SUMAS SODA FELDSPAR PROPERTY
SUMAS MOUNTAIN, B.C.

NEW WESTMINSTER MINING DIVISION
NTS 92G/1E
122°10'W, 49°7'N

A FELDSPAR PROSPECT

for

Jack Lee

by

John G. Payne, PhD

John G.Payne Consultants, Ltd.,
877 Old Lillooet Road,
North Vancouver, B.C., V7J 2H6

August 1989

TABLE OF CONTENTS

		page
1.Ø	Introduction	1
	1.1 Purpose	1
	1.2 Economic Uses	1
	1.3 Location and Access	1
	1.4 Physiography and Vegetation	3
	1.5 Claim Status	3
	1.6 Previous Work	3
2.Ø	Geology	5
	2.1 Regional Geology	5
	2.2 Property Geology	6
3.Ø	Geochemistry	7
4.Ø	Geophysics	8
5.Ø	Discussion and Conclusions	9
6.Ø	Recommendations	9
	6.1 Stage 1	9
	6.2 Stage 2	1Ø
7.Ø	Reference	11
8.Ø	Appendix 1: Individual Total-Fe Analyses	11
9.Ø	Certificate of Engineer	12

FIGURES

Figure 1	Location Map	2
Figure 2	Claim Map	4
Figure 3	Regional Geology	5
Figure 4	Property Geology	inside back cover
Figure 5	Sample Location Map	inside back cover

TABLES

Table 1	Whole-Rock Analyses of Samples from Unit 5	7
Table 2	Iron in Rocks of Units 3, 4, and 5	7
Table 3	Comparison of Fe_2O_3 Content Between Labs	8

SUMAS SODA FELDSPAR PROPERTY
SUMAS MOUNTAIN, B.C.

NEW WESTMINSTER MINING DIVISION
NTS 92G/1E

$122^{o}10'W$, $49^{o}7'N$

A FELDSPAR PROSPECT

1.0 INTRODUCTION

1.1 Purpose

At the request of Jack Lee, and of the directors of a previous optioner (Wescan Energy Ltd.) of the Sumas Mountain property (Samus Claim Group), I mapped part of the property in November, 1987 and collected 99 rock chip samples of outcrops for chemical analysis. Nine of the samples were analysed for all the major elements, and the rest were analysed only for iron. The purpose of the examination was to evaluate the economic potential of the claim group, and if warranted, to recommend a program of exploration and development. Since that time several visits were made to the property to examine showings exposed by new logging-road cuts.

1.2 Economic Uses

The property is of economic interest mainly because it is underlain in part by feldspar-rich dikes. Parts of the dikes are sufficiently low in iron content to be suitable for use as an industrial mineral in the fiberglass, glass, and ceramic industries. Recommended iron (as Fe2O3) contents for raw material for various industrial products are as follows:

high-quality glass and porcelain	0.05% Fe2O3
low-quality glass	0.30
fiberglass	0.25-0.35

Locally, the feldspar-rich dikes have been quarried for use as a road aggregate. The material may also be useful for sand-blasting.

1.3 Location and Access (see Figure 1)

The property is on the west side of Sumas Mountain. It is accessible from Batt Road, a one-lane gravel road which branches east from Upper Sumas Mountain Road near the crest of a ridge, just south of where Upper Sumas Mountain Road drops steeply to the Fraser River. Batt Road continues eastward and upwards to Sumas Mountain Provincial Park on the summit of Sumas Mountain.

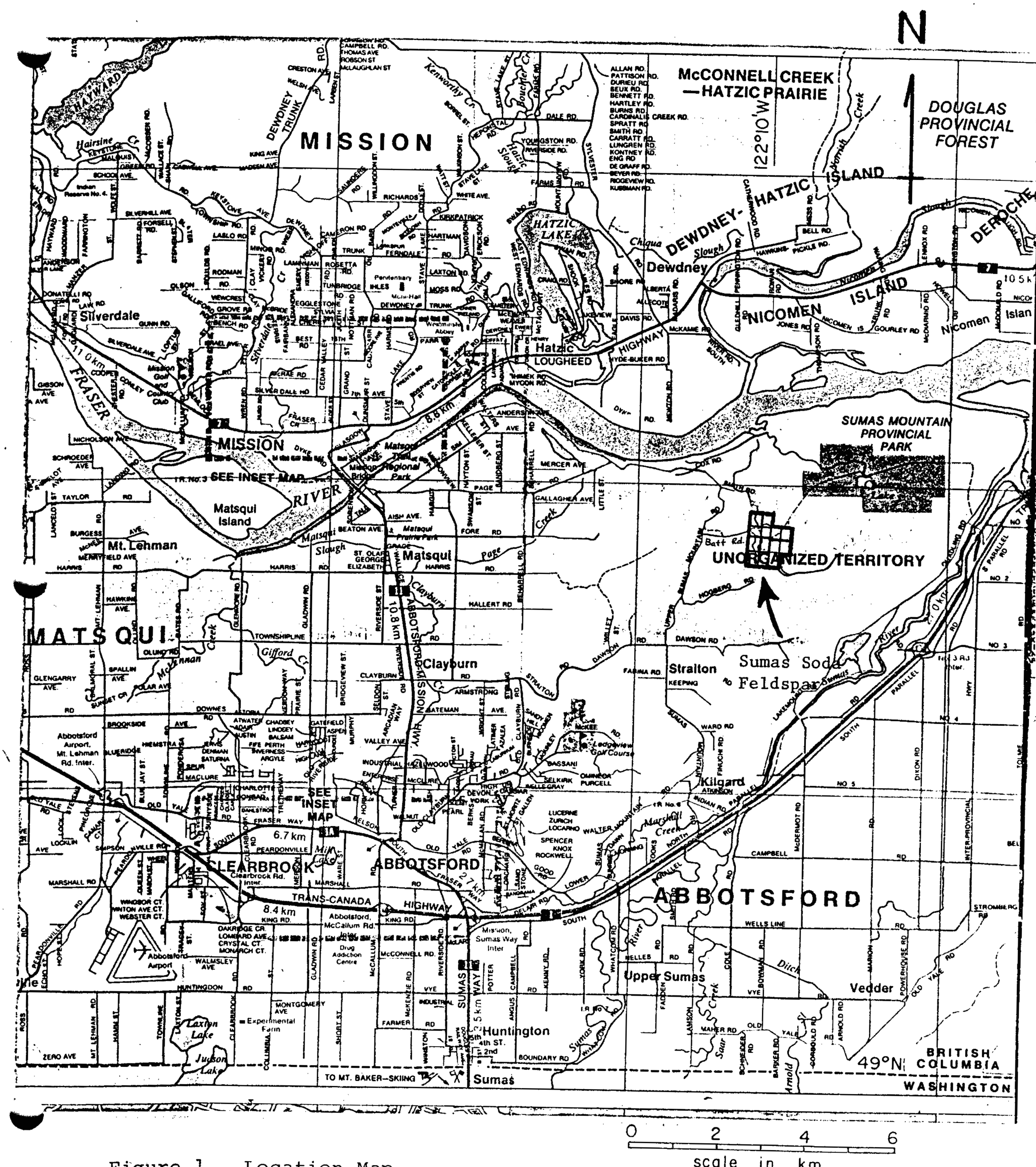


Figure 1. Location Map

1.4 Physiography and Vegetation

The property extends from an elevation of 240 metres in the west to 440 metres in the east. It is incised by several branches of Wade Creek, which flows to the west before turning north to join Chadsey Creek just before the latter empties into the Fraser River. Chadsey Creek cuts a steep valley from east to west to the north of the property before emptying into the Fraser River near Cox Station.

Prominent knobs expose bedrock or hide it beneath a thin soil cover supporting an open, stunted forest. Most of the valleys and flatter parts of the property are covered by deposits of glacial gravel, sand, and clay, which support a dense forest. Locally, glacial deposits reach thicknesses of several tens of metres. Extensive recent and active logging has denuded the slopes, and has exposed much bedrock in road cuts.

1.5 Claim Status (see Figure 2)

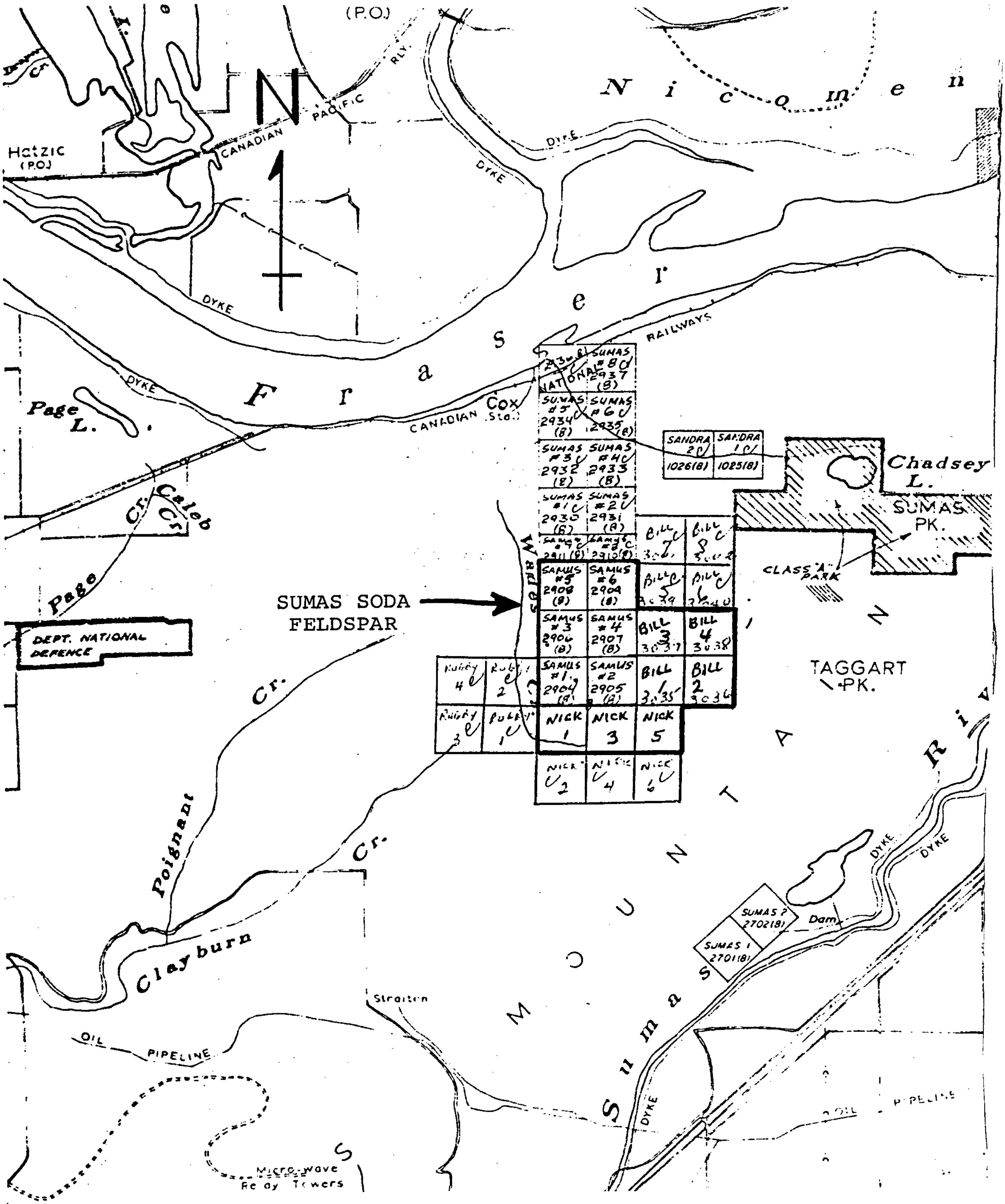
The property consists of 3 claim groups as follows:

Claim Group	No. of Units	Record No.	Expiry Date
Samus 1-6	6	2904-09	18-08-89
Bill 1-4	4	3035-38	18-08-89
Nick 1, 3, 5	3	3044, 3046, 3048	18-08-89

1.6 Previous Work

Minor quarrying has been done in parts of the feldspar-rich dikes to provide aggregate for logging-road construction. The dike material is strongly fractured, and breaks readily into durable, angular fragments suitable for road aggregate. No previous work has been done with respect to evaluating the feldspar-rich dikes as a raw material for the glass and ceramic industries.

A 10-metre adit was driven into a quartz vein just north of the property on the south slope of Chadsey Creek; the vein cuts metamorphosed andesite enclosed in a sheared part of the granodiorite intrusion. Just west of the adit is the outcrop of feldspar-rich dike.



0 1 2 3 4 5

scale in km

Figure 2. Claim Map

2.0 GEOLOGY

2.1 Regional Geology (see Figure 3)

Roddick (1945) mapped Sumas Mountain as part of a regional project, but did not indicate the presence of the feldspar-rich dike nor that of the andesitic rocks in the western part of the property and to the southwest and west. Much of Sumas Mountain is underlain by the Jurassic to Cretaceous Coast Range Batholith, here dominated by medium grained granodiorite to quartz diorite, with hornblende dominant over biotite. These rocks are overlain unconformably by sedimentary rocks of the Cretaceous(?) Harrison Lake Formation, which in turn are overlain by Eocene shales, sandstones, conglomerates, and clays. Glacial deposits are common, especially on the northern side of Sumas Mountain. The Fraser Valley is underlain by glacial and alluvial deposits.

LEGEND

4 Pleistocene to Recent glacial and alluvial deposits

3 Eocene sedimentary rocks

2 Cretaceous? Harrison Lake formation: sedimentary rocks

1 Cretaceous Coast Range Batholith

0 1 2 3 4

scale in km

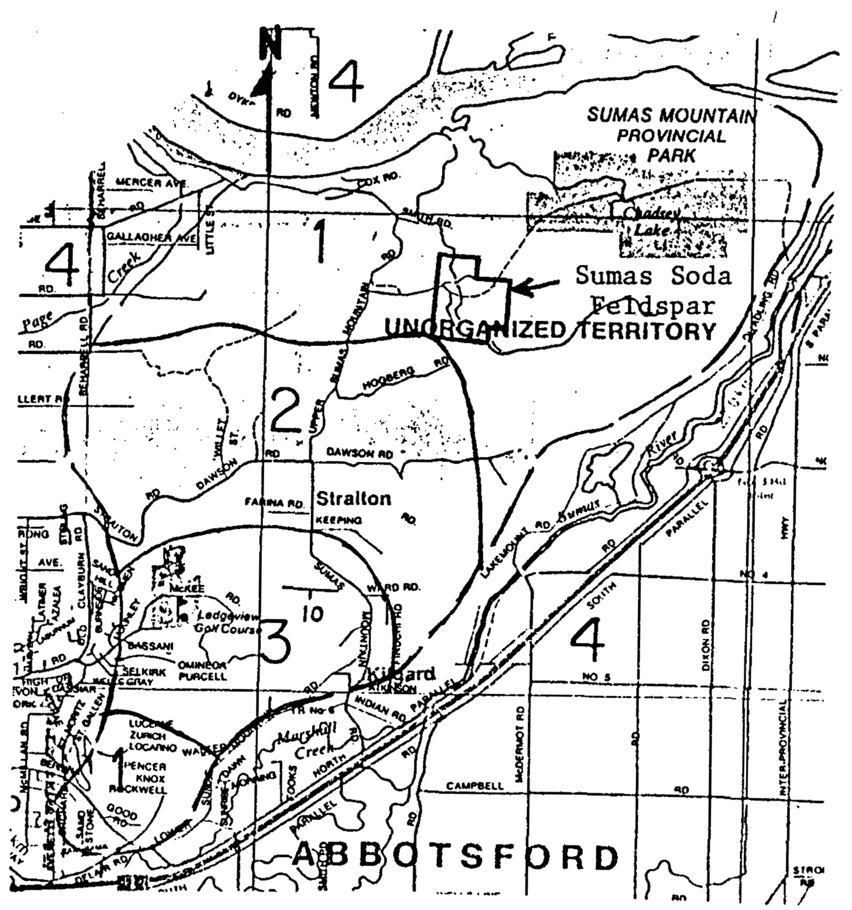


Figure 3. Regional Geology (after Roddick, 1965).

2.2 Property Geology (see Figure 4)

The western part of the property is underlain by an interval of minor cherty argillite (Unit 1) and dominant andesitic volcanic rocks (Unit 2), probably of Jurassic age. Bedding attitudes are sparse and variable. Andesitic rocks range from massive flows to flow breccias and tuffs.

The eastern part of the property is underlain by the Cretaceous hornblende quartz diorite to granodiorite (Unit 3). This is a medium grained, grey to pink rock dominated by feldspars with lesser quartz and hornblende (7-15%), and minor biotite. Mafic minerals are altered moderately to strongly to chlorite and epidote. In a few places, especially along Chadsey Creek to the north, alteration and fracturing are strong, and secondary epidote is common on veins.

Near the contact of the Jurassic and Cretaceous rocks are a series of feldspar-rich dikes (Units 4 and 5). Dikes commonly trend northeast, and occur mainly in the older sequence of rocks. Two major phases were distinguished. Most of the dikes are a porphyritic dacite (Unit 4), with 10-25% phenocrysts of plagioclase and much less abundant ones of quartz in an aphanitic, pale to medium green groundmass. The rocks contain minor actinolite and chlorite, with lesser Ti-oxide and locally minor pyrite. In several places, one variety of this unit (Unit 4i) contains minor to 20 per cent inclusions averaging a few to several cm across of aphanitic, medium to dark green andesite, probably equivalent the andesite of Unit 2.

A second rock type is a leucocratic, extremely fine grained dacite (Unit 5), with very fine grained phenocrysts of plagioclase and quartz in a groundmass of feldspars and quartz. It is cream to white in color, and contains minor mafic minerals (magnetite, chlorite, actinolite), Ti-oxide, and locally up to 1% pyrite. A second variety of this unit is a white to light grey, flow banded latite. It occurs along borders of some dikes and occupies the entire width of other, narrower ones.

Rocks of Unit 5 commonly are strongly fractured along sheeted joint sets. One of these is subhorizontal and locally is parallel to a weak flow-banding. Locally pyrite forms minor disseminated grains. Limonite and lesser hematite are common on joint and fracture surfaces.

3.0 GEOCHEMISTRY

In 1986, Jack Lee submitted two samples of Unit 5 to Quanta Trace Laboratories, Burnaby, B.C. for whole-rock analysis (Table 1). One sample was from the center of the property, and the other was from the dike on the south slope of Chadsey Creek north of the property. Based on these results, the feldspar-rich dikes were considered to have potential for production of a low-iron feldspar product. A further 99 chip samples were taken from outcrops of Units 3, 4 and 5, and were submitted for analysis of total-Fe (as Fe_2O_3) to Acme Analytical Laboratories, Vancouver, B.C. Results are listed in Appendix 1 and summarized in Table 2. Splits of eight of the samples were sent to Chemex Labs Ltd., North Vancouver, for comparative analysis of Fe_2O_3 (see Table 3). For eight of the chip samples from Unit 5, whole-rock analysis were done (see Table 1).

Table 1. Whole Rock Analyses of Samples from Unit 5

Sample	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	Na_2O	K_2O	TiO_2	P_2O_5	LOI
JL1	72.2	17.8	0.19	0.14	0.33	8.92	0.44	0.13	0.09	0.50 *
JL2	71.1	17.1	0.27	0.17	0.26	8.53	0.20	0.19	0.09	0.45 *
4	77.3	11.3	2.33	0.35	0.77	4.20	2.30	0.18	0.06	0.7
20	78.4	11.4	1.28	0.11	0.36	4.40	2.65	0.17	0.01	0.9
30	77.7	12.8	0.82	0.14	0.78	6.25	0.30	0.24	0.03	0.7
76	79.5	11.8	0.84	0.25	0.57	6.20	0.15	0.15	0.01	0.3
77	79.1	12.0	0.65	0.10	0.57	6.30	0.15	0.15	0.01	0.7
132A	78.9	11.4	2.06	0.09	0.45	5.55	0.15	0.12	0.01	1.0
132B	78.6	11.8	1.68	0.34	0.77	5.70	0.20	0.10	0.01	0.6
188	81.7	10.9	0.52	0.01	0.28	5.40	0.10	0.13	0.01	0.9

* All samples analysed at Acme Lab, Vancouver, except JL1, JL2, which were analysed at Quanta Trace Labs, Burnaby. Analysis by ICP technique.

Table 2. Iron in Rocks of Units 3, 4, and 5

Rock Unit	No.of samples	Average Fe_2O_3	Median Fe_2O_3
3	6	2.70%	2.32%
4 (+ inclusions)	8	2.80	2.11
4 (fresh)	39	1.66	1.66
4 (bleached)	19	0.97	1.00
5	25	0.87	0.81

All samples analysed by Acme Labs, Vancouver
(See Appendix 1 for individual analyses)

Table 3. Comparison of Fe2O3 Content Between Labs

Sample No.	Fe2O3 content		difference
	Acme	Chemex	(Acme-Chemex)
8	0.76	0.64	0.12 *
13	0.77	0.70	0.07
16	0.58	0.56	0.02
26	0.43	0.42	0.01
30	0.82	0.55	0.27 *
77	0.65	0.43	0.22 *
78	0.64	0.59	0.05
103	0.47	0.44	0.03
264	0.31	0.29	0.02

* significant difference

Results indicate that Unit 5 is the only zone in the dikes with any economic potential for a low-iron, feldspar-rich product. Values in Unit 5 range from 0.19 to 1.50% **Fe2O3**, with most samples between 0.50 and 1.0% **Fe2O3**. Petrographic analysis suggests that much of the iron in the rocks is contained in Fe-bearing silicates such as chlorite and actinolite, and to a lesser extent in hematite and pyrite. These minerals generally are intimately intergrown with feldspar, and would be difficult to separate. Examination of the crushed rock suggests that a moderate amount of the iron is present as magnetite, most of which could be separated readily with a small magnet. Further studies will determine to what extent the Fe-content of the rock can be lowered by magnetic separation of the dry, crushed sample.

Comparison of the two labs indicates that about one third of the results from Chemex are significantly lower (average about 0.2% **Fe2O3**) than corresponding results from Acme. At the level of Fe in the samples, this is an important difference. It is recommended that further checks be made in the future on this variation between labs.

4.0 GEOPHYSICS (MAGNETOMETER SURVEY)

A preliminary ground magnetometer survey was carried out in areas of good outcrop along logging roads to determine if the different rock types in the dike have different magnetic signatures. It would be expected that the material with the lowest Fe-content might also have the weakest magnetic response. However, variation in the ratios of magnetite/Fe-silicate between rock types would be as important a factor as overall Fe-content.

The survey did not show any correlation of magnetic response with rock types. Thus it was considered unproductive to make a more detailed survey at this time.

5.0 DISCUSSION and CONCLUSIONS

1. The Sumas Mountain feldspar-rich dikes are part of a previously unmapped geologic unit outcropping over a distance of a few kilometres, and being up to 100 metres in width. They are subvertical, with an expected vertical dimension of at least a few hundred metres.

2. The dikes have potential for production of a low-iron industrial material for use in the fibreglass and glass industries, and possibly in the ceramic industry. The feldspar-rich rock may have other uses because of its moderately high alumina content.

3. Of the rock types in the dikes, Unit 5 (leucocratic latite and dacite) has the best potential for use as a low-iron industrial material.

4. The critical factor in the economic evaluation is the content and distribution of iron in the raw material. Iron which is locked up in silicates would be difficult and expensive to remove by milling; that contained in magnetite can be removed easily using magnetic separation.

5. In the zone of surface weathering, iron was deposited along abundant fractures; below this zone the iron content of the rocks is expected to be moderately (10-30%) lower than that on surface.

6. The location of the property along the main line of the Canadian National Railway and near the Fraser River gives it an advantage of low transportation costs in comparison to those of many competitors.

6.0 RECOMMENDATIONS

The exploration program should continue to further evaluate the economic potential to produce a low-iron, feldspar-rich product, and to determine what markets are available for the range of products which could be produced. This program should include the following:

6.1 Stage 1

1) Geological mapping of the property should continue, with emphasis on distribution and composition of rocks of Unit 5. Present logging provides continued improved access and exposure of bedrock in road cuts. Preliminary mapping can continue on aerial photographs and existing topographic maps (at a scale of 1:10,000). When and if work proceeds to Stage 2, a new topographic base should be made of the areas of interest at a scale of 1:1000; this could be done from the most recent color photography flown by the B.C. government.

2) Analysis of iron for outcrops of Unit 5 should be continued as mapping is continued, to determine the overall distribution of iron in these rocks, and to locate favorable zones of low-iron content. Short drill holes can be used to obtain fresher samples below the weathered surface.

3) Studies should be conducted to determine whether the iron-content of the samples can be reduced by magnetic separation of the dry crushed material, and at what size ranges is this most effective.

4) To determine the vertical extent and Fe-content of rocks of Unit 5 below the zone of surface weathering, percussion holes up to 30-metres depth should be drilled in the most favorable zones.

5) At the same time, market studies should continue to determine potential users of the product, and their specifications regarding chemical composition of raw material and tonnage requirements. In this study, the costs of competitive suppliers should be compared with the expected costs from the Sumas Mountain property.

6.2 Stage 2

Based on favorable results from Stage 1, a second stage should be carried out to include the following:

1) A topographic base map should be prepared from the most recent color aerial photographs in areas of interest. A suitable scale would be 1:1000.

2) Further drilling and trenching should be done to outline the size and distribution of bodies of low iron content. Holes would be less than 50 metres in depth.

3) Bulk sampling should be done in favorable zones, and samples prepared to meet the size requirements of potential customers. Samples should be treated by magnetic separation to determine to what extent this technique can lower the Fe-content of the material. Samples could be delivered to potential customers for their examination, testing, and recommendations.

John G. Payne,
August 1989

7.0 REFERENCE

Roddick, J.A., 1965. Vancouver North, Coquitlam, and Pitt Lake Map Areas, British Columbia. Geol. Survey of Canada, Mem. 335, 276 p.

8.0 APPENDIX 1: INDIVIDUAL TOTAL-FE ANALYSES (as FE2O3)

Sample	Unit	Fe2O3	Sample	Unit	Fe2O3	Sample	Unit	Fe2O3
JL-1	5	0.19%	73	4	1.82%	180	4b	0.37%
JL-2	5	0.27	74	4	0.95	181	4	1.13
4	5	2.33	76	5	0.84	182	4	1.33
8	5	0.76	77	5	0.65	185	4	1.48
13	5	0.77	78	4b	0.64	186	4b	1.03
14	5	1.59	88	4	1.33	187	4b	1.36
16	5	0.58	90	4	2.85	188	5	0.52
19	4	1.40	91	4	2.85	189	4b	0.63
20	5	1.28	95	5	0.74	191	4b	0.56
21	5	1.35	96	4	1.01	192	4b	0.93
26	4b	0.43	98	4	1.81	193	4b	1.35
27	4i	1.66	99	4	1.94	196	4	2.19
28	4i	2.15	100	4	1.66	214	5	1.28
30	5	0.82	101	4	1.66	215	5	1.56
31	5	0.83	102	5	0.81	217	3	2.32
32	4	1.04	103	4	0.47	224	3	2.28
34	4	1.33	104	4	0.71	226	4b	1.02
35	4	1.63	108	4	1.73	233	4	1.04
36	4i	0.92	110	4	1.42	238	4	1.99
37	4	1.28	115	3	3.21	240	3	1.13
38	4	1.79	116	3	0.81	243	4	1.65
39	4	2.84	117	5	0.50	245	4	1.62
43	4i	5.55	120	4	1.00	247	4	2.10
46	5	1.07	125	3	3.35	248	4	1.99
47	4	2.27	132A	5	2.06	249	4	2.03
49	4	1.71	132B	5	1.68	253	4	1.67
50	4i	4.80	134	3	5.44	255	4b	0.82
51	4i	3.13	136	4	1.30	256	4b	1.47
60	41	2.12	138	4	1.89	257	5	1.65
63	5	0.67	145	5	0.69	259	4	1.76
65	4i	2.10	160	3	1.76	261	5	0.86
69	4b	2.15	165	3	3.99	264	5	0.31
70	4b	1.01	171	4	1.81	265	4	1.31
71	4	1.20						

9.0 CERTIFICATE OF ENGINEER

I, John G. Payne, do hereby certify that:

1. I am a consulting geological engineer.

2. In 1961, I graduated from Queen's University, Kingston, Ontario, with a BSc in Geological Engineering. In 1966, I received a PhD in Geochemistry from McMaster University, Hamilton, Ontario.

3. I have practiced geology since graduation from McMaster for 23 years, mainly in the North American Cordillera.

4. I am a Fellow of the Geological Association of Canada.

5. My address is 877 Old Lillooet Road, North Vancouver, B.C., V7J 2H6. My business phone number is 604-986-2928.

6. This report is based on 7 days field examination of the Sumas Soda Feldspar property and immediately surrounding region between November 1986 and July, 1988, and one-half day lab examination of thin sections of rocks collected in the field examination. Other data included in the report include chemical analyses done in 1983 and 1984 for Jack Lee.

7. The report was written at the request of Jack Lee, prospector and owner of the claims.

8. I have no direct or indirect interest in the Sumas Soda Feldspar property.

9. This report may be used by Jack Lee in a Statement of Material Facts or Prospectus for public financing.

Dated at North Vancouver, B.C., August 10, 1989.

John G Payne

John G. Payne

John G. Payne Consultants, Ltd.,
877 Old Lillooet Road,
North Vancouver, B.C., V7J 2H6
Phone: (604) 986-2928

Bill to: **Jack Lee**
Sumas Mountain, B.C.

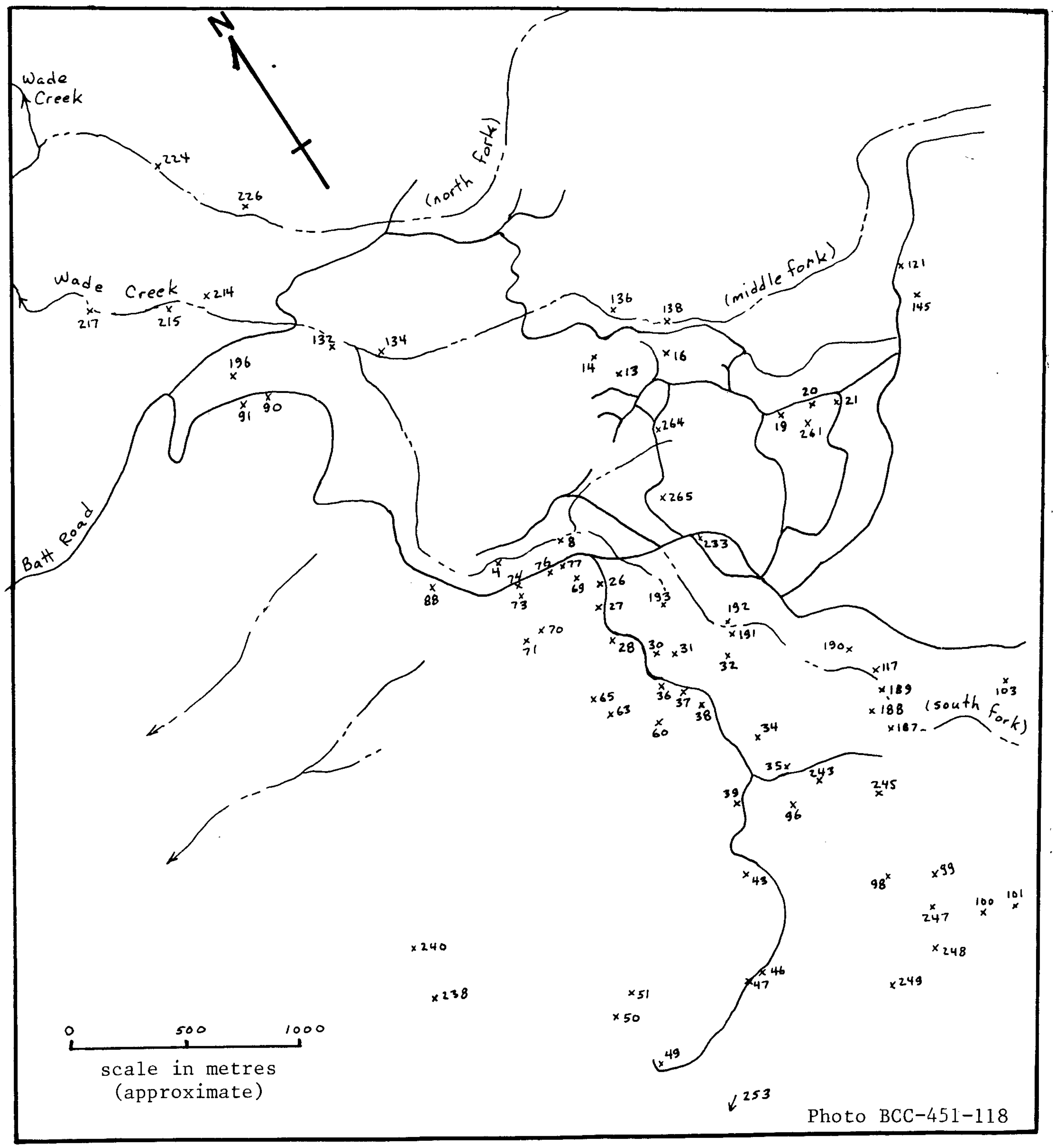
Re: Geological Consulting, Sumas Soda Feldspar Property

November 1986-August 1989

7.3 days @ 300/day		$2,190.00
Chemical Analyses		
Acme Labs	$699.00	
Chemex	103.75	
	802.75	802.75
Supplies (Mylar,etc.)		7.25
Total		**$ 3,000.00**
Advance Payment		500.00
Balance Outstanding		**$ 2,500.00**

John G. Payne
John G. Payne
August 1989

WEST HALF



EAST HALF

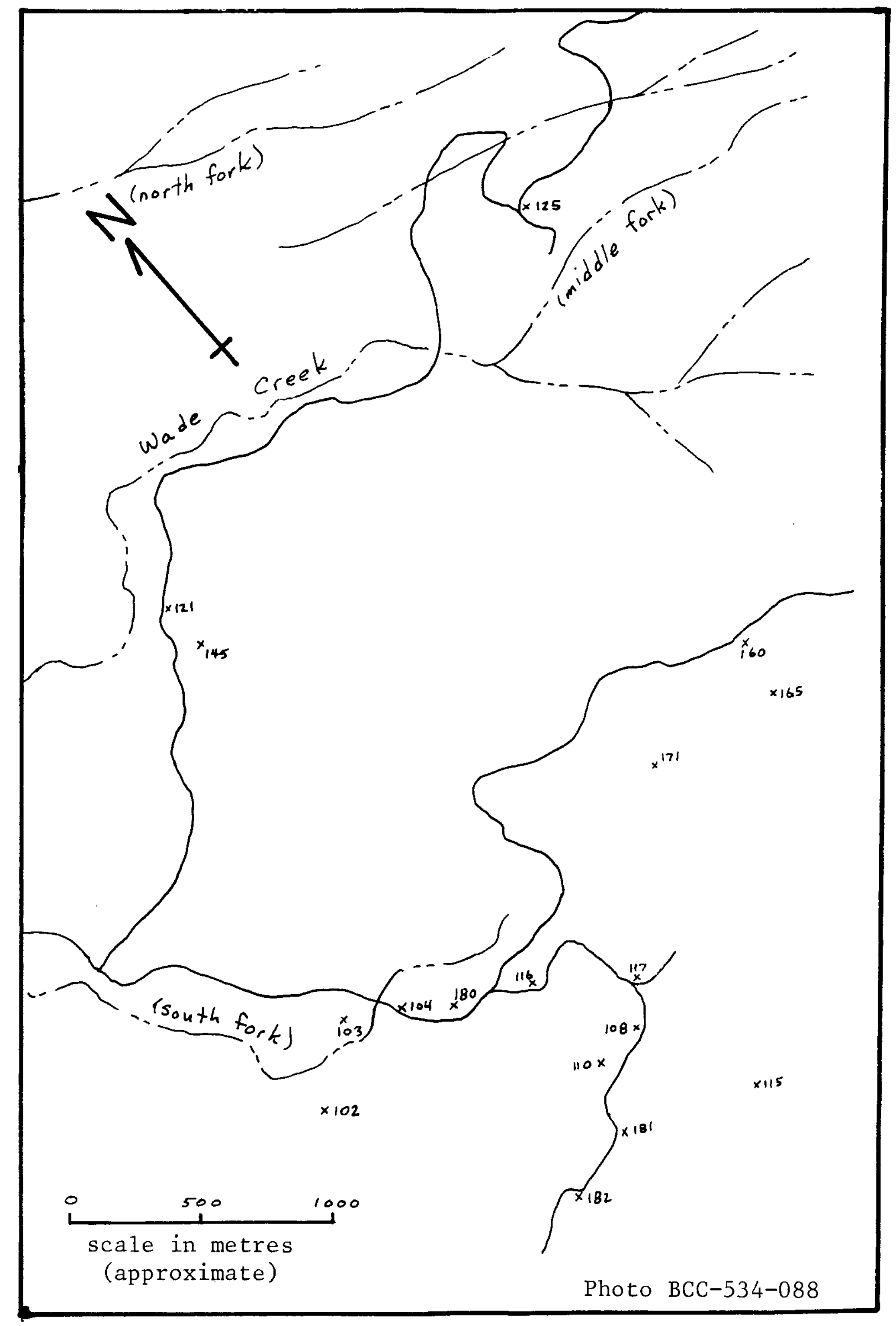


Figure 5. Sample Location Map

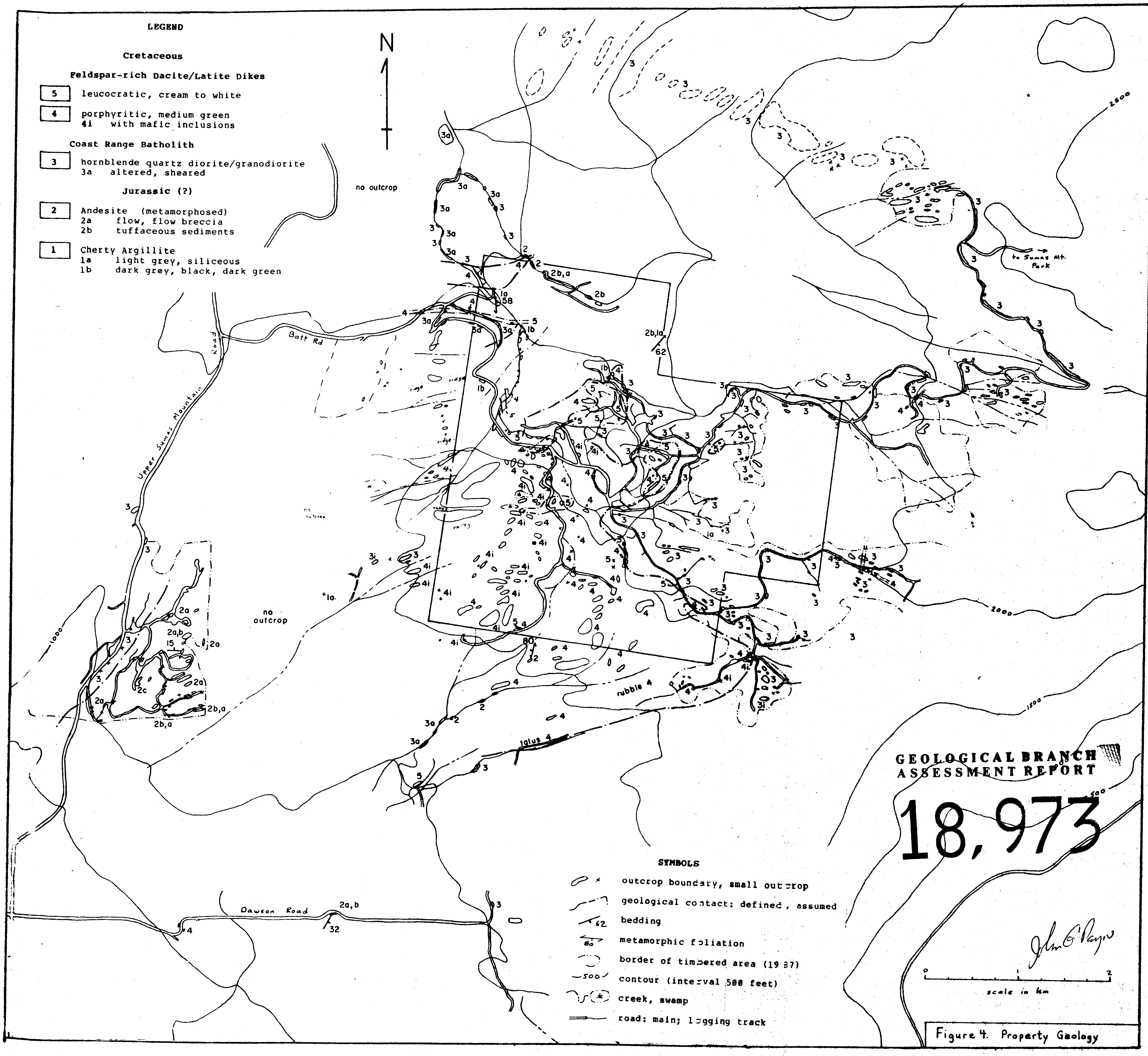


Figure 4. Property Geology