° 35' and 48° 50' and longitudes 124° 00' and 124° 30'. Topography ranges from Sea Level to 1050 metres, with valleys generally less than 300 metres. There are numerous lakes, creeks and streams where water for diamond drilling is readily obtainable. Heavy duty equipment for trenching, road-building and quarrying will be accessible locally, in either Lake Cowichan or Port Renfrew.

The climate on the southwest Island is relatively mild. The summers are warm and generally dry, while the winters are cool and wet. Snow will accumulate on the higher peaks, but generally the valley bottoms and lower hills are clear for year round work.

The logistics of working in this section of Vancouver Island are very good. Communities in the immediate area include Lake Cowichan and Port Renfrew, with either Duncan or Victoria only a short distance (30 to 90 minutes) away. Timberwest is actively logging throughout this area, resulting in a myriad of logging roads available for access.

Tidewater at Port Renfrew lies within 20 to 30 kilometres of most of the limestone occurrences. A dock and loading facility would need to be established in order to move large tonnages of limestone to market.



Mammoth Geological Ltd.

Renfrew Creek Project

Claim Location

From Sheet 092C069

Drawn By: R T Henneberry

Date: October 1999

Scale:

Figure

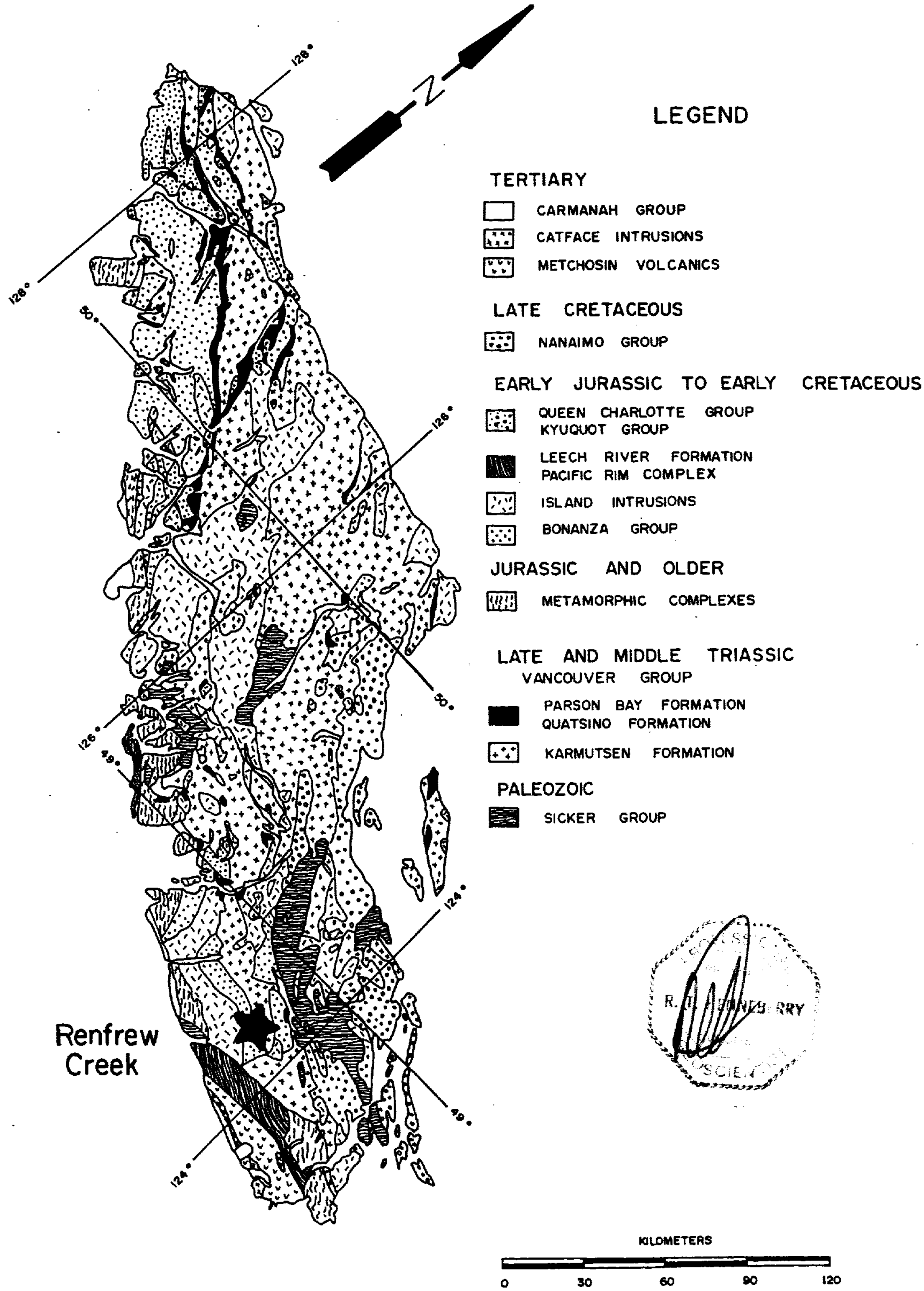
PROPERTY HOLDINGS

The Renfrew Creek project consists of four units:

Name	Record Number	Anniversary Date
Hemm #1	367248	December 2, 2000 *
Hemm #2	367249	December 2, 2000 *
Hemm #3	367250	December 2, 2000 *
Hemm #4	367251	December 2, 2000 *

* pending approval of 1999 assessment credits

The Hemm #1 to Hemm #4 claims are presently registered to R. Tim Henneberry of Mill Bay, B.C.



FROM MULLER 1977. GEOLOGY OF VANCOUVER ISLAND; GSC OPEN FILE 463

Mammoth Geological Ltd.

Renfrew Creek Project

Regional Geology

Drawn By: R T Henneberry

Date: August 1999

Figure 3

SOUTHERN VANCOUVER ISLAND GEOLOGY

The geology of the south end of Vancouver Island has been described by Muller (1975; 1976; 1977). The Island lies in the Insular Belt of the Canadian Cordillera, within the Wrangellia terrane, which on Vancouver Island comprises three thick volcano-sedimentary cycles (Paleozoic Sicker Group, Upper Triassic Vancouver Group and Jurassic Bonanza Group). These cycles are intruded by the Jurassic Island Intrusions and overlain by epiclastic sediments of the Jurassic-Cretaceous Leech River Formation and Upper Cretaceous Nanaimo Group. The youngest rocks in the south Island are the Tertiary Metchosin and Sooke Formations and intrusions. Typical of Vancouver Island, the south Island has been heavily faulted.

. The oldest rocks in the area are the Paleozoic Colquitz Gneiss and Wark Diorite, speculated by Muller (1975) to be recrystallized Sicker and also possibly Vancouver volcanics. The Paleozoic Sicker Group consists of basaltic to rhyolitic volcanics and volcaniclastic sediments overlain by epiclastic sediments and limestones. The Sicker Group defines three broad geosynclines in the south and central Vancouver Island.

The Sicker Group is overlain by the Triassic Vancouver Group, comprised of the lower Karmutsen Formation, middle Quatsino Formation and upper Parson Bay Formation. The Karmutsen Formation, the thickest and most widespread of the Vancouver Group formations, consists of basaltic pillow lavas, pillow breccias and lava flows with minor interbedded limestones, primarily in the upper part of the formation. Coeval mafic sills and dykes intrude the Sicker Group units. The Quatsino Formation limestones and Parson Bay Formation calcareous sediments overlies the Karmutsen volcanics, though through erosion they are limited in extent on the southern Island. The one exception is in the Gordon River area, where 300 metres of dark grey to black Quatsino limestones have been mapped by Muller (1976).

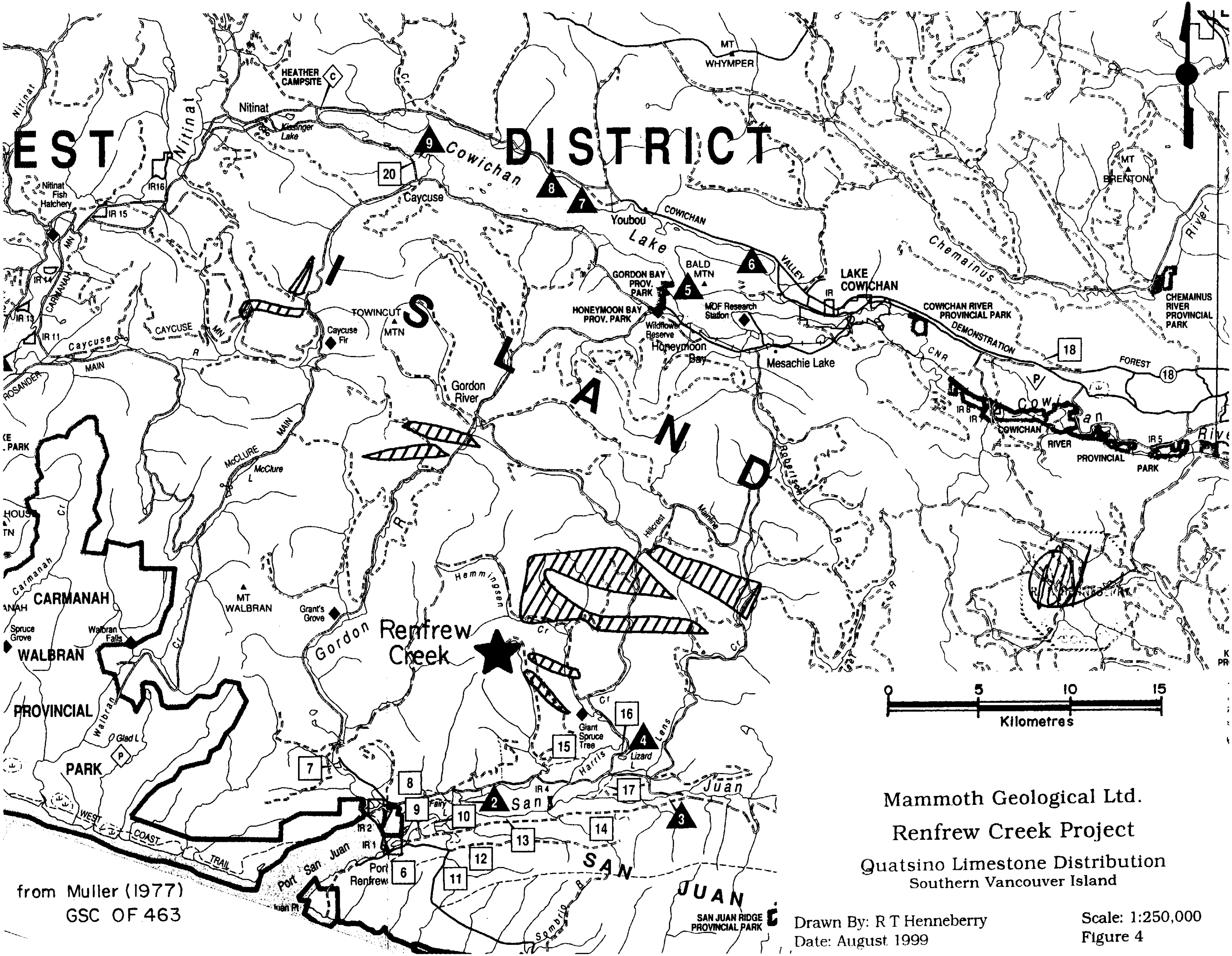
The Bonanza Group overlies the Vancouver Group. Bonanza Group rocks are primarily a Jurassic assemblage of interbedded lava, breccia and tuff with compositions ranging from basalt through andesite and dacite to rhyolite, deposited in a volcanic island arc environment. The Bonanza Group outcrop primarily on the west side of southern Vancouver Island.

Granitoid batholiths and stocks of the Island Intrusions underlie large parts of Vancouver Island. These intrusions range in composition from quartz diorite and tonalite to granodiorite and granite. Island Intrusions outcrop in a belt through the central section of Vancouver Island.

The Leech River Formation of suspected late-Jurassic, early-Cretaceous age is exposed in a wide, eastward narrowing belt of uplands between the San Juan and Leech River Faults. The Formation consists of turbiditic greywacke-argillite sequences that have been metamorphosed to schist and slate.

The Cretaceous Nanaimo Group epiclastic sediments outcrop throughout the eastern side of the south Island. The group consists of cyclical successions of sandstone, conglomerate and shale, with interbedded coal.

Eocene basic volcanics of the Metchosin volcanics and basic intrusive rocks of the Sooke Intrusions underlie the entire area south of the Leech River Fault. These units are overlain by epiclastic sediments of the Sooke Formation..



Mammoth Geological Ltd.

Renfrew Creek Project

Quatsino Limestone Distribution

Southern Vancouver Island

Drawn By: R T Henneberry

Date: August 1999

Scale: 1:250,000

Figure 4

Block faulting of the crystalline and volcanic rocks is dominant. The network of faults displayed on the south end of Vancouver Island appears to be the super position of two or more fracture patterns, each with a characteristic directions and of different age and origin.

Quatsino Formation

Quatsino limestones are the main focus of the carbonate exploration. The formation consists almost entirely of limestone. Where the limestone is thin, bedding is commonly obscure, but thick sections exhibit distinct beds 10 cm to 1 cm thick separated by calcarenite layers. (Muller, 1976).

Typically, the Quatsino limestone is blue-grey weathering, dark grey to black and finely crystalline. The grain is so fine that, except for scattered crinoid plates, individual crystals are indistinguishable, even under a hand lens. Crinoid remnants are common, but other fossil remains are infrequent (McCammon, 1966).

Corals have not been found and the beds are more probably algal reefs. The limited extent of the reefs suggests they may have been atoll-like structures or seamounts of Karmutsen volcanics, rather than basin deposits. (Muller, 1976).

The greatest thickness of Quatsino limestone, estimated at 300 metres, occurs in the Gordon River area. The limestone thins eastward and also decreases in thickness westward from Gordon River. (Muller, 1976).

For the most part, the limestone is of high calcium type, although magnesian beds are present in some places. Dykes are rare. Multi-directional joints occur abundantly at random spacings, with the surrounding volcanics highly folded and faulted. (McCammon, 1966).

Quatsino limestone outcrops sporadically through a loosely defined south-east trending zone from Nixon creek in the northwest, through Gordon River in the centre, to Harris creek in the southeast. McCammon (1966) sampled exposures in all three areas for chemical analyses, taking a total of seven samples.

Analyses of limestone from Cowichan Lake - Port Renfrew area
(From McCammon, 1966)

Sample	CaO	MgO	Insol	R_2O_3	Ig.Loss	as $CaCO_3$
1 - Harris	54.48	0.60	0.84	0.62	43.50	97.23
2 - Harris	53.82	0.90	1.33	0.68	43.39	96.06
3 - Harris	54.54	1.00	0.39	0.25	43.65	97.34
4 - Harris	49.98	4.63	0.58	0.61	44.37	89.20
5 - Nixon	54.52	0.23	1.65	0.59	43.37	97.31
6 - Gordon	54.72	0.21	1.30	0.43	43.22	97.66
7 - Gordon	48.00	5.54	1.85	1.00	43.78	85.67

Harris Creek - (MINFILE 092C085)

Limestone in the Harris creek area lies at the headwaters of Harris creek and Lens creek, approximately 7 kilometres southwest of Lake Cowichan. The Quatsino in this location is broken up into five major northwest trending masses by a network of west-northwest and north trending faults. The limestone masses, up to 3 kilometres in length and 1 kilometre in width, occur over a northeast-southwest distance of 3 kilometres. The limestone in individual fault blocks generally strikes west-northwest and dips 20 to 80 degree north.

The various masses are comprised of fine-grained, dark grey to black limestone that weathers medium to light grey. The limestone is generally high calcium in composition, although a few magnesian limestone beds are present. Siliceous protrusions are sometimes displayed on weathered surfaces.

Gordon River - (MINFILE 092C086)

Limestone in the Gordon River area lies to the south of the Gordon River logging camp, 25 kilometre southwest of Cowichan Lake. The Quatsino extends west-northwest from Gordon River for 2 kilometres and 1 to 1.5 kilometres in width. The limestone is underlain by Karmutsen Formation basaltic volcanics, outcropping along its southern margin. The limestone is in fault contact with the Karmutsen volcanics and also with Bonanza Group volcanics to the north. Bedding within the limestone mass dips 25 to 45 degrees north.

The limestone is fine-grained, dark grey to black on fresh surfaces, weathering medium to light grey. The limestone is generally high calcium in composition, although a few magnesian limestone beds are present. Siliceous protrusions are sometimes displayed on weathered surfaces.

Nixon Creek - (MINFILE 092C087)

Limestone in the Nixon creek area lies along the west side of the creek, 30 kilometres west of Lake Cowichan. The Quatsino in this location is comprised of two limestone horizons, striking northeast for 2.5 kilometres and dipping 5 to 40 degrees northwest. The two horizons are separated by a mafic flow or sill. The limestone is overlain by Parson Bay argillites and underlain by Karmutsen mafic volcanics. The sequence is segmented by several faults trending west-northwest.

The horizons consist of fine-grained, dark grey to black, high calcium limestone.

PREVIOUS EXPLORATION

While the general area to the south of Cowichan Lake has been explored for base and precious metals since the discovery of placer gold in the late 1890's, specific exploration of the Quatsino limestones for their industrial mineral potential has been very limited. In fact, most exploration centred on these limestones has been directed at iron and copper deposits along the limestone contacts.

The British Columbia Geological Survey Branch's dimension stone initiatives in the late-1980's / early 1990's resulted in the examination of the south Island limestones for their marble potential. Matrix Marble Ltd. of Duncan quarried a limited number of blocks from three locations: two sites of white marble on Renfrew Creek (to the south and east of the Harris Creek zone) and one site of black marble from the Gordon River zone (Schroeter, 1994; 1995). No reports were filed on the test quarrying program, but all claims have subsequently lapsed, suggesting the results were not favourable.

Van City Marble explored a white limestone horizon in the Gordon River zone for its filler potential as a possible source of white calcium carbonate for its own cultured marble plant. Geological mapping located a large area of high brightness white limestone with potential resources in excess of 4 million tonnes. A program of detailed sampling and diamond drilling was recommended but not carried out. The mapping actually showed the bulk of the white limestone to be on crown grants not held by Van City. (Shearer, 1995). The Van City claims have subsequently lapsed.

Shearer (1995) did manage to have several samples analyzed during his exploration program. Some of the results are summarized below:

Analyses of limestone from Gordon River area
(From Shearer, 1995)

Sample	CaO	MgO	Insol	R_2O_3	Ig.Loss	as $CaCO_3$	Brightness
VI-1 Baird	54.79	0.34	1.46	0.01		97.8	89.9
VI-2 Lorimer 1	55.02	0.26	1.20	0.01		98.2	79.5
VI-3 Lorimer 2	53.79	1.32	1.33	0.04		96.0	90.7

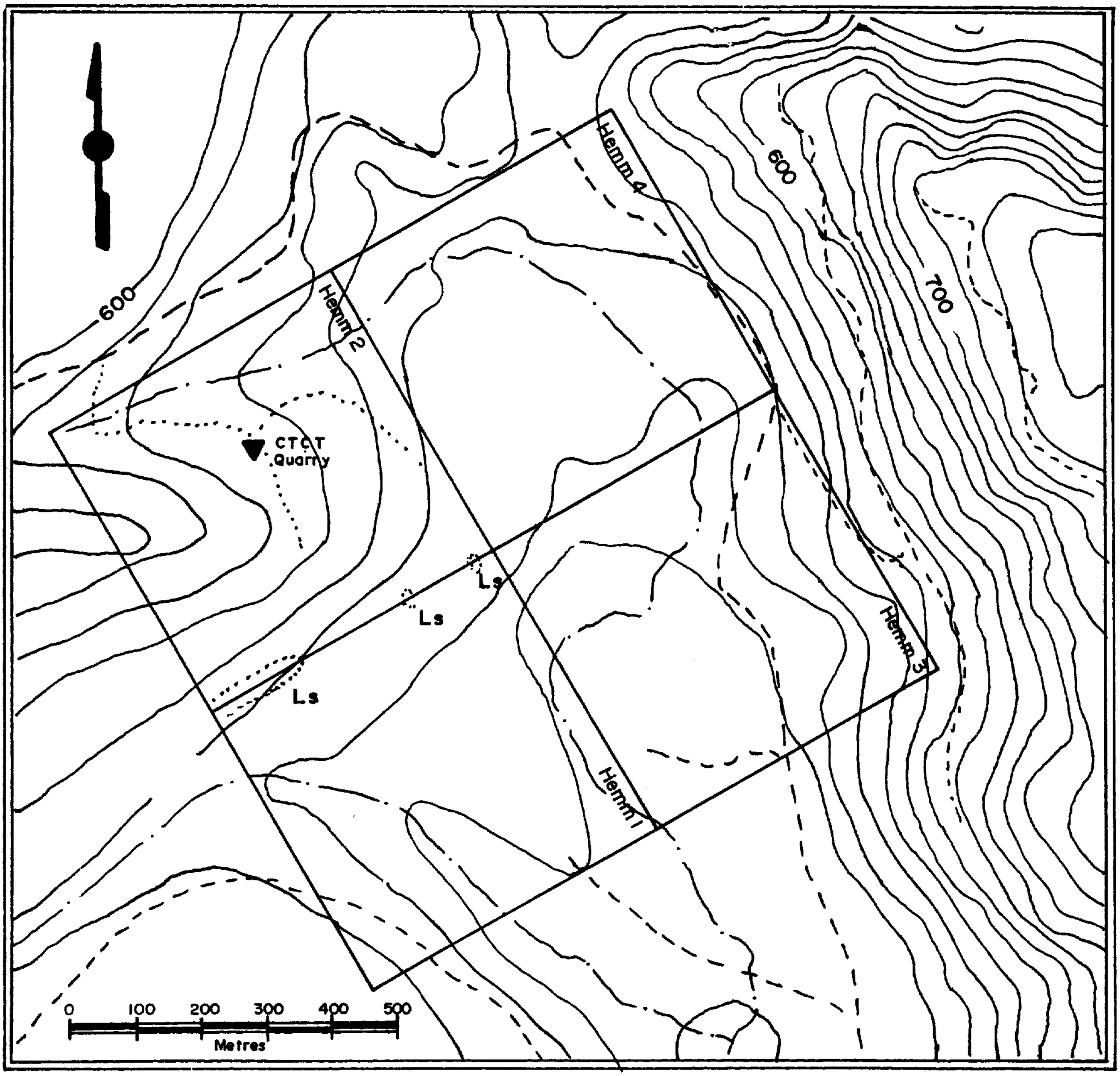
Renfrew Creek Area

The area covering the Renfrew Creek Property was previously explored for replacement iron and copper deposits in the limestone. Reako Explorations Ltd. completed surface mapping, magnetometer surveys and diamond drilling in the early 1970's. A number of these claims remain in good standing today, 25 years later.

The limestone was mapped both by Roscoe (1973) for Reako Explorations Ltd. and by Eastwood (1974; 1975) for the Geological Survey Branch. Two east-west trending bands of limestone were identified, a northern band centred on the pass between Hemmingsen creek and Renfrew creek and a southern band extending from Renfrew creek over the ridge to Hemmingsen creek. Reako's efforts were directed at exploring for magnetite deposits, with little attention paid to the potential of the limestone.

Cowichan Terrazo and Ceramic Tile (CTCT) of Duncan explored the southernmost band for marble dimension stone in the early 1990's. (Schroeter, 1994; 1995). CTCT chose not to file geological reports on their programs, so details of their programs are not available. Marble blocks were cut with a diamond wire saw from two locations on the southern band of limestone.

The small volumes of marble quarried, combined with the subsequent abandonment of all of CTCT's claim units suggests the marble was not suitable for their purposes.



Legend

Ls limestone

outcrop

Creek

Road

20 metre contour interval

Mammoth Geological Ltd.

Renfrew Creek Project

Preliminary Geology

Drawn By: R T Henneberry

Date: November 1999

Scale: 1:10,000

Figure 5

PROPERTY GEOLOGY

The Renfrew Creek Property has not been explored in great detail to date. A cursory examination was completed during staking, which included: examining the main exposure in the area of the previous quarrying operations and noting outcrop exposures along the claim centre line during staking.

CTCT Quarry Site

Limestone outcrops along the lower slope on the west side of Granite Creek in an area approximately 400 metres by 400 metres. The area around the quarry site was examined. Several blocks have been quarried and removed. The sill bench is approximately 10 by 10 metres, now covered by a thin layer of overburden.

The stone is a steeply dipping, medium to coarse grained, grey white to white limestone. Stylolites are common but not abundant. The stone is regularly fractured but at widely spaced (+ 1 metre) intervals. Little limonite was noted. Few mafic dykes were noted.

Claim Centre Line

The topography is typical of limestone terrane as the line crosses three short gullies over a length of 800 metres.

The first two hundred metres consists of semi-massive to broken white to grey-white limestone. Two small area of limestone outcrop further along the line. The stone in these two locations is more grey-white than white.

The stone was not sampled for chemical or optical properties during this phase of the exploration program.

DISCUSSION

The Renfrew Creek Property was acquired as a possible source of white limestone for fillers and extenders, aggregate and possibly coarse rip rap.

Filler and extender grade limestone has to meet a brightness specification in excess of 95%. Of equal importance is the amount and composition of the insolubles. Quartz causes grinding problems and iron oxides causes coloration in the filler.

Limestone for aggregate should have low porosity, a high compressive strength (10,000 to 15,000 psi) and a uniform texture. These characteristics should be consistent along strike and along bedding. The stone should be relatively free of deleterious substances.

There are few specifications required for rip rap. The key geological aspects are the fracture pattern and fracture density. These control the maximum size of rip rap than can be produced.

The demand for aggregate in the Pacific northwest and southwestern British Columbia continues to grow, due primarily to the exhaustion of existing resources and sterilization of new resources by public opposition and land withdrawal.

The demand for white limestone for fillers and extenders is also expected to continue to rise. *Ground calcium carbonate (GCC) is becoming increasingly more important in the* papermaking process.

The Renfrew Creek Property is fairly well situated for development of a white limestone quarry for aggregates and fillers. An exploration program of mapping, sampling and diamond drilling is recommended to properly explore the property and produce a stage I feasibility study.

CONCLUSIONS AND RECOMMENDATIONS

The Renfrew Creek Property presently consists of 4 units, totaling 100 hectares. The property was staked as a potential source of white limestone for aggregates and industrial fillers.

The property was briefly explored during staking. Previous exploration consisted of quarrying test blocks to test the suitability of the stone for marble dimension stone.

The property is underlain by steeply dipping, thickly bedded, white to grey-white limestone of the Triassic Quatsino Formation. The stone outcrops as a distinct knob of ± 400 metres by 400 metres on the west side of upper Renfrew Creek.

A program of mapping, sampling and diamond drilling is recommended. Total cost is estimated at $150,000.

The cost of the exploration program completed during staking is $900.

REFERENCES

Carr,D.D., Rooney,L.F. and Freas,R.C. (1994). Limestone and Dolomite. In: Industrial Rocks and Minerals, 6th Edition, D.D.Carr, Senior Editor. Society of Mining, Metallurgy, and Exploration, Inc. pp.605-629.

Eastwood,G.E.P. (1974). Reko. British Columbia Ministry of Energy, Mines and Petroleum Resources Geology, Exploration and Mining 1974. pp.166-170.

Eastwood,G.E.P. (1975). Southern Vancouver Island. British Columbia Ministry of Energy, Mines and Petroleum Resources Geological Fieldwork 1975. pp.33-34.

Fischl,P. (1992). Limestone and Dolomite Resources in British Columbia. British Columbia Ministry of Energy, Mines and Petroleum Resources Open File Report 1992-18. 152p.

McCammon,J.W. (1966). Limestone in the Cowichan Lake - Port Renfrew Area. British Columbia Ministry of Mines Annual Report for 1966. pp.269-270.

MINFILE 092C Cape Flattery. British Columbia Ministry of Energy and Mines.

Muller,J.E. (1975). Victoria Map-Area, British Columbia. Geological Survey of Canada Paper 75-1A. pp.21-26

Muller,J.E. (1976). Cape Flattery Map-Area, British Columbia (92C). Geological Survey of Canada Paper 76-1A. pp.107-112.

Muller,J.E. (1977). Geology of Vancouver Island. Geological Survey of Canada Open File 463.

Schroeter,T.G. (1994). British Columbia Mining, Exploration and Development 1993 Highlights. British Columbia Ministry of Energy, Mines and Petroleum Resources Information Circular 1994-1. 22p.

Schroeter,T.G. (1995). British Columbia Mining, Exploration and Development 1994 Highlights. British Columbia Ministry of Energy, Mines and Petroleum Resources Information Circular 1995-1. 24p.

Shearer,J.T. (1995). Industrial Mineral Assessment Report on the Marble Project. British Columbia Ministry of Energy and Mines Assessment Report 23,939.

Temanex Consulting Inc. (1994). Industrial Minerals Opportunities in Pulp and Paper in British Columbia to the Year 2003. British Columbia Ministry of Energy, Mines and Petroleum Resources Open File Report 1994-23. 59p.

STATEMENT OF QUALIFICATIONS

I, R.Tim Henneberry, am the principle of Mammoth Geological Ltd., a geological consulting firm with offices at 604 Noowick Road, Mill Bay, B.C. V0R 2P0.

I earned a Bachelor of Science Degree majoring in geology from Dalhousie University, graduating in May 1980.

I have practiced my profession continuously since graduation.

I am registered with the Association of Professional Engineers and Geoscientists in the Province of British Columbia as a Professional Geoscientist. I am also a Fellow of the Geological Association of Canada.

I am the registered owner of the Hemm #1 - #4 (367248-367251) mineral claims

I undertook the exploration program on the Hemm #1 - #4 mineral claims during staking on December 2, 1998.

This report may be used for any purpose normal to the business of Mammoth Geological Ltd., provided no part is used in such a manner to convey a meaning different than that set out in the whole.

Dated this 30th day of November in the Town of Mill Bay, British Columbia.

PROFESSIONAL
PROVINCE
R. T. HENNEBERRY

R.Tim Henneberry, P.Geo

STATEMENT OF COSTS

Renfrew Creek Property

Geologist	1 day	@	$300 per day	$300
Documentation	2 days	@	$300 per day	$600
Renfrew Creek Property Costs				**$900**

COST ESTIMATES

The purpose of this stage of the exploration program is two-fold:

1. Block out sufficient reserves to ensure a minimum 10 year supply of stone
   establish the continuity of limestone along strike and at depth
   establish the continuity of chemical and optical properties along strike and at depth

2. Complete a stage I feasibility report
   calculate a mineral inventory (reserve)
   complete preliminary engineering of site
   complete preliminary permitting
   complete preliminary proforma and business plan
   complete preliminary marketing

Property wide mapping, sampling	$6,650
Diamond drilling	$122,550
Documentation	$13,100
Contingency	$7,725
Total Budget	**$150,000**

Property wide mapping and sampling

produce geological map of claim group
sample at regular intervals along and across stratigraphy for chemical and optical properties
locate drill sites

Geologist	5 days	@	350 /day	$1,750
Prospector	5 days	@	250 /day	$1,250
Room and Board	10 days	@	125 /day	$1,250
Vehicle and Fuel	5 days	@	75 /day	$375
Analysis				
Chemical	20 samples	@	30 /sample	$600
Optical	20 samples	@	60 /sample	$1,200
Sundries				$200
Property mapping total				**$6,625**

COST ESTIMATES
(Continued)

Diamond drilling

drill to depth of 200 to 250 feet (10-12 holes
establish sufficient reserves for at least 10 years of mining
sample at 10 to 20 foot intervals in each hole
survey property for initial engineering drawings for project

Geologist	35 days	@	350 /day	$12,250
Prospector	35 days	@	250 /day	$8,750
Mob / Demob				$2,500
Footage	2500 feet	@	20 /foot	$50,000
Room and Board	70 days	@	125 /day	$8,750
Vehicle and Fuel	70 days	@	75 /day	$5,250
Analysis				
Chemical	220 samples	@	30 /sample	$6,600
Optical	220 samples	@	60 /sample	$13,200
Engineering				$15,000
Sundries				$250
Diamond drilling total				**$6,625**
Documentation	15 days	@	350 /day	$5,250
Stage I Feasibility				
Geologist	15 days	@	350 /day	$5,250
Travel	10 days	@	200 /day	$2,000
Reproduction				$600
TOTAL BUDGET				**$150,000**

GENERAL BACKGROUND ON THE CARBONATE INDUSTRY

Geology - (Condensed from Carr et al, 1994).

Carbonate rocks form about 15% of the earth's sedimentary crust, predominantly as limestone and dolomite or their metamorphosed equivalents, marble. Most limestones of economic importance were partially or wholly biologically derived from seawater and accumulated in a relatively shallow marine environment. Environment of deposition is important because it determines the economically significant characteristics of the carbonate deposit. Limestones formed in high energy zones generally contain little non-carbonate material and hence may be a source of high purity carbonate material. Micrites (very fine-grained carbonate muds), which accumulate in zones of low energy, are more likely to be diluted by clay and silt size non-carbonate material. Carbonate rocks are highly susceptible to postdepositional alteration and modification.

The principle carbonate rocks used by industry are limestone and dolomite. Limestones are sedimentary rocks composed mostly of the mineral calcite ($CaCO_3$). Dolomites are sedimentary rocks composed mostly of the mineral dolomite [$CaMg(CO_3)_2$].

Impurities in carbonate rock vary considerably in type and amount but are important from an economic standpoint only if they affect the usefulness of the rock. The most common impurity is clay, followed by chert, silica and organic matter. Color, an important property of carbonate rocks, can be a rough guide to purity, but it can also be misleading. Most high purity limestones are shades of light brown to grey to white.

Mining

Limestone and dolomite are high volume, low-value commodities, with production cost control being the critical element in any quarry operation. Mining is predominantly done from open pit quarries, though large scale underground operations due exist.

Carbonate rocks are quarried in 47 of the 50 United States and in all provinces in Canada except Saskatchewan. They are mined from rocks of almost every age in the geological time scale. (Carr et al, 1995).

Carbonate Rock Production in British Columbia for 1986 and 1987 (tonnes * 1000)
(From Fischl, 1992)

Company	Location	1986	1987	Location	1986	1987
Holnam West Materials Ltd.	Texada Island	1,149.8	1,907.5			
Ashgrove Cement West Inc.	Texada Island	1,046.5	1,046.3			
Imperial Limestone Ltd.	Texada Island	173.8	140.9			
Lafarge Canada Inc.	Texada Island	341.4	0.0			
Lafarge Canada Inc.	Kamloops	126.9	155.3			
Steel Brothers Canada Ltd.	Marble Canyon	146.1	194.6			
Northrock Industries	Dahl Lake	25.4	30.0			
Quesnel Readi-Mix Cement Co.	Purden Lake	10.0	0.0			
International Marble & Stone Co Ltd.	Lost Creek	7.1	6.6			
International Marble & Stone Co Ltd.	Benson Lake	9.9	13.2			
International Marble & Stone Co Ltd.				Crawford Creek	27.7	31.9
Mighty White Dolomite Ltd.				Rock Creek	8.0	8.0
Totals		**3,036.8**	**3,494.4**	**Totals**	**35.7**	**39.9**

Limestone and dolomite are currently produced from a few locations throughout the province for a variety of uses. Most of the limestone production originates from Texada Island, while most of the dolomite production comes from Crawford Creek, east of Kootenay Lake. (Fischl, 1992).

Processing - (Condensed from Fischl, 1992).

Carbonate rocks generally do not undergo a milling process. Processing, though dependent on end uses, generally involves some type of crushing and size sorting by screening.

Fischl (1992) has described a chemical composition based classification system for British Columbia carbonate rocks, which needs to be outlined to follow the ensuing discussion on end uses:

Ultra high calcium limestone	+97 percent $CaCO_3$ (54.3% CaO)	
High calcium limestone	+95 percent $CaCO_3$ (53.2% CaO)	<2 percent $MgCO_3$ (0.96% MgO)
Calcium limestone	+95 percent $CaCO_3$	<10 percent $MgCO_3$ (4.79% MgO)
Magnesian limestone		<40 percent $MgCO_3$ (19.15% MgO)
Dolomitic limestone		+40 percent $MgCO_3$

The primary use of carbonate rock is the in British Columbia is in the manufacture of cement. Generally, high-calcium limestone is required for cement manufacture. Higher silica and alumina contents may be useful for manufacturing cement, but excessive amounts of alkalies cannot be tolerated, limited to less than 0.6%. Magnesia content cannot exceed 3 per cent.

Carbonate Rock Consumption in British Columbia for 1986 and 1987 (tonnes * 1000)
(From Fischl, 1992)

	1996	**1997**
Cement manufacture		
Domestic	1,282.8	1,051.1
Foreign	468.1	724.1
Lime manufacture		
Domestic	290.7	388.1
Foreign	395.9	584.5
Pulp and paper	129.4	165.1
Agriculture	19.1	27.0
Fillers (whiting)	31.7	31.3
Stucco dash	14.4	18.1
Crushed rock	283.1	328.5
Other		
Domestic	8.9	14.7
Foreign	149.7	142.5
Totals	**3,073.7**	**3,475.1**

Lime manufacture is another important use of British Columbia carbonate rock. Limestone used for lime manufacture must be at least high calcium in composition, with less than 2.5 percent MgO.

The pulp and paper industry consumes significant quantities of limestone to recover caustic soda in the pulping process. Limestone for the pulping process must be at least high calcium in composition, with less than 3.0 percent MgO.

Agricultural limestone is generally produced as a byproduct of major quarries, used to neutralize acidic conditions in soil. Limestone for this end use can range from high calcium to dolomitic in composition.

Carbonate rock is also used as fillers and extenders in paints and plastics, as chips and granules for architectural and decorative purposes and in the manufacture of glass. Limestone and dolomite for use in most fillers and extenders must have a brightness in excess of 85 percent (ideally 95 to 96 percent dry brightness in blue light), low iron contents and no silicates. Glass manufacturers require limestone with no more than 0.1 percent Fe_2O_3.

Structurally competent beds of limestone, or more importantly marble, can be used for dimension stone. Waste product from these operations can also be considered for use as landscape stone.

Demand

According to Fischl (1992), the consumption of limestone and dolomite is expected to increase in a number of areas in the near future. The province's mining industry will be relying on limestone to control acid mine drainage and to neutralize waste cyanide. The pulp and paper industry is expected to consume increasing amounts.

Temanex Consulting Inc. (1994) in a report on industrial mineral opportunities in British Columbia pulp and paper forecast an increase from 300,000 to 750,000 tonnes per annum for pigments in the Western North American paper industry. The pigments they describe are kaolin and calcium carbonate. The carbonate is used as a coater and filler in alkali paper processes.