

FEB 25 1997  
Gold Company  
Vancouver

1996 EXPLORATION AND DEVELOPMENT PROGRAM

ON THE

TSITIKA PROPERTY

PROGRESS REPORT TO DECEMBER 15, 1996

FOR ASSESSMENT CREDITS

Nanaimo Mining Division  
Vancouver Island, B.C.

FOR

TSITIKA STONE INDUSTRIES

(A Division of Mammoth Geological Ltd.)

GEOLOGICAL SURVEY BRANCH  
ASSESSMENT REPORT

By: R.Tim Henneberry, P.Geo.  
February 20, 1997

24,876

## SUMMARY

The Tsitika property consists of 8 contiguous, two-post mineral claims in the Nanaimo Mining Division of Vancouver Island. The initial claims were staked in May 1994, with additional claims added since that time. This property is the first one on Vancouver Island to be explored as a source of granite dimension stone. The target is a white-grey, medium- to coarse-grained, granodiorite being marketed as *Tsitika Grey*.

A small quarry bench was established in 1996 to ascertain the quarrying characteristics of the granite. The blocks quarried split well along grain, showing the stone should quarry well. Considerable pinching and jamming of blocks resulted in subsequent waste from trying to remove the blocks from the up-dip side.

The quarry bench site was later shown to be located on the up-dip side of the sill fractures, as opposed to the down-dip side of the sill fractures, where it should be located.

A bench needs to be established on the down-dip side of the sill fractures. This will require the building of an access road prior to establishing the bench. The cost of the road building is estimated at \$10,000, while the establishing of a down-dip quarry bench is estimated at \$43,000 for a total cost of \$53,000.

The cost of the 1996 exploration program was \$22,173.15.

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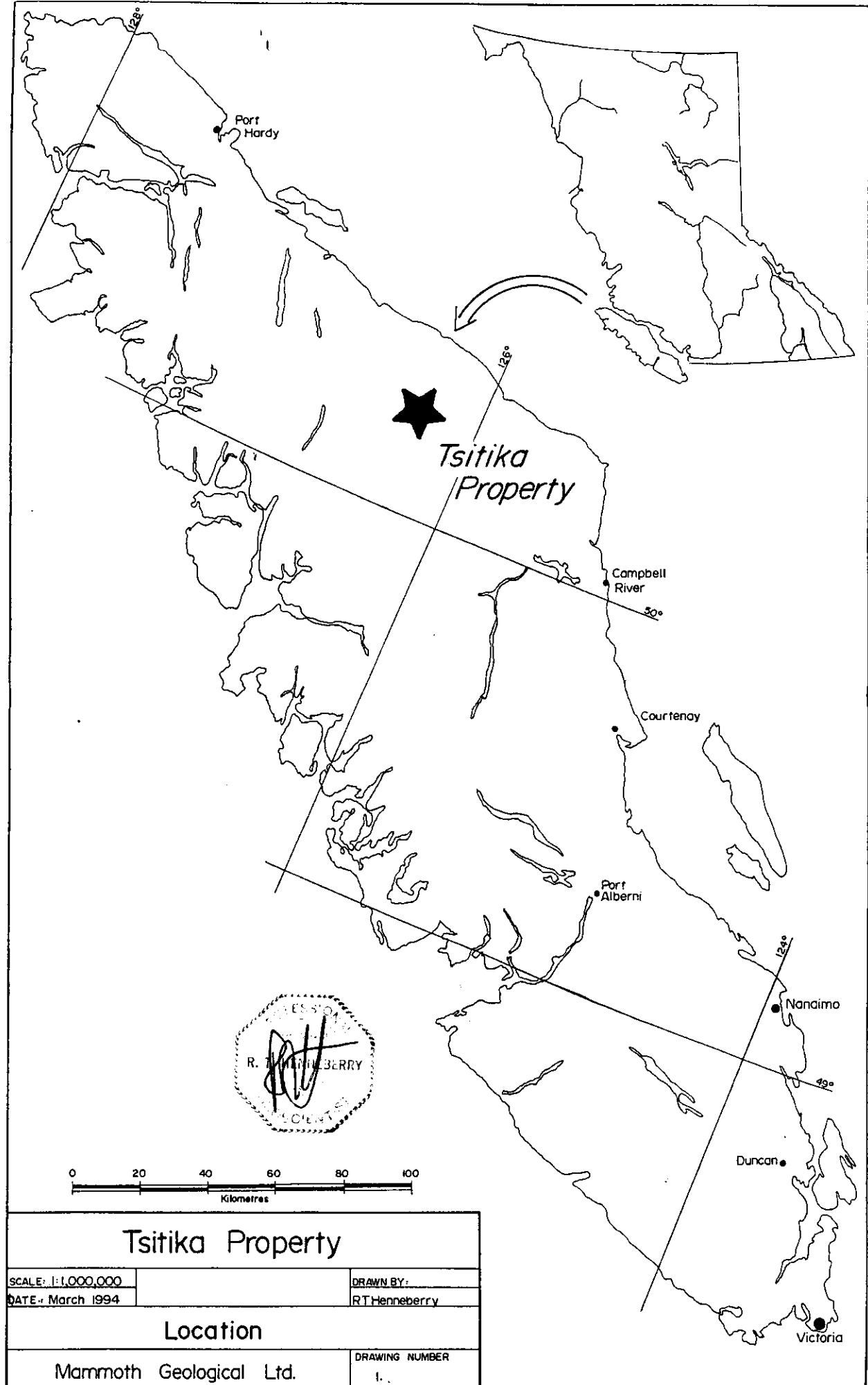
## INTRODUCTION

The purpose of this report is to document the results of the 1996 exploration program on the Tsitika property for assessment credits. The property has been continuously explored since 1994 and now consists of eight claim units.

Prior to 1996, exploration was concentrated on testing boulders scattered over the claim group for structural stone. These boulders were test split with the resulting granite supplied for job site market tests. The boulder program showed the stone was structurally sound and esthetically pleasing and would be used in the marketplace if available.

The aim of the 1996 program was to open a preliminary quarry bench to test the quarrying characteristics of the granite outcroppings as opposed to the boulders. A small initial quarry bench was established at the south end of the large granite knob on the S90-1 claim.

This property was examined in 1996 by Dan Hora of the provincial geological survey branch. His description of the property is published in the 1996 Geological Fieldwork Volume of the provincial geological survey (Hora and Hancock, 1997).



## LOCATION, ACCESS

The area of interest is the northern section of Vancouver Island, between latitudes 49° 45' and 50° 45' and longitudes 126° 30' and 127° 55'. 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 and road-building will be accessible locally, in either Port Hardy, Port McNeill or Sayward.

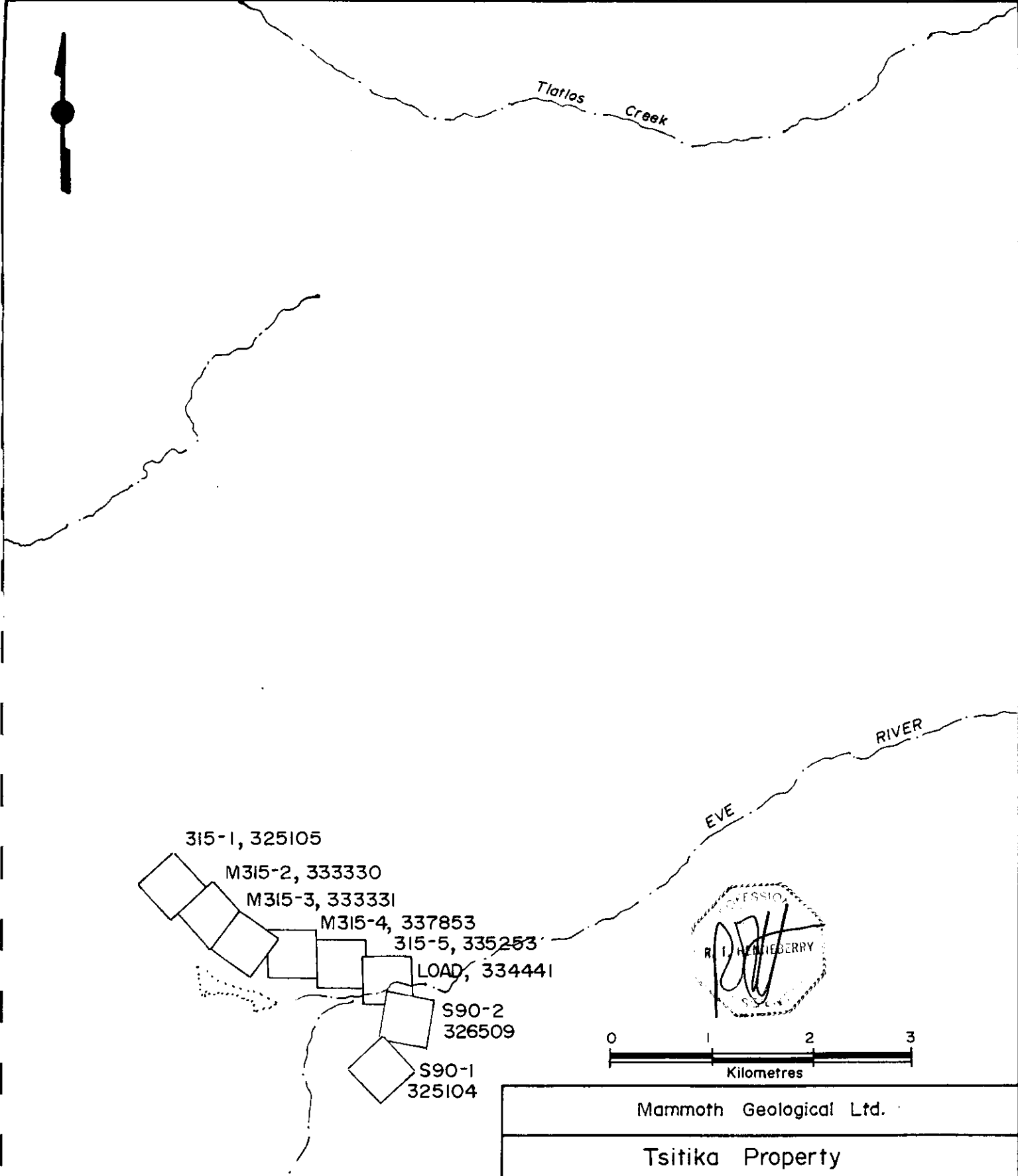
The climate on the north island is relatively mild. The summers are warm and generally dry, while the winters are cool and wet. Snow will accumulate on the higher peaks, but generally the valley bottoms and lower hills are clear for year round work.

There are several towns and lesser communities in the map area where accommodation and lodging can be readily obtained, including Port Hardy, Port McNeill and Sayward. The Island Highway cuts through much of the map area. The numerous logging roads of Canadian Forest Products, TimberWest Forest and Canadian Pacific Forest Products provide access to different claim groups.

More specifically, the Tsitika group lies on NTS Sheet 92L/08W, 17 kilometres northeast of Woss. The claims cover the lower south-facing slope of the pass between the headwaters of Eve River and the Tsitika River valley. The S90-1 and S90-2 claims cover a prominent ridge of granite on the north-facing slope.

Access is provided from the Island Highway at both ends of the claim group, as an entrance to the highway from the mainline logging road occurs at either end. The westernmost entrance is 18 kilometres east of Woss along the Island Highway.

The status of the property is logged and naturally reforested. This property is at the highest point on the Island Highway and can be susceptible to snowfall accumulations from mid-October to mid-February.



Mammoth Geological Ltd.	
Tsitika Property Claim Locations (From sheet 92L 08W)	
DR. BY: RT Henneberry	SCALE: 1:50,000
DATE: December 1995	APPRD. BY:
CHK'D. BY:	REV.:
DWG. NO.	
FIGURE 2	

CLAIM OWNERSHIP

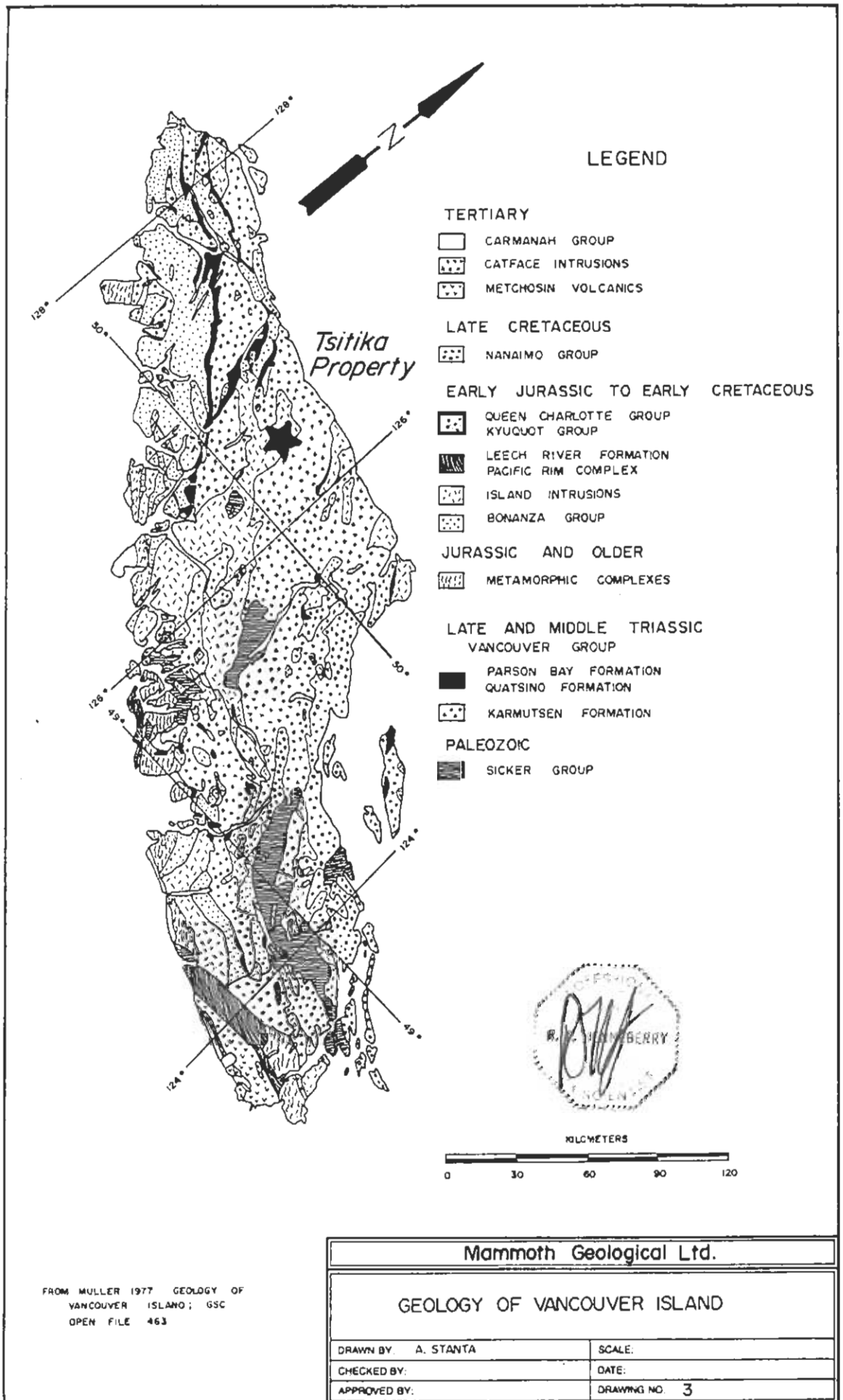
The Tsitika property consists of 8 contiguous two-post mineral claims encompassing an area 4 kilometre by 0.5 kilometre. The property covers the lower slopes of the pass between the Tsitika and Eve River valleys.

Claim	Record Number	Anniversary Date *
315-1	325105	May 3, 1999
M315-2	333330	December 27, 1998
M315-3	333331	December 27, 1998
M315-4	337853	July 14, 1999
315-5	335253	April 19, 1999
Load	334441	March 17, 1999
S90-1	325104	May 3, 1999
S90-2	326509	June 20, 1999

\* pending approval of 1996 assessment credits

The registered owner of each of the listed claims is R.Tim Henneberry of Port Hardy, B.C.





## REGIONAL GEOLOGY

The geology of the north end of Vancouver Island has been described by Muller et al (1974) and Muller et al (1980). The area lies in the Insular Belt of the Canadian Cordillera. The map area is chiefly underlain by the middle to upper Triassic Vancouver Group, overlain by the lower Jurassic Bonanza Group. The Vancouver Group is intruded by large and small bodies of middle Jurassic Island Intrusions and the related (?) Westcoast Complex, and overlain unconformably by remnants of a lower Cretaceous clastic wedge on the southwest side and similar upper Cretaceous beds on the northwest side of Vancouver Island. There are some small early Tertiary (Catface) intrusions also mapped. The region may be divided into several great structural blocks, separated mainly by important near-vertical faults and themselves fractured into many small fault segments.

The Vancouver Group is 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. Karmutsen rocks outcrop throughout the north part of Vancouver Island, primarily on the east side.

The Quatsino Formation overlies the basalts. The lower part of the Quatsino Formation consists of thick bedded to massive, brown-grey to light grey, grey to white weathering, fine to microcrystalline, commonly stylolitic limestone. The upper part is thin to thick bedded, darker brown and grey limestone, with fairly common layers of shell debris. The formation is in gradational contact with the overlying Parson Bay Formation by an increase in layers of calcareous pelites. Quatsino limestone outcrops as three narrow belts on the north part of Vancouver Island.

The Parson Bay Formation consists of a series of interbedded silty limestones and calcareous shales and sandstones, and occasional beds of pure limestone. Parson Bay rocks outcrop sporadically overlying the Quatsino limestone.

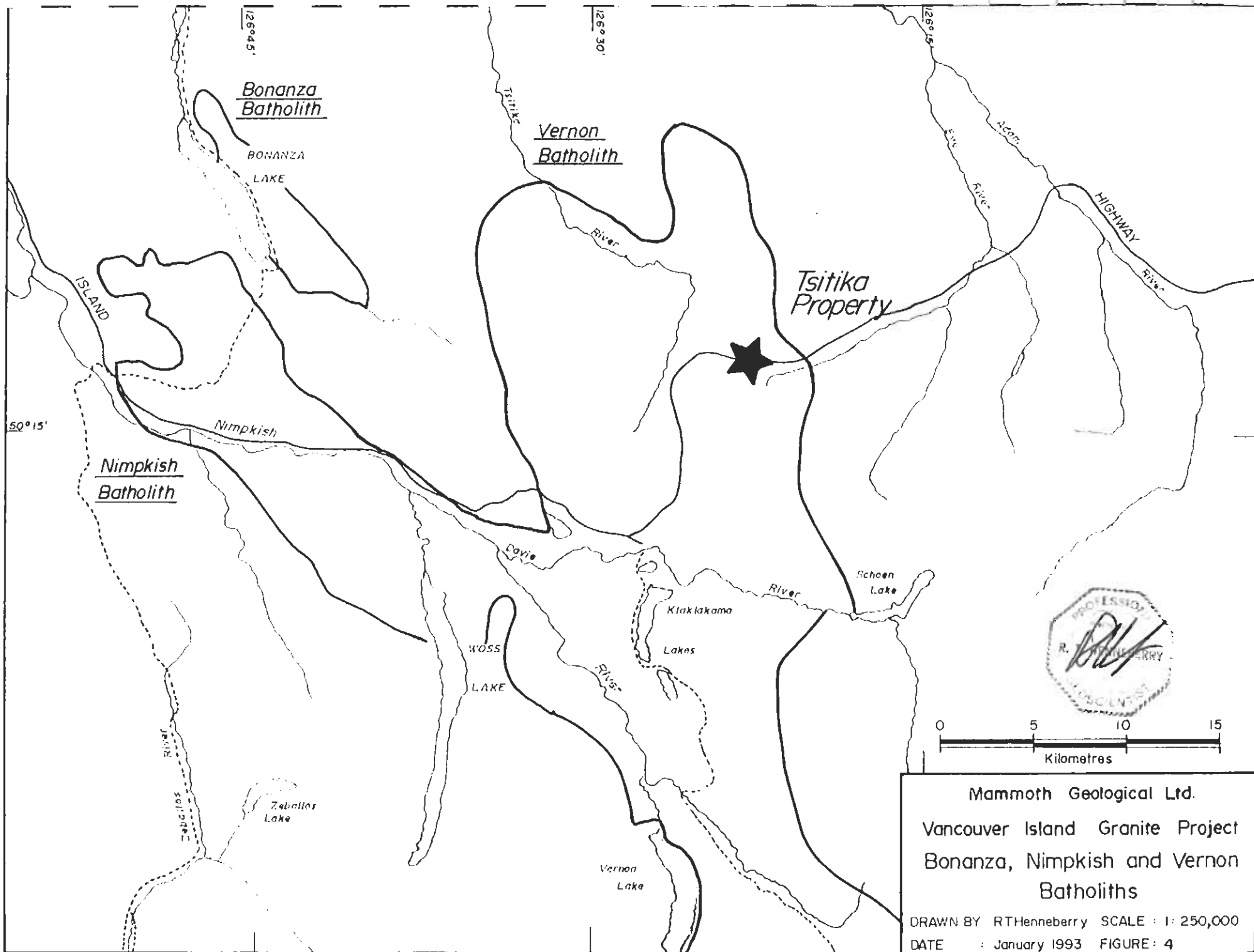
The Bonanza Group overlies the Vancouver Group. Bonanza Group rocks are primarily a Jurassic assemblage of interbedded lava, breccia and tuff with compositions ranging from basalt through andesite and dacite to rhyolite, deposited in a volcanic island arc environment. The Bonanza Group outcrop primarily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

The Westcoast Complex is a heterogeneous assemblage of amphibolite and basic migmatite with minor metasedimentary and metavolcanic rocks of greenschist metamorphic grade. The Westcoast Complex outcrops in a loosely defined belt on the west coast of 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 Cretaceous clastic wedge includes the Queen Charlotte and Nanaimo Groups. These groups consist of cyclical successions of sandstone, conglomerate and shale, with interbedded coal in the Nanaimo Group. These rocks outcrop around Quatsino Sound.

Small intrusive stocks of early Tertiary age and of general quartz dioritic composition are known in many parts of Vancouver Island. These rocks are generally massive, light colored, fine to medium grained equigranular to locally porphyritic granitoid rocks. They are commonly regularly and closely jointed.



Mammoth Geological Ltd.  
 Vancouver Island Granite Project  
 Bonanza, Nimpkish and Vernon  
 Batholiths  
 DRAWN BY: R. Henneberry SCALE: 1: 250,000  
 DATE: January 1993 FIGURE: 4

The network of faults displayed on the north 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.

### **Island Intrusions**

The intrusive rocks of the Island Intrusions at the north end of Vancouver Island have received little attention as a source of dimension stone in the past. These "granites" have dimension stone potential as both polished stone (tiles and slabs) and structural stone. A literature compilation, combined with a preliminary prospecting program (Henneberry, 1994; 1995) identified several target areas within these intrusions. Systematic evaluation has lead to the staking of a number of claims, including the claims comprising the Tsitika group.

The Jurassic Island Intrusions underlie much of the central core of Vancouver Island. The Island Intrusions have invaded all Vancouver Group rocks and are elongated in a northwesterly direction. (Muller, 1977). The Intrusions vary in composition from leuco-quartz monzonite to gabbro, but the majority are granodiorite and quartz diorite. Small high-level bodies and cores of the larger bodies contain leuco-granodiorite and quartz monzonite, and deeper and marginal parts contain diorite and gabbro. Muller et al (1974) and Muller et al (1981) have divided the Island Intrusions of northern Vancouver Island into several distinct zones, based on location and composition.

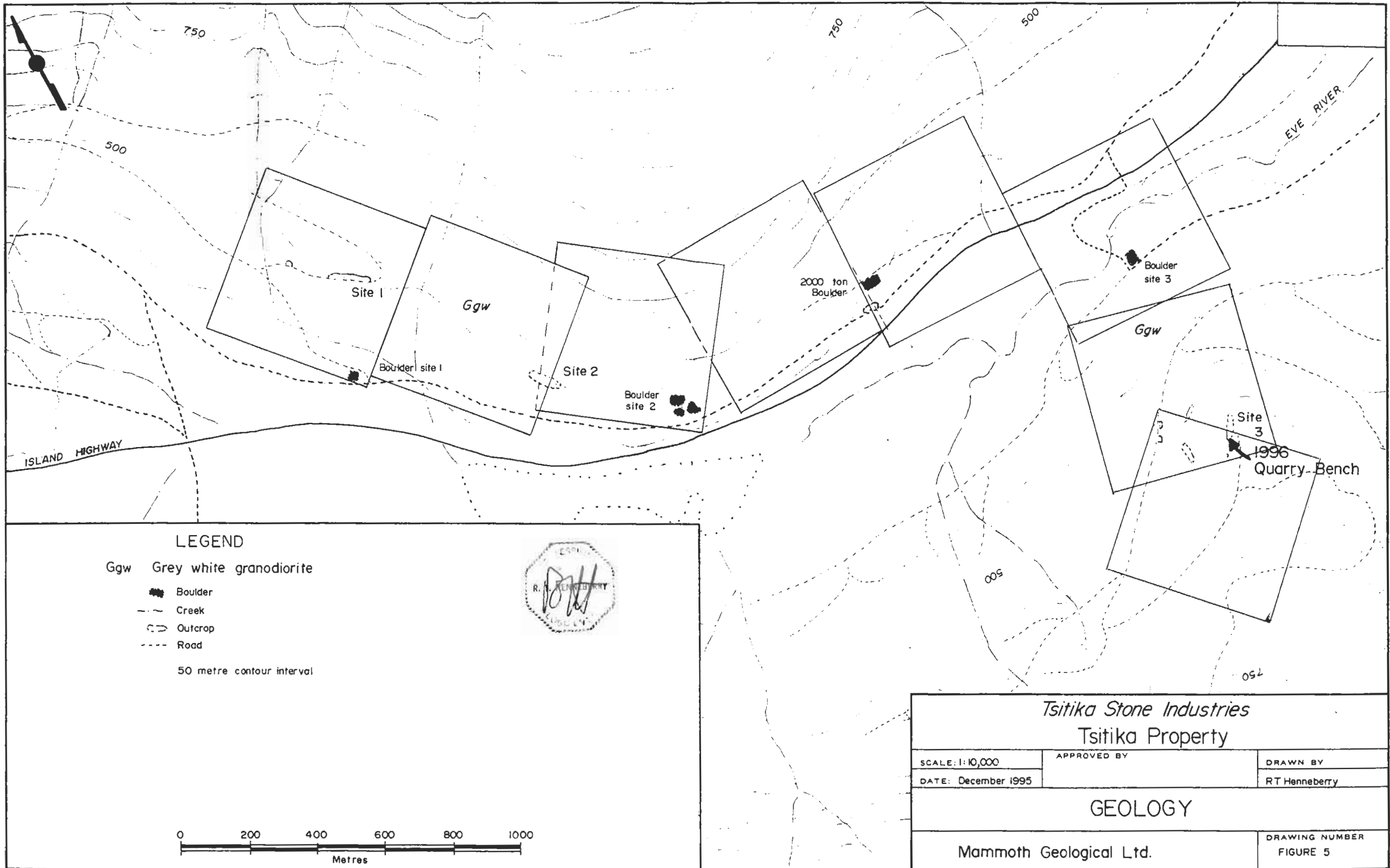
The zones of interest for dimension stone are the lighter colored monzonites and associated leuco-granodiorite, and the dark to black gabbros. The lighter rocks are pink to red or white and contain less than 5% mafics, while the darker rocks are black and contain 30%-50% mafics. The Vernon batholith is the largest intrusion on the North Island and was the first one prospected.

### Vernon Batholith

The Vernon Batholith of the Jurassic Island Intrusions is the main focus of the granite exploration. The Vernon Batholith is a large rather homogeneous body of medium- to coarse-grained plutonic rocks ranging from biotite-hornblende quartz diorite to leuco-quartz monzonite. It is elongate in an approximate north-south direction, is up to about 10 miles wide and occupies much of the upper Nimpkish Valley with northward extension in the head water area of Tsitika River. To the south it connects with the Nootka and Bedwell batholiths. It is entirely enclosed by Karmutsen volcanics.

The rocks are readily divisible into two distinct petrographic groups. Light-pink colored leuco-granodiorite and leuco-quartz monzonite are exposed in an elongate central core marked by Klaklakama Lakes in its middle part, and a poorly defined area east of Vernon Lake, but most of the batholith consists of dark-grey biotite-hornblende quartz diorite and granodiorite.

Except for the on-going exploration programs of the north Island dimension stone project undertaken by the author, there has been no exploration undertaken for dimension stone within the Vernon Batholith.



**LEGEND**

Ggw Grey white granodiorite

● Boulder

--- Creek

○ Outcrop

--- Road

50 metre contour interval



*Tsitika Stone Industries*  
Tsitika Property

SCALE: 1:10,000

APPROVED BY

DRAWN BY

DATE: December 1995

RT Henneberry

**GEOLOGY**

Mammoth Geological Ltd.

DRAWING NUMBER  
FIGURE 5

## 1996 EXPLORATION PROGRAM

The Tsitika property lies near the northeast contact of the Vernon Batholith, covering the lower slopes of the headwaters of Eve River, through the pass into the Tsitika River valley. Prominent ridges of granite were mapped on the 315-1, M315-2, M315-3 and S90-2 claims. Numerous boulders ranging in size from 50 to 2000 tons lie adjacent to logging roads on all claims.

Prior to 1996, the mapping, sampling, marketing and boulder quarrying phases were successfully completed, proving the stone is both structurally sound and esthetically pleasing.

The 1996 exploration program concentrated on opening an initial quarry bench on the southern end of the S90-1 granite knob (the third and best site earlier identified by Henneberry, 1996). A small quarry bench was established.

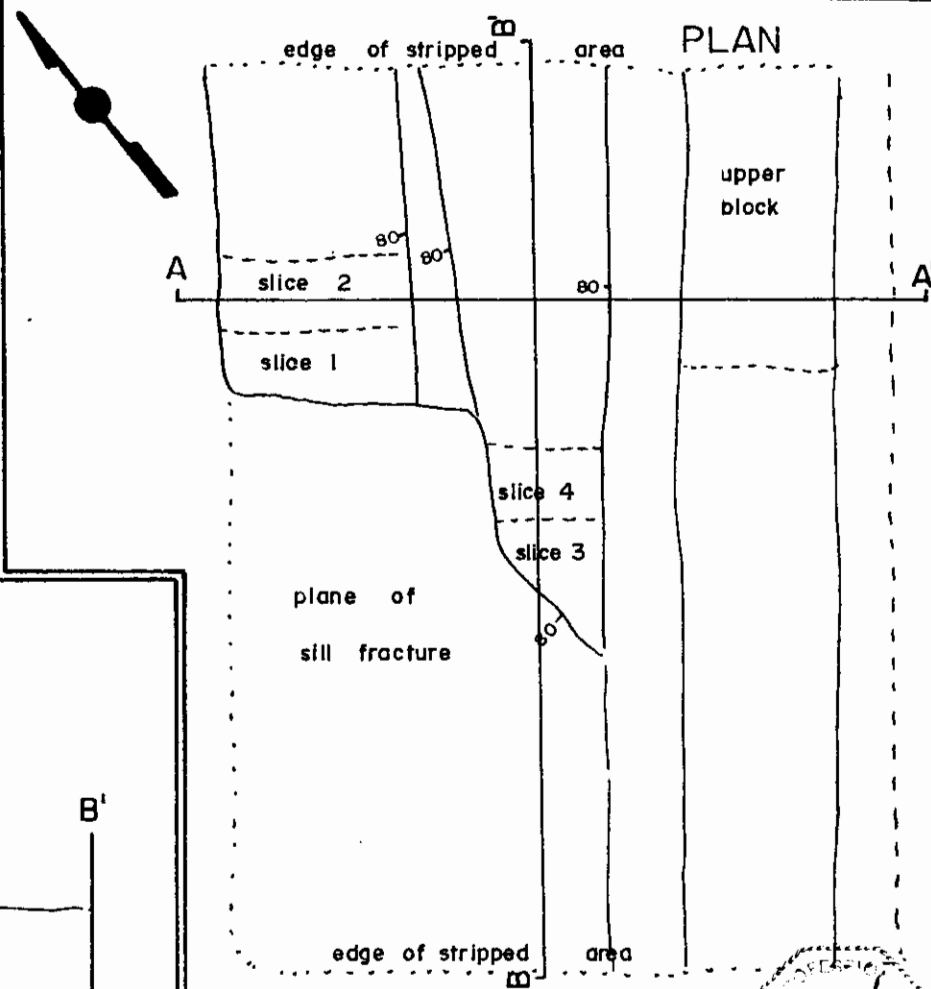
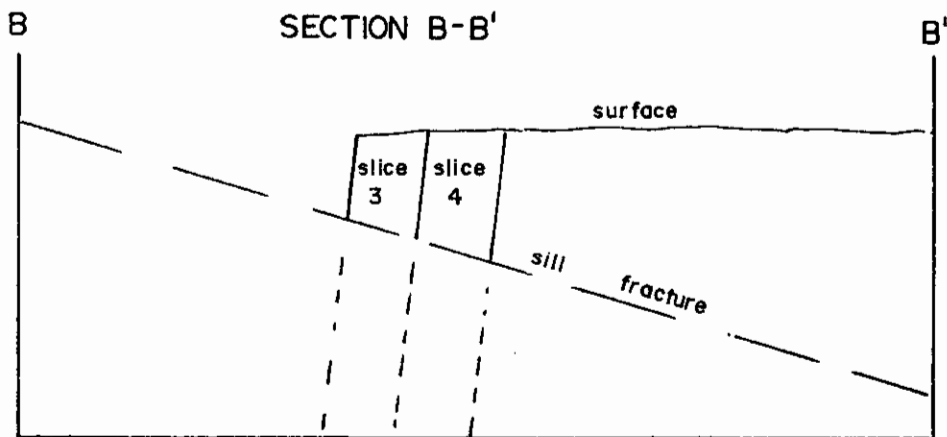
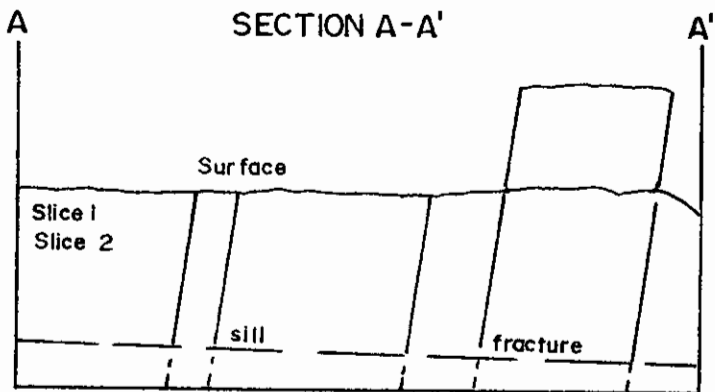
### **Geology**

The geology of the property has been described previously (Henneberry, 1995). To summarize, the property is underlain by a medium-grained, equigranular, grey-white, hornblende-biotite granodiorite. The constituents are: 20-25% anhedral (5-7mm) cream K-feldspar, 40-45% anhedral (5-7mm) white plagioclase, 20% anhedral, grey (5-10mm) quartz and 10-15% black (5-10mm) mafics with hornblende over biotite.

This stone has a fresh, clean appearance on newly exposed surfaces, with little sign of alteration. The stone weathers well, as little rusting or other deleterious substances were noted on the natural bench faces.

No sulfides were noted in any of the samples, or on the weathered surfaces. The stone is peppered with xenoliths, typical of the Island Intrusions. They can range from 0-5% of the granodiorite, ranging in size from 2-10 centimetres, though an occasional 30 cm xenolith has been observed. They generally show a rounded character, and give the stone "a character" for structural purposes.

Three prospective quarry sites were located during the prior property mapping program (Henneberry, 1996). The site of the 1996 quarry bench test was Henneberry's (1996) third site on the S90-1 claim. The stone was described as massive in outcrop, lying in a series of benches progressing up the hill toward a solid knob at the top. While the north end of the knob exposure looked to be the best location, the south end was chosen because it would not require any significant access road at this time. This later proved not to be the wisest of decisions.



R. HENNEBERRY

Tsitika Stone Industries  
 Tsitika Property  
 Initial Quarry Bench

DRAWN BY: RTHenneberry DATE: December 1996  
 Mammoth Geological Ltd. FIGURE: 6

### **Preliminary Quarry Bench - Figure 6**

An area approximately 15m by 25m was stripped to bedrock. Three sub-parallel fractures were mapped (037/80NW, 030/80NW, 040/80NW). The fractures were spaced at intervals ranging from 1.5m to 4.5m. One cross-cutting fracture was mapped at 177/80W. This fracture pattern resulted in master blocks of horizontal dimensions of 1.4m to 4.5m by indeterminate lengths (the lengths are determined by the size of blocks required, usually 2m to 3m).

A horizontal fracture (actually 135/25NE) provides a sill at approximately 4 metres depth. This is also the grain plane.

The outermost section was opened with two 2m slices, drilled to a depth of 14 feet (4.3m). This yielded master blocks of dimensions 4.5m by 2m by 4.3m. These master blocks were liberated by blasting with primacord, pushed over and split into 5 ton blocks. The dip of the sill yielded a thickness of over 16 feet (4.5m) for the second slice, causing it to jam against the sill.

Two slices were also taken from the third section in. These slices were 3m by 2m, drilled to a depth of 10 feet (3m). Again the dip of the sill, this time in combination with the cross-cutting fracture caused the blocks to pinch and jam.

While the blocks finally split out are sound, considerable effort was expended fighting the sill fracture dip. This problem caused portions of the master blocks to be lost.

The quarry bench will need to be established at a location on the other side of the knob, necessitating some road building. The quarry can then advance up the dip of the sill as opposed to down the dip..

### **Marketing**

The marketing program is essentially complete for the Tsitika property. The stone has been used and accepted on a number of job sites. The remaining aspect of the marketing program is identical to the remaining aspect of the quarrying program, open a quarry bench to ensure a continued supply of stone will be available.



## CONCLUSIONS

The Tsitika property is the first granite property to be opened on northern Vancouver Island. The previous marketing and boulder testing programs showed the stone (marketed as *Tsitika Grey*) has appeal in the marketplace.

The initial quarry bench proved to be established on the wrong side of the S90-1 granite knob. The site was located on this side to avoid the building of access road. The initial bench showed the sill dips at  $\pm 25^\circ$ , considerably steeper than first indicated. This resulted in the bench being established down the dip of this sill and caused pinching and jamming of blocks against the sill and resulted in parts of the master block being damaged and lost.

A second bench should be established on the other side of the knob to establish a bench up dip along the sill plane. The cost of building the access road, establishing the bench and quarrying  $\pm 1,000$  tons is estimated at \$53,000.

The 1996 program cost was \$22,173.15.

REFERENCES

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STATEMENT OF QUALIFICATIONS

I, R. Tim Henneberry, am the principle of Mammoth Geological Ltd., a geological consulting firm with offices at 9250 Carnarvon Road, Port Hardy, B.C. The mailing address is Box 5250, Port Hardy, B.C. V0N 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 conducted and supervised the exploration program completed on the Tsitika group during the following dates: July 31, August 19-26 and 29-31, September 4-5, 21-23 and 28, October 16-19 and 29-31 and November 3-14. I am presently the registered owner of the Tsitika group, comprising the following mineral claims: 315-1 (#325105), M315-2 (#333330), M315-3 (#333331), M315-4 (#337853), 315-5 (#335253), Load (#334441), S90-1 (#325104) and S90-2 (#326509).

Tsitika Stone Industries is a wholly owned subsidiary of Mammoth Geological Ltd. I am the principle of Mammoth Geological Ltd.

This report may be used for any purpose normal to the business of Tsitika Stone Industries and/or 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 23<sup>rd</sup> day of February in the Town of Port Hardy, British Columbia.

  
R. Tim Henneberry, P. Geo

STATEMENT OF COST

Tsitika Property

Exploration dates: Jul 31, Aug 19-26, Aug 29-31, Sep 4-5, Sep 21-23, Sep 28, Oct 16-19, Oct 29-31, Nov 3-14

Driller (T. Henneberry)	29 days @ 200.00 /day	\$5,800.00
Assistant (R. Henneberry)	31 days @ 150.00 /day	\$4,650.00
Excavator Mob	16 hrs. @ 75.00 /hour	\$1,200.00
Excavator Hours	46 hrs. @ 95.00 /hour	\$4,370.00
Vehicles	32 days @ 50.00 /day	\$1,600.00
Compressor		\$2,598.00
Sundries (bits, paint etc)		\$1,955.15

**Tsitika Property Costs** **\$22,173.15**

COST ESTIMATES

Phase III - Pre-production Bulk Test (10 days)	
Road Building	\$10,000
Contractor Cost (Machinery)	\$8,000
Quarrying Equipment Cost	\$2,300
Quarrying Personnel Cost	\$5,000
Field Costs (Geological and Supervision)	\$4,500
Support Costs (Room and Board, Vehicles)	\$3,250
Sample Preparation	\$10,000
Documentation (Reports)	\$4,500
Contingency (15%)	\$5,633
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<b>TOTAL BUDGET FOR TSITIKA PROPERTY</b>	<b>\$53,183</b>