

[ARIS11A]

ARIS Summary Report

Regional Geologist, Vancouver

Date Approved: 1999.04.01

Off Confidential: 1999.12.26

ASSESSMENT REPORT: 25801

Mining Division(s): Nanaimo

Property Name: Tsitika

Location:	NAD 27	Latitude: 50 17 30	Longitude: 126 22 00	UTM:	09	5574159	687573
	NAD 83	Latitude: 50 17 29	Longitude: 126 22 05	UTM:	09	5574343	687469
	NTS:	092L08W					

Camp:

Claim(s): 315-1, M315-2-3

Operator(s): Tsitika Stone Industries

Author(s): Henneberry, R. Tim

Report Year: 1998

No. of Pages: 22 Pages

Commodities

Searched For: Granite

General GEOC

Work Categories:

Work Done: Geochemical

~~SAMP. Sampling/assaying (10 sample(s))~~

Elements Analyzed For : Dimension Stone

Keywords: Boulders, Feasibility studies, Granodiorites, Island Intrusions, Jurassic

Statement Nos.: 3130442

MINFILE Nos.: 092L 345

Related Reports: 23891, 24251, 24876

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1998 EXPLORATION AND DEVELOPMENT PROGRAM

ON THE

TSITIKA PROPERTY

FOR ASSESSMENT CREDITS

Nanaimo Mining Division

Vancouver Island, B.C.

MINERAL TILES BRANCH	
Rec'd.	
JAN 14 1999	
L.I.#	_____
File	_____
VANCOUVER, B.C.	

FOR

TSITIKA STONE INDUSTRIES
(A Division of Mammoth Geological Ltd.)

By: R.Tim Henneberry, P.Geo.
January 7, 1999

GEOLOGICAL SURVEY BRANCH
ASSESSMENT REPORT

25,801

GOLD COMMISSIONER	
RECEIVED and RECORDED	
JAN 11 1999	
M.R. #	_____
VICTORIA, B.C.	

SUMMARY

The Tsitika property consists of 8 contiguous, two-post mineral claims in the Nanaimo Mining Division of Vancouver Island. This property was the first one on Vancouver Island to be explored as a source of granite dimension stone. The white-grey, medium- to coarse- grained, granodiorite is known in the local market place as *Tsitika Grey*.

A small bench quarry, established in 1996, was subsequently found to be on the up-dip, as opposed to down-dip, side of a major sill fracture. A program of road building, followed by opening of a quarry bench on the logical down-dip side of the sill fracture was recommended as the next phase of exploration at a cost of \$53,000.

A lack of funding made it impossible to implement this road building and quarry bench program. Assessment requirements necessitated a small exploration program in 1998 to maintain the property in good standing.

The large number of 5 - 10 ton boulders on the north side of Highway 19 were thought to make an attractive target for landscape boulders. The small 1998 program concentrated on stockpiling and splitting (as required to reduce weight) a super "B" train load (± 45 tons) for shipment to a stone yard in Vancouver.

The manager of the stone yard ended up using the boulders for split stone and coping, suggesting there is not a large potential market for landscape boulders.

The cost of the 1998 program was \$3,593.

The recommended exploration program for the Tsitika property remains unchanged from the 1996 report: build a 1-2 km access road to the north side of the granite knob and establish a bench quarry on the down dip side of the sill fracture. The cost of this program is still estimated at \$53,000.

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INTRODUCTION

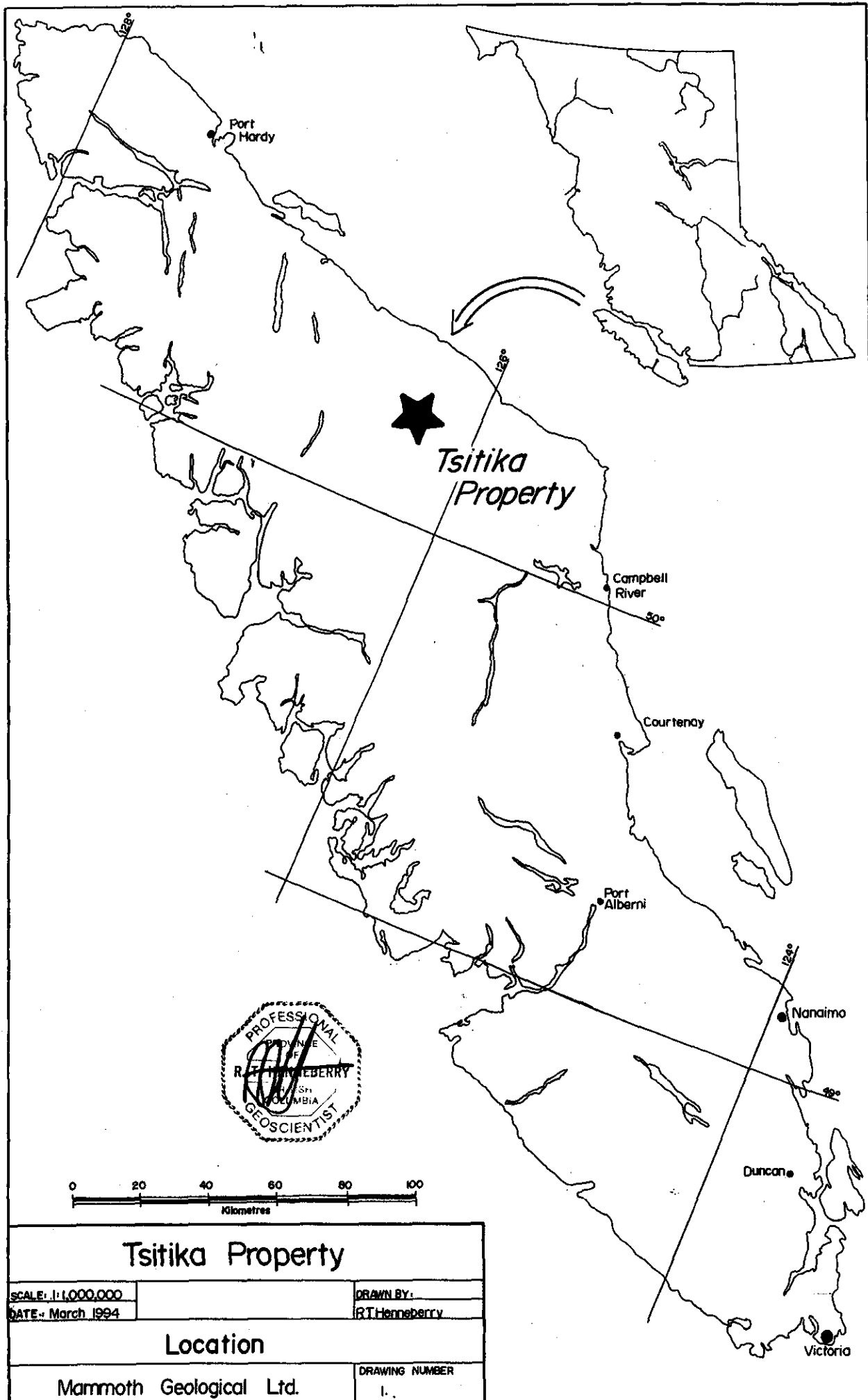
The purpose of this report is to document the results of the 1998 exploration program on the Tsitika property for assessment credits. The property has been continuously explored since 1994 and consists of eight claim units.

A large exploration program of road building and quarrying was originally planned for 1997. Tsitika Stone Industries has been unable to secure the financing to undertake the planned program.

Assessment credits were required for most of the claims in late 1998 - early 1999. A small program was improvised, concentrating on the numerous 5 ton to 10 ton boulders scattered throughout the claim group, especially on the north side of Highway 19.

The objective was to test the marketability of the boulders, either whole or split into half or quarters, as landscape stone. The boulders could be used as stand alone boulders, as driveway entrance columns, as signage or in other such applications.

Approximately 50 tons of boulders were dug out, picked up and moved to a load out site by excavator and 20 ton truck. They were split (if they were too heavy to lift) and loaded onto a super "B" train for shipment to a stone yard in Vancouver.



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 is 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 most of the map area.

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.



Tlatlos Creek

RIVER

EVE

315-1, 325105

M315-2, 333330

M315-3, 333331

M315-4, 337853

315-5, 335253

LOAD, 334441

S90-2
326509

S90-1
325104



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

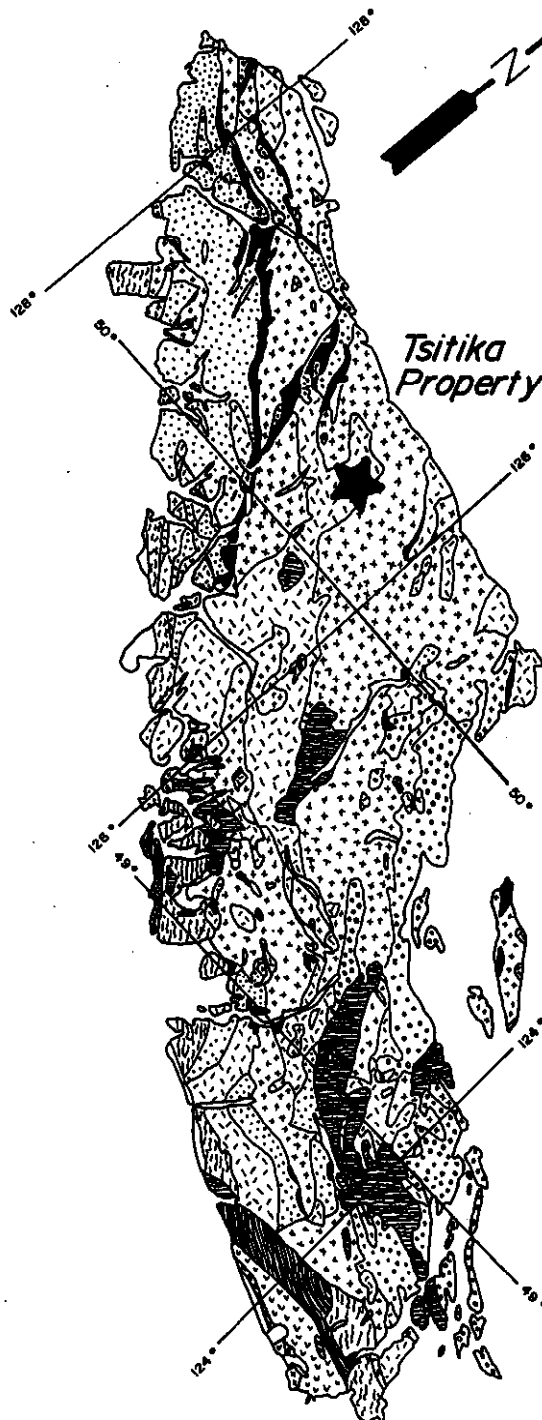
CLAIM OWNERSHIP

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, 2001
M315-2	333330	December 27, 2000
M315-3	333331	December 27, 2000
M315-4	337853	July 14, 2001
315-5	335253	April 19, 2001
Load	334441	March 17, 2001
S90-1	325104	May 3, 2001
S90-2	326509	June 20, 2001

* pending approval of 1998 assessment credits

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



LEGEND

TERTIARY

- CARMANAH GROUP
- CATFACE INTRUSIONS
- METCHOSIN VOLCANICS

LATE CRETACEOUS

- NANAIMO GROUP

EARLY JURASSIC TO EARLY CRETACEOUS

- QUEEN CHARLOTTE GROUP
- KYUQUOT GROUP
- LEECH RIVER FORMATION
- PACIFIC RIM COMPLEX
- ISLAND INTRUSIONS
- BONANZA GROUP

JURASSIC AND OLDER

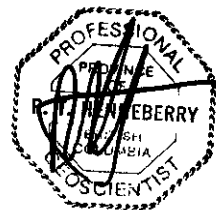
- METAMORPHIC COMPLEXES

LATE AND MIDDLE TRIASSIC

- VANCOUVER GROUP
- PARSON BAY FORMATION
- QUATSINO FORMATION
- KARLUTSEN FORMATION

PALEOZOIC

- SICKER GROUP



KILOMETERS

0 30 60 90 120

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

Mammoth Geological Ltd.

GEOLOGY OF VANCOUVER ISLAND

DRAWN BY: A. STANTA

SCALE:

CHECKED BY:

DATE:

APPROVED BY:

DRAWING NO: 3

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 marked 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.

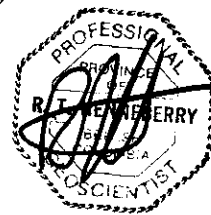
Bonanza
Batholith

BONANZA
LAKE

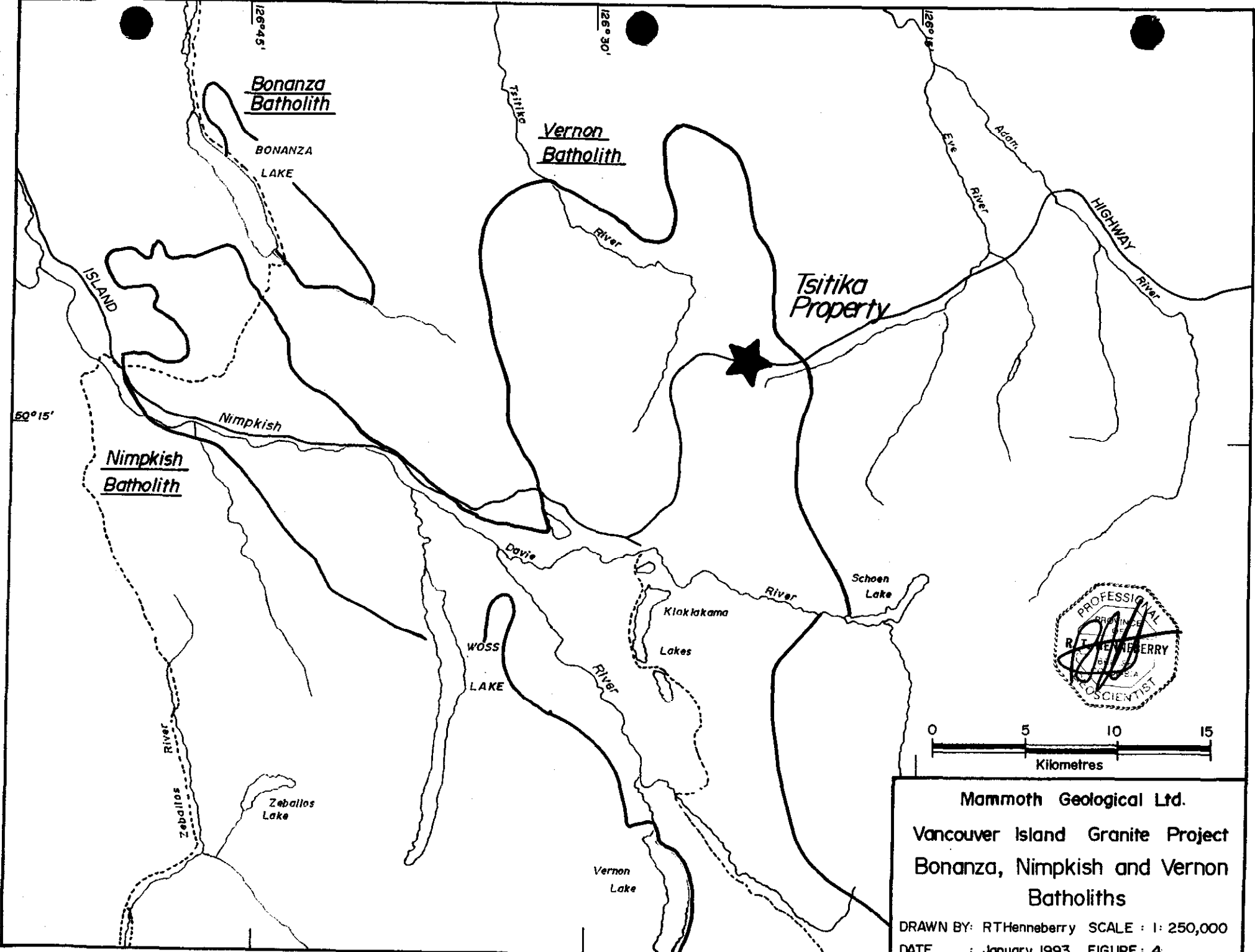
Vernon
Batholith

*Tsitika
Property*

Nimpkish
Batholith



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



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.

The network of faults displayed on the north end of Vancouver Island appears to be the superposition 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.

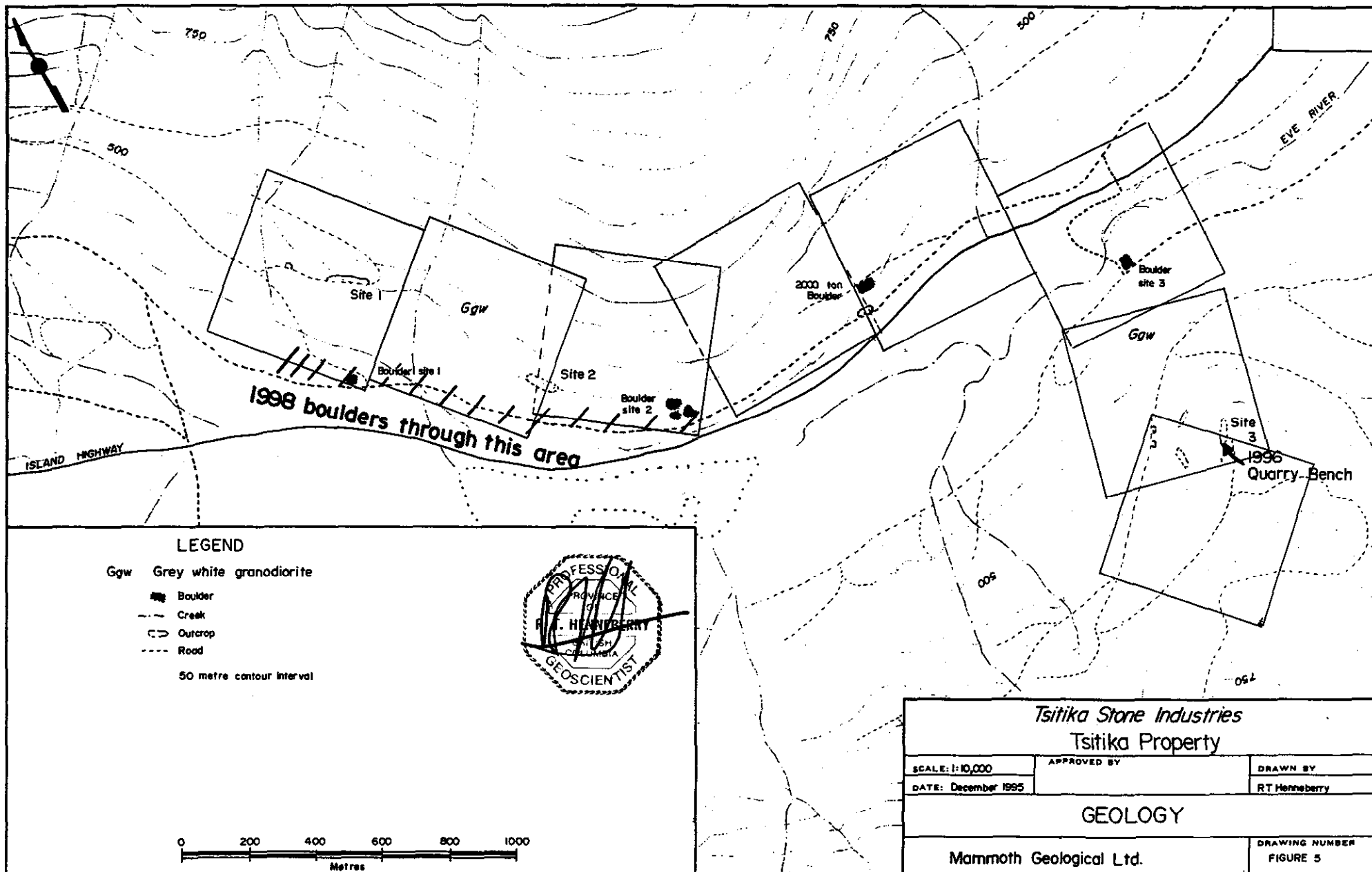
Vernon Batholith

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 exploration programs of the north Island dimension stone project undertaken by the author, there was no exploration undertaken for dimension stone within the Vernon Batholith until 1997.

Yoho Natural Stone Ltd. is currently (1998) exploring a granite boulder field on the upper White River. The field lies immediately east of the Vernon Batholith and the boulders are likely sourced from it.



PREVIOUS EXPLORATION

Prior to dimension stone exploration initiated by the author, the granites of northern Vancouver Island had never been considered as potential sources of dimension stone.

Preliminary prospecting was completed in 1992 and 1993, resulting in the identification and staking of a number of prospects. Further exploration eliminated a number of these sites, while on-going further prospecting located the present Tsitika claim group in 1994.

Initial exploration on the Tsitika property was concentrated on testing several of the large granite boulders for split stone. These 100 to 800 ton boulders were progressively split down to the local industry standard 4 inch split face product and supplied to a number of job sites for market tests. These boulder programs showed the stone to be structurally sound and esthetically pleasing. (Henneberry 1995a; 1995b; 1996).

In 1996, a preliminary quarry bench was opened on a large granite knob on the S90-1 claim. The actual quarried blocks split well along grain and were structurally sound. Unfortunately, the sites selected proved to be on the up-dip side of the sill fracture, resulting in pinching and jamming of the larger primary quarry blocks. A 1-2 kilometre road is required to provide access to the lower down-dip side of the granite knob. (Henneberry, 1997).

The Tsitika 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).

Geology

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.

The Tsitika 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.

Mapping programs located three areas within the claim group where fracture patterns and density is conducive to quarrying. The site on the S90-1 claim was chosen for the preliminary quarry bench. 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.

An area 15m by 25m was stripped to bedrock and four master blocks were liberated, two from each of two different locations along the quarry face. The face was opened utilizing a sill fracture (135/25NE) and a series of three sub-parallel vertical fractures (030-040/80NW). Blocks to 4.5 m by 2 m by 4.3 m were obtained (see Henneberry, 1997).

The sill fracture dips back into the hill at angle much steeper than originally thought, causing problems liberating the master blocks. These blocks will become progressively thicker and will also become more wedge shaped as the quarry face is advanced into the hill. Therefore, no further quarrying is planned for this location.

Logically, the quarry bench should be established at the north end of the outcrop (on the down-dip side of the sill fracture). This will entail construction of a 1-2 km access road.

Marketing

The marketing program is essentially complete for the Tsitika property. The stone has been successfully used and accepted on a number of job sites. Two high profile sites are the new library at the University of British Columbia and the Sears Metrotown Mall in Burnaby. Further marketing will be initiated once the quarry bench has been established on the down dip side and a continued supply of stone is available.

1998 EXPLORATION PROGRAM

A fully funded exploration program would have seen the construction of the access road and establishment of a quarry bench on the down dip side of the sill fracture on the knob of the S90-1 claim. The required funds were not available, so a significantly altered program was initiated.

This program concentrated on the smaller 5-10 ton boulders on the 315-1, M315-2 and M315-3 claims. The objective was to quarry and send to Vancouver a "B" train load of boulders in this size range for splitting in half or into 4 pieces at the most. The resulting pieces would then be utilized in landscape applications.

The boulders were gathered and taken to a central load site on the 315-1 claim by a Hitachi LX 200 excavator and a 20 ton dump truck. Larger boulders were split in half to keep the weight under 5 tons.

The boulders were then loaded onto a super "B" train and trucked to Vancouver.

The feed back has been poor, as most of the boulders ended up being split into 4 inch split face and coping by the stone yard in Vancouver.

CONCLUSIONS

The Tsitika property has been explored for granite dimension stone since 1994. The stone (marketed as *Tsitika Grey*) has been accepted in the local marketplace.

A program of road building and opening of a second bench on the north side of the prominent granite knob was recommended at the conclusion of the last phase of exploration in 1996. Funding shortfalls in 1998 resulted in a much scaled down program.

The large number of 5 - 10 ton boulders on the north side of Highway 19 were thought to make an attractive target for landscape boulders. The program completed in 1998 concentrated on stockpiling and splitting (as required to reduce weight) a super "B" train load (± 45 tons) for shipment to a stone yard in Vancouver.

The manager of the stone yard ended up using the boulders for split stone and coping, suggesting there is not a large potential market for landscape boulders.

The cost of the 1998 program was \$3,593.

The conclusion and recommendation from the completion of the 1996 exploration program (Henneberry, 1997) remain valid. The recommendation is as follows:

.....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 estimated costs remain valid in 1999. A copy of this cost estimate is appended in this report.

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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 604 Noowick Road, R.R.#1, 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 conducted and supervised the exploration program completed on the Tsitika group during the following dates: May 31 and June 5. 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 9th day of January in the Town of Mill Bay,
British Columbia.


R. Tim Henneberry, P. Geo.

STATEMENT OF COST

Tsitika Property

Exploration dates: May 31, June 5

T. Henneberry	1.5 days	@	300 /day	\$450.00
Vehicle	1.5 days	@	50 /day	\$75.00
Excavator				\$1,168.92
Trucking (to Vancouver)				\$1,300.00
Report	2 days	@	300 /day	\$600.00

Tsitika Property

\$3,593.92

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

TOTAL BUDGET FOR TSITIKA PROPERTY \$53,183