ARIS SUMMARY SHEET

District Geologist, Smithers — Off Confidential: 92.08.22

ASSESSMENT REPORT 21862 — MINING DIVISION: Liard

PROPERTY: Bronsan Creek
LOCATION: LAT 56 35 00 LONG 131 00 00
UTM 09 6272582 377154
NTS 104B10W 104B11E

CAMP: 050 Stewart Camp

CLAIM(S): Gossan 31
OPERATOR(S): Cathedral Gold
AUTHOR(S): Gorc, D.M.;Harris, J.F.
REPORT YEAR: 1991, 42 Pages
COMMODITIES SEARCHED FOR: Gold,Zinc,Copper
KEYWORDS: Triassic,Stuhini Group,Andesites,Greywackes,Diorites,Pyrite Pyrrhotite,Chalcopyrite

WORK DONE: Geological
PETR 16 sample(s)
Map(s) - 1; Scale(s) - 1:2500
MINFILE: 104B 131,104B 206,104B 138

PETROGRAPHIC STUDY - S AND T ZONES

BRONSON CREEK PROPERTY

Liard Mining Division
Iskut River Gold Camp

NTS: 104B/10, 11
Latitude: 56°35'N
Longitude: 130°53'W

CATHEDRAL GOLD CORPORATION

by

Dennis Gorc
Dr. J. H. Harris

NOVEMBER 1991

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1.0 INTRODUCTION

This report discusses a petrographic report completed by Dr. J. H. Harris on rocks and mineralized specimens taken from the "S" and "T" mineralized zones on Cathedral Gold's Bronson Creek Property located within the Iskut River Gold Camp.

The petrographic report is attached in Appendix I.

2.0 LOCATION, ACCESS AND TOPOGRAPHY

The property is located on NTS map sheets 104B/10W and 11E. The Bronson property is bounded to the north by Winslow Gold Corporation, the east by Skyline Gold's Johnny Mountain property and the southeast by Gulf International's Inel Resources property. The centre of the property is approximately 9 km southeast of Cominco-Prime Snip Deposit; 4 km east of Skyline's Johnny Mountain Mine and 4 km northwest of Inel Resource underground adit.

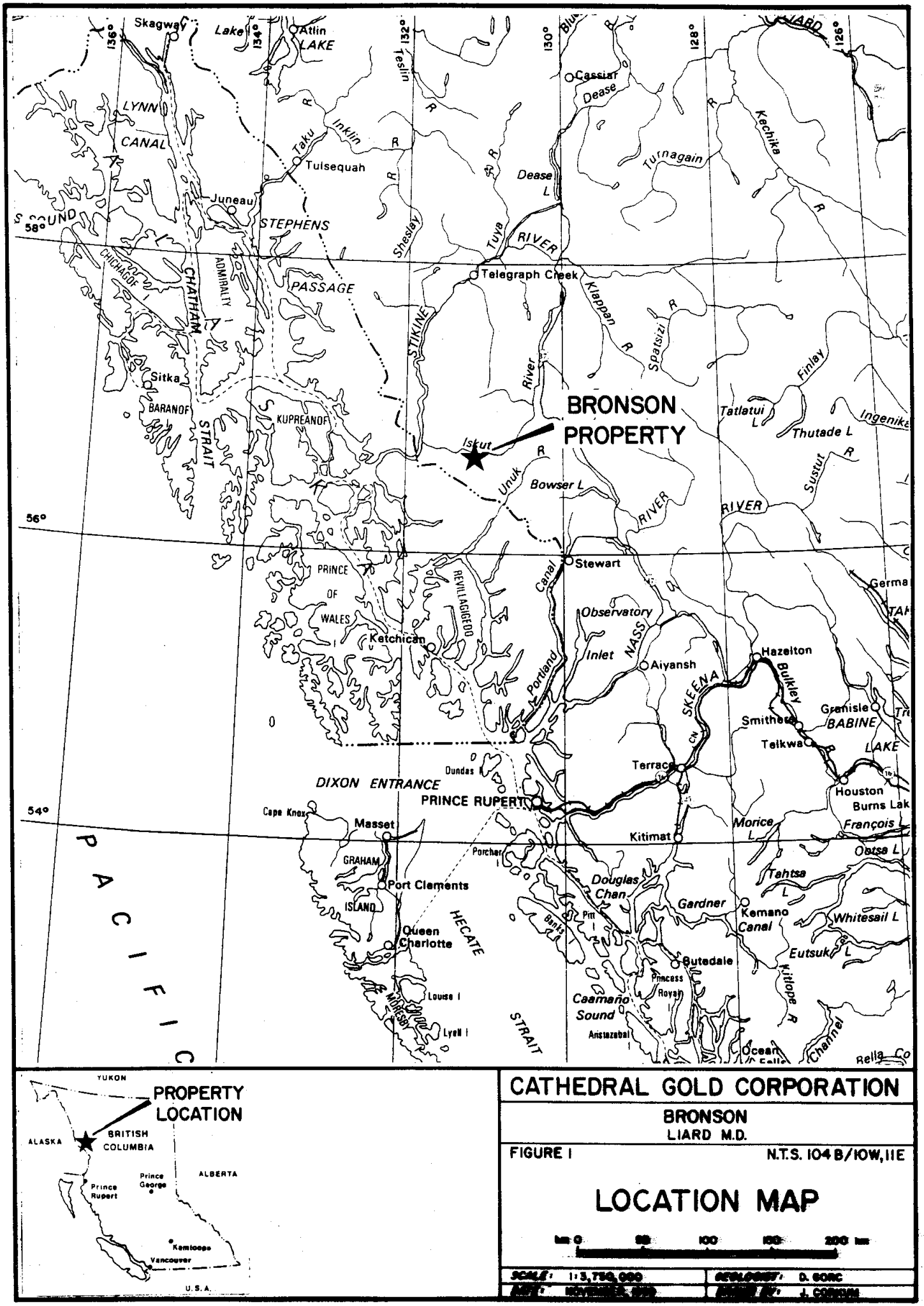
Access to the property is by helicopter from the Bronson airstrip located approximately 7 km northwest of the Bronson Property. Charter aircraft readily fly from Smithers or Terrace.

Topography varies from moderate to very rugged steep relief. The rugged terrain makes exploration on the property difficult and time consuming.

3.0 CLAIMS - AGREEMENTS

In 1983 Mr. Chris Graf staked the Gossan property in the Iskut River area. In 1985 Western Canadian Mining signed an option agreement with Mr. Graf whereby Western Canadian Mining could earn a 60% interest in the Gossan property.

In August 1988 Cathedral Gold Corporation and Western Canadian Mining signed an agreement whereby Cathedral could earn Western Canadians 60% interest in the Bronson and Pelican portions of the former Gossan property.



CATHEDRAL GOLD CORPORATION

BRONSON
LIARD M.D.

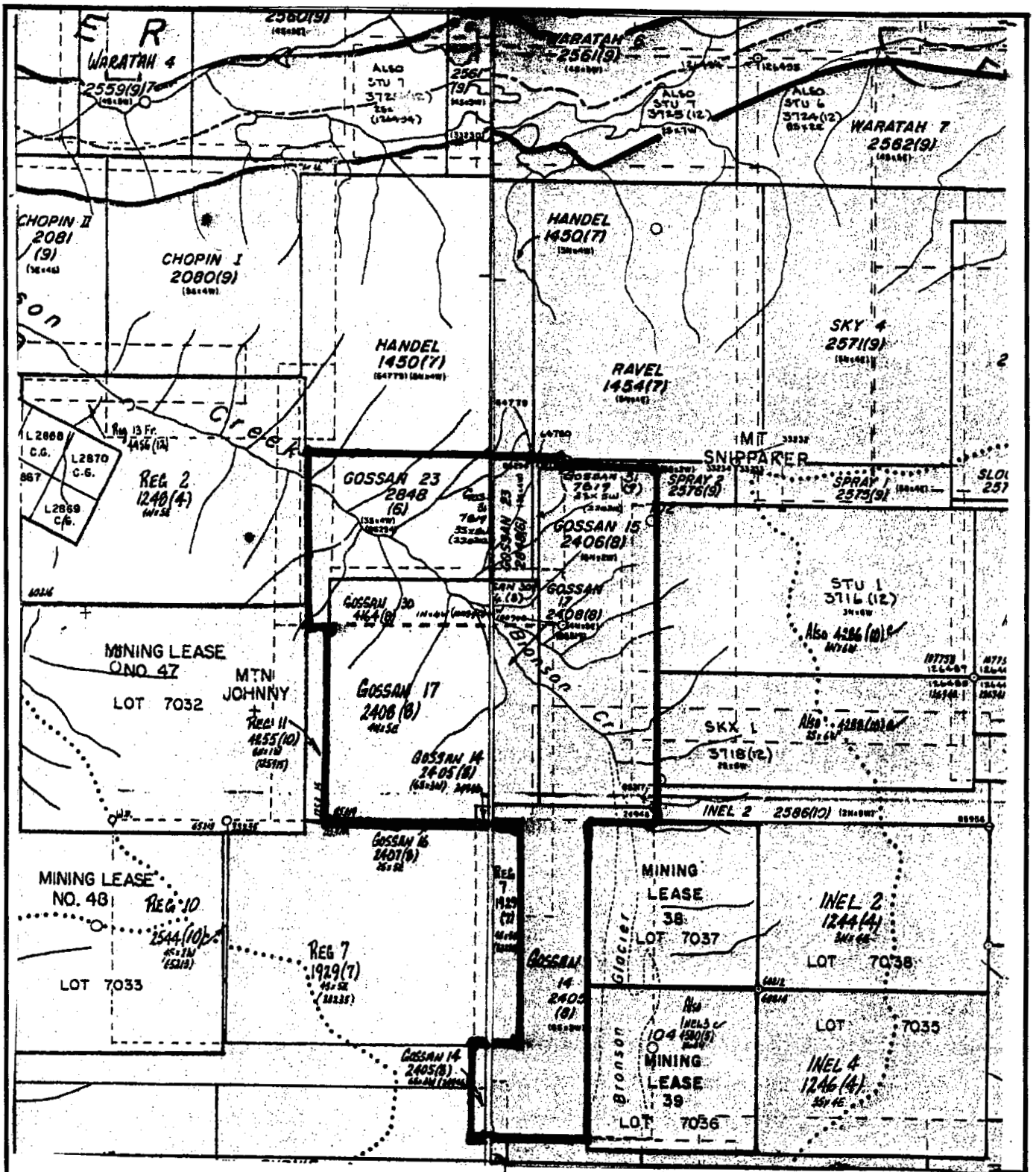
FIGURE 1 — N.T.S. 104 B/10W,11E

LOCATION MAP

km 0 50 100 150 200 km

SCALE: 1:3,750,000 — DEVELOPED: D. GORC

DATE: NOVEMBER 5, 1990 — DRAWN BY: J. CORIGAN



CATHEDRAL GOLD CORPORATION

BRONSON CREEK
LIARD M.D., B.C.

FIGURE 2 NTS 104B 10W/11E

CLAIM MAP

SCALE 1:50000	GEOLOGIST D. GORC
DATE NOVEMBER 1991	DRAWN BY: D. GORC

TABLE 1

Claims Information - Bronson Property

Claim Name	Units	Record No.	Recording Date
Gossan 14	18	2405	August 24, 1983
Gossan 15	12	2406	August 24, 1983
Gossan 16	10	2407	August 24, 1983
Gossan 17	20	2408	August 24, 1983
Gossan 23	12	2848	June 30, 1983
Gossan 30	4	4164	August 14, 1987
Gossan 31	15	7819	September 1, 1990
	91		

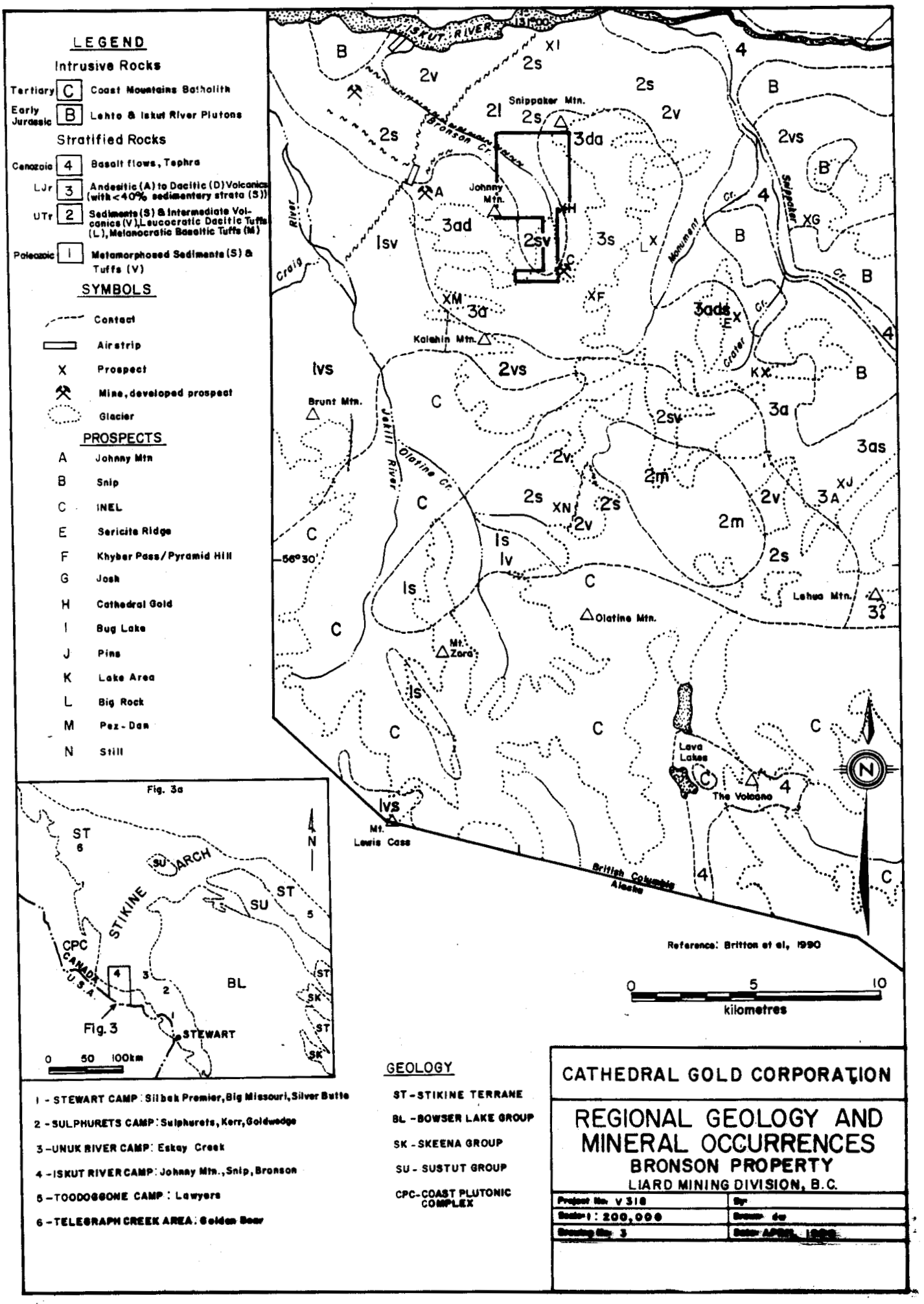
4.0 REGIONAL GEOLOGY

4.1 Introduction

Past geological mapping in the area by Kerr (1948) and Grove (1971, 1986) is currently being revised and updated by both the Federal and Provincial governments (Anderson, 1989); (Britton, et. al, 1990). Although this work is not yet finished there is now a clearer understanding of the geology of the area.

The Iskut map area is located near the boundary of the Intermontane Belt and the Coast Plutonic Complex. Anderson (1989) has proposed four tectonostratigraphic assemblages to define the geology of the area:

1. Tertiary Coast Plutonic Complex
2. Middle-Upper Jurassic Bowser Assemblage
3. Triassic-Jurassic volcanic-plutonic arc assemblage
4. Paleozoic Stikine Assemblage



CATHEDRAL GOLD CORPORATION

REGIONAL GEOLOGY AND MINERAL OCCURRENCES

BRONSON PROPERTY

LIARD MINING DIVISION, B.C.

Project No. V 318	By:
Scale: 1 : 200,000	Drawn by:
Drawing No. 3	Date: APRIL, 1990

The Pelican Property is underlain by rocks belonging to Triassic-Jurassic volcanic-plutonic arc assemblage within 5-10 km of the Coast Plutonic Complex.

4.2 Triassic-Jurassic Volcanic Arc Assemblage

The Triassic-Jurassic Volcanic-Plutonic Arc Assemblage has been divided into the following stratigraphic units:

a) Upper Triassic Stuhini Group
   i) Eastern Facies
   ii) Western Facies

b) Lower Jurassic Hazelton Group
   i) Unuk River Formation
   ii) Betty Creek Formation
   iii) Mount Dilworth Formation

c) Lower and Middle Jurassic Salmon River Formation

A brief description of the above stratigraphic units follow:

a) <u>Stuhini Group</u>

   i) Eastern Facies:
   This facies grades to the northeast from a largely intermediate to mafic tuff sequence to a sequence containing abundant greywackes and siltstone. This facies lacks the thick limestone and felsic tuff units of the western facies.

   ii) Western Facies:
   This facies consists of a lower unit of limestone and conglomerate which changes towards the east to a largely feldspathic greywacke-siltstone unit at Bronson Creek. This sedimentary unit is overlain by a bimodal volcanic suite consisting of volcanic breccia, limestone and

felsic tuff. Overall the character of the sequence becomes more sedimentary towards the east.

b) Hazelton Group

i) Unuk River Formation:
This formation consists of andesitic breccias and lavas which grades into siltstones, conglomerate and greywackes west of the Bowser River.

ii) Betty Creek Formation:
This formation contains volcanic-siltstone, greywacke, conglomerate and breccia. A maroon colour characterizes this formation.

iii) Mount Dilworth Formation:
Consisting of felsic tuff, tuff breccia and dust tuff. This unit represents the final episode of Hazelton volcanism.

c) Salmon River Formation

The formation contains a basal calcareous sandstone unit overlain by one of three north trending facies.

i) East - Troy Ridge Facies:
Siltstone shale, tuff turbidite

ii) Central - Eskay Creek Facies:
Pillowed lava, limy to siliceous shale and siltstone

iii) West - Snippaker Mountain Facies:
Andesitic volcaniclastics

4.3 Intrusives

The northwestern area of British Columbia is characterized by four episodes of intrusive activity:

Hyder Suite	(Tertiary)	44-46 My
Three Sisters Suite	(Middle Jurassic)	175-180 My
Texas Creek Suite	(Early Jurassic)	189-196 My
Stikine Suite	(Late Jurassic)	213-226 My

These episodes appear to be coeval with volcanic rocks of the Stuhini Group, Hazelton Group and Salmon River Formation. The composition of plutons, associated with the various intrusive episodes are as follows:

Hyder Suite (Tertiary) - monzogranite, quartz monzonite and granodiorite with minor monzodiorite and microdiorite dykes.

Three Sisters Suite (Middle Jurassic) - Plutons of this age have not yet been recognized in the Iskut River area.

Texas Creek Suite (Early Jurassic) - a) calc-alkaline quartz monzodiorite and granodiorite characterized by widespread chlorite -epidote alteration, b) alkaline syenite often associated with gold and porphyry copper-gold deposits.

Stikine Suite (Late Jurassic) - gabbro, diorite and quartz monzonite.

5.0 ECONOMIC GEOLOGY - REGIONAL

5.1 "Golden Triangle" - NW British Columbia

The mineral deposits of the area can be divided into four main classes: vein, porphyry/disseminated, stratabound massive sulphide and skarn. High-grade gold-quartz-base metals veins are by far most abundant type of deposit and have constituted the main exploration target until recently. Recent exploration programs on porphyry targets such as the Kerr property and several properties in the Galore Creek area as well as exploration

programs for massive sulphide targets such as Eskay Creek have significantly widened the scope of exploration.

The vein deposits occur at a variety of stratigraphic levels from the Permian/Mississippian (e.g. McLymont Creek) to the lower Middle Jurassic (e.g. Eskay Creek). With the exception of the Eskay Creek, which is now believed to be at least in part a massive sulphide deposit, the deposits do not appear related to specific stratigraphic horizons but several do appear to be related to Early Jurassic intrusions (Texas Creek Suite) (Premier, Kerr, Inel, Snip). In Table 2 some characteristics of several vein deposits are listed.

5.2 Bronson Trend

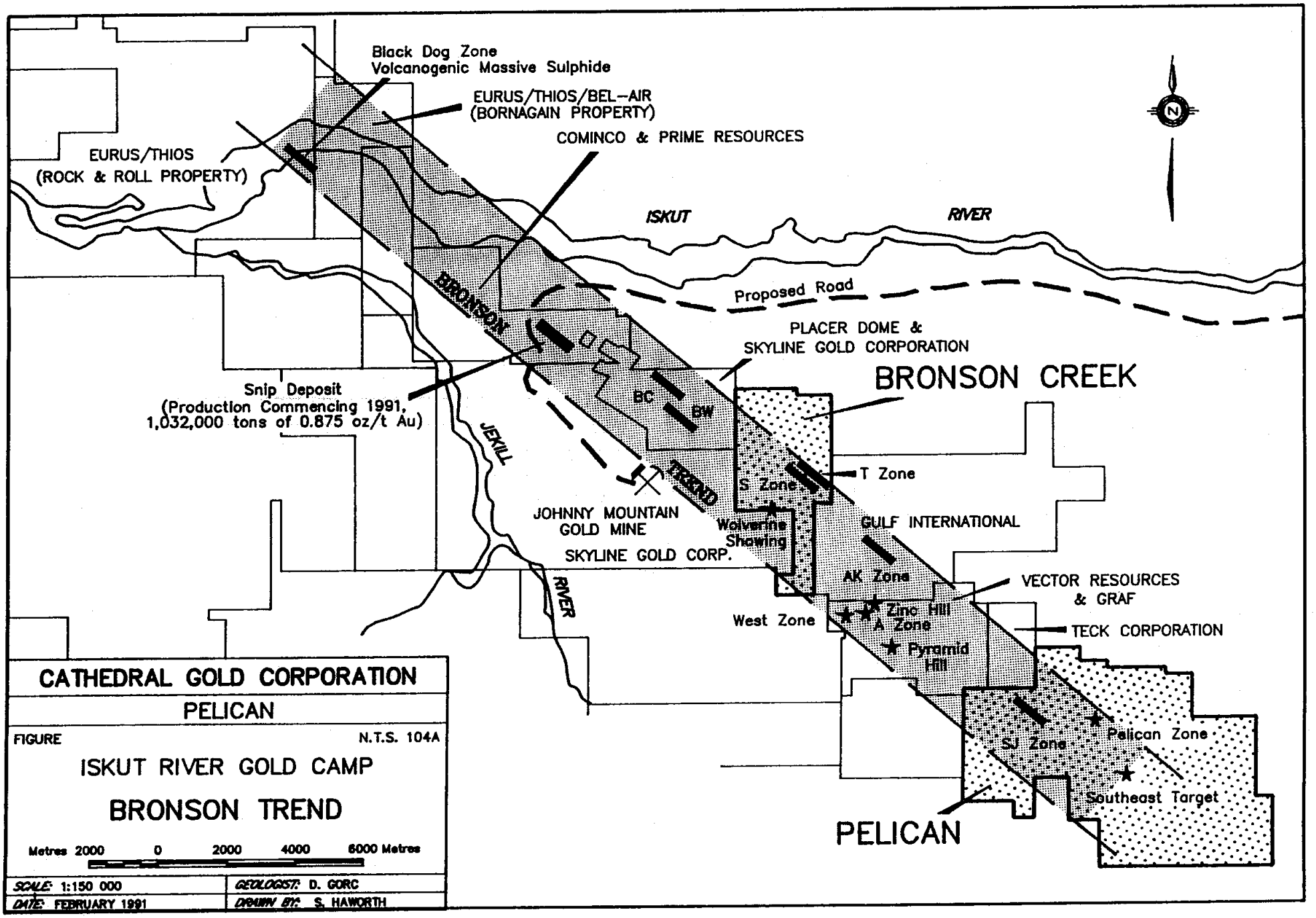
In the Iskut Gold Camp gold mineralization has been discovered within a NW-SE trending corridor approximately 2 km in width extending from Cominco/Prime's Snip deposit to Cathedral Gold's Pelican Property. Mineralized zones discovered to date include:

a) Snip (Twin Zone) - Cominco/Prime
b) Bronson Creek and Bonanza West - Placer Dome/Skyline
c) S and T Zones - Cathedral Gold Corporation/Ecstall Mining
d) AK Zone - Gulf International
e) Khyber - Vector Industries International/Graf
f) SJ - Cathedral Gold Corporation/Ecstall Mining

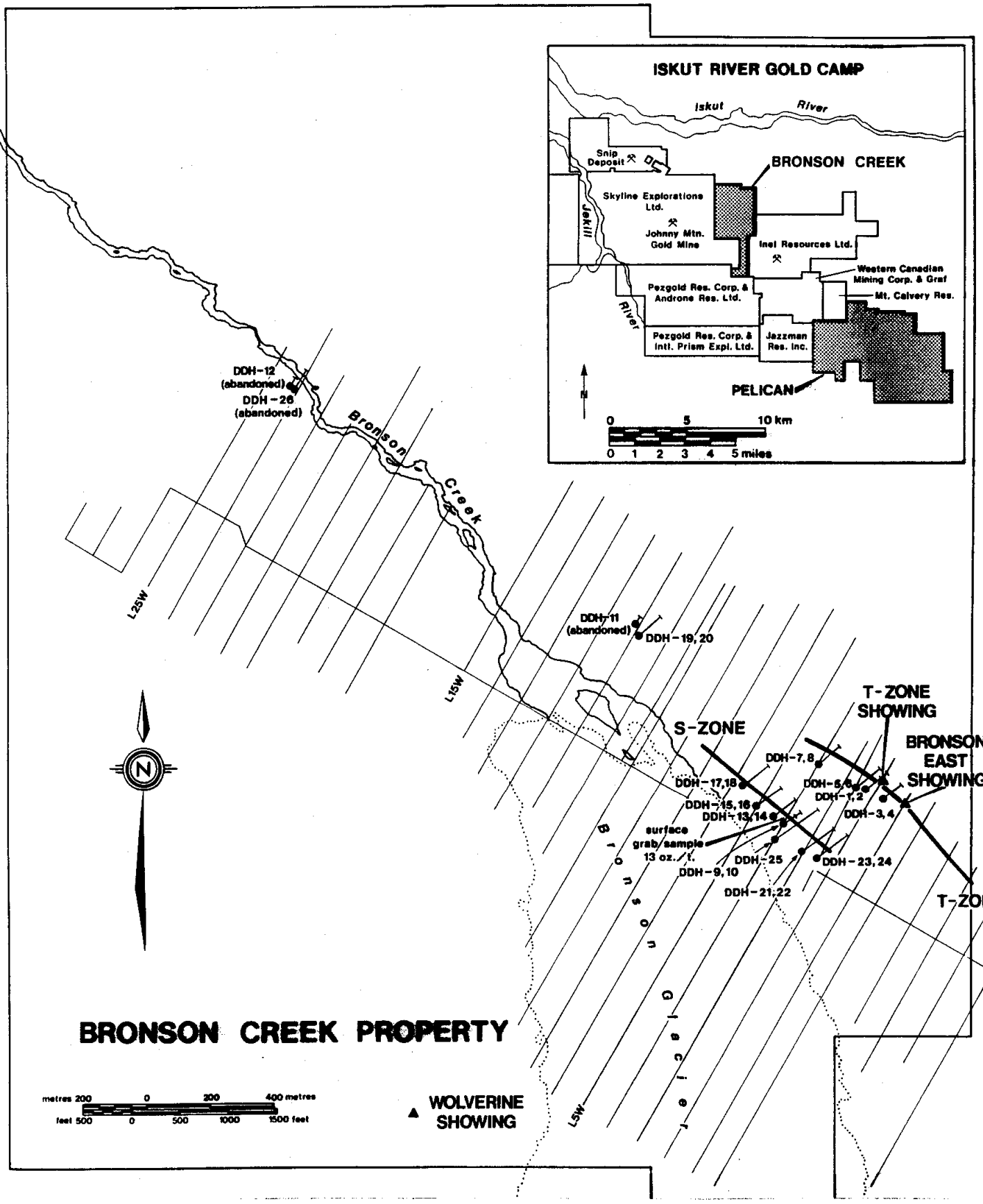
The above mineralized zones all trend NW-SE and appear to have similar mineralogy: gold, pyrite, pyrrhotite, sphalerite, chalcopyrite, galena, calcite and quartz.

6.0 EXPLORATION HISTORY - BRONSON CREEK AREA

Mineral exploration in the area began with the discovery of gold mineralization near Johnny Mountain in 1907. There have been several episodes of exploration since then looking for both precious meal and base metal deposits. The most recent period of exploration has been for precious metals which eventually led to the discovery of the Johnny Mountain, Snip and Brucejack Lake gold deposits.


Black Dog Zone
Volcanogenic Massive Sulphide
EURUS/THIOS/BEL-AIR
(BORNAGAIN PROPERTY)
COMINCO & PRIME RESOURCES
EURUS/THIOS
(ROCK & ROLL PROPERTY)
ISKUT
RIVER
Proposed Road
BRONSON
PLACER DOME &
SKYLINE GOLD CORPORATION
BRONSON CREEK
Snip Deposit
(Production Commencing 1991,
1,032,000 tons of 0.875 oz/t Au)
JEKILL
BC
BW
TREND
S Zone
T Zone
JOHNNY MOUNTAIN
GOLD MINE
SKYLINE GOLD CORP.
Wolverine
Showing
GULF INTERNATIONAL
AK Zone
VECTOR RESOURCES
& GRAF
RIVER
West Zone
Zinc Hill
A Zone
TECK CORPORATION
Pyramid
Hill
SJ Zone
Pelican Zone
Southeast Target
PELICAN
CATHEDRAL GOLD CORPORATION
PELICAN
FIGURE
N.T.S. 104A
ISKUT RIVER GOLD CAMP
BRONSON TREND
Metres 2000 0 2000 4000 6000 Metres
SCALE: 1:150 000
GEOLOGIST: D. GORC
DATE: FEBRUARY 1991
DRAWN BY: S. HAWORTH

Cathedral
GOLD CORPORATION



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The initial exploration on the property was conducted by Chris Graf - Lonestar Resources, who completed a regional geological mapping, silt sampling and soil sampling program on the Gossan property in 1983. This program led to the discovery of the Wolverine and Bronson East Showings on what is now the Bronson property and the Pelican, Lake, Snow and Pins Showings on what is now the Pelican property.

During the period 1985-1987 Western Canadian did geological mapping and soil surveys on portions of the Bronson and Pelican properties. These surveys returned sporadic, moderately anomalous gold values.

During the period 1988-1989 there was considerable exploration activity in the Bronson Creek area.

Cominco/Prime completed a detailed underground drill and test scope program on their Snip deposit in preparation for a final feasibility study.

Skyline opened the Johnny Mountain Gold Mine and in 1989 conducted a $2 million surface exploration program which focused on the Bronson Creek Valley on 5 strike of the Snip deposit. This work located several new areas of mineralization including what is called the Bronson Creek Zone.

Initial drill results on the Bronson Creek Zone indicate a multiple gold vein system on strike with the Snip deposit. The drill area is approximately 2 km northwest of Cathedral Gold's Bronson property.

Drill results include:

Hole	Length (ft)	Gold oz/ton
S-917	3.18	0.40
S-918	25.59	0.10
	1.15	0.68
S-919	1.15	1.21
	1.31	2.88
S-911	5.02	0.18
	14.19	0.10

Given the results to date along the Bronson Creek Valley it would appear likely that additional mineralization will be discovered with continued exploration.

1988 Exploration Program

(a) 2.5 km cut and chained baseline
(b) 18 km of linecutting
(c) 21 km of VLF electromagnetic survey (Seattle, Hawaii, Annapolis)
(d) 20 km of magnetometer survey
(e) 7 km of Max-Min HLEM survey
(f) surveying of LCP for Gossan 15 establishing east boundary of property
(g) discovery of T-Zone: massive pyrrhotite-pyrite-chalcopyrite-sphalerite mineralization with adjacent massive pyrite veins; 30m of trenching; assays of up to 16 gr/tonne Au.
(h) geophysics indicated several conductors worth of follow-up, most of which are within 400m of T-Zone. However, the best conductor is at the extreme northwestern end of grid 2 km from the T-Zone.

1989 Exploration Program

(a) airborne electromagnetic and magnetic survey - total survey 164 km
(b) construction of 14-man camp, 4 helipads and 14 drill platforms
(c) 31.2 km of linecutting; *establishment of grid lines 100m apart; stations every* 25m
(d) 367 soil samples submitted for 30 element ICP analyses and gold by atomic absorption
(e) 50 surface rock samples submitted for 30 element ICP analysis and gold by atomic absorption
(f) 23.5 km of UTEM electromagnetic geophysical survey
(g) 10,642 feet (3243.7m) diamond drilling in 26 drill holes
(h) 1532 core samples analyzed for 30 element ICP and gold by atomic absorption; a total of 91 samples fire assayed for gold
(i) 1:20,000 air photographs of property.

7.0 REFERENCES

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Meyers, R.E., 1986: 1986 Geochemical Sampling and Reconnaissance Mapping Gossan 1-4-7 Claim Group, Gossan 14-17, 23 Claim Group; Western Canadian Mining (WCM) Ltd., Report #995.

8.0 STATEMENT OF QUALIFICATIONS

I, DENNIS M. GORC, residing at #103, 2083 Coquitlam Avenue in Port Coquitlam, British Columbia, V3B 1J4, state that:

1. I graduated from Queen's University, Kingston, Ontario with a B.Sc. (Eng.) degree in mineral exploration in May, 1976;

2. Since 1976, I have supervised mineral exploration programs in British Columbia, Northwest Territories, Manitoba and Ontario;

3. I am presently employed as a geologist with Imperial Metals Corporation, Suite 800, 601 West Hastings Street in Vancouver, British Columbia;

DATED THIS 28 DAY OF November, 1991.

Dennis M. Gorc
IMPERIAL METALS CORPORATION
Vancouver, B.C.

APPENDIX I

Petrographic Study of Rocks and Mineralized Material from the Bronson Project, Iskut River Area

by Dr. J. F. Harris
August 23, 1991

Harris
EXPLORATION
SERVICES

MINERALOGY AND GEOCHEMISTRY

534 ELLIS STREET, NORTH VANCOUVER, B.C., CANADA V7H 2G6 TELEPHONE (604) 929-5867

Report for: Dennis Gorc,
Cathedral Gold Corp.,
P.O. Box 84,
800 - 601 West Hastings St.,
Vancouver, B.C.
V6B 5A6

Report 91-38

August 23rd, 1991

PETROGRAPHIC STUDY OF ROCKS AND MINERALIZED MATERIAL FROM THE BRONSON PROJECT (No. 8102), ISKUT RIVER AREA, B.C.

INTRODUCTION:

Samples submitted are as follows:

	Sample No.	Location		Slide No.	Prep. Type
A. Rock Suite:					
	1	DDH 89-10	28.5m.	91-195X	TS
	2		53.0m.	196X	TS
	3	DDH 89-6	9.1m.	193X	TS
	4		13.0m.	194X	TS
	5	DDH 89-5	104.0m.	191X	TS
	6		108.5m.	192X	TS
	7	DDH 89-1	52.3m.	186X	TS
	8		23.5m.	184X	TS
	9		42.85m.	185X	PTS
	10	DDH 89-3	35.4m.	188X	TS
B. Sulfide Suite:					
S-Zone	1	DDH 89-23	132.3m.	91-197X	PTS
	2		133.9m.	198X	PTS
T-Zone	3	DDH 89-1	73.8m.	187X	PTS
	4	DDH 89-3	45.3m.	189X	PTS
	5		45.6m.	190X	PTS
	6	T-Zone Trench		183X	PTS

SUMMARY:

A. ROCK SUITE

The rocks of this suite fall into two main groups: igneous, and volcaniclastic/sedimentary.

a) Igneous rocks (probable intrusives):

Sample 2 is a quartz-poor diorite porphyry, with prominent phenocrysts of plagioclase and lesser K-spar in a minutely microgranular groundmass. The plagioclase phenocrysts show moderate pervasive sericitization. Mafics are totally altered to secondary biotite and carbonate.

Sample 3 is a strongly altered porphyritic andesite. Phenocrysts of plagioclase and probable hornblende are totally altered to sericite and carbonate. They are set in a sericitized felsitic groundmass. Weak flow orientation of the phenocrysts suggests that this is a flow or dyke. Quartz is minor, and the rock is not a granodiorite. It differs from Sample 2 in the absence of K-spar.

Sample 4 illustrates the contact of an apparent andesite dyke. The latter is sparsely porphyritic, with phenocrysts of fresh plagioclase and altered mafics (carbonate/secondary biotite). The groundmass is partially sericitized and carbonated.

The country rock is a strongly biotitized and sericitized ash tuff or mudstone, similar to Sample 10. Contact effects on the thin section scale are limited to minor fragmentation.

Sample 5 is a basalt or diabase - probably a dyke. It is composed of a groundmass of fresh plagioclase and augite plus accessory opaques. Prominent mafic phenocrysts (originally olivine?) now consist of olive-brown secondary products and carbonate. The same material occurs as an interstitial phase in the groundmass.

Sample 6 is a diabase. It is essentially identical to Sample 5, but slightly coarser. The altered mafic phenocrysts are composed of the brown secondary product plus possible talc.

b) Volcaniclastic/sedimentary rocks:

These are bedded clastic rocks in which the predominance of plagioclase and paucity of quartz suggests andesitic volcanic affiliations. The presence of biotite and, less commonly, actinolite or epidote, are probably effects of thermal metamorphism.

Sample 1 consists of bedded gradations from wacke to siltstone. The wacke unit is composed largely of plagioclase crystals with an interclast phase of green actinolite. The siltstone unit is composed of much finer plagioclase clasts (10 - 30 microns) with abundant interclast and pervasive biotite.

Sample 7 is a volcanic wacke composed of a mixture of plagioclase (and minor quartz), crystal clasts and felsitic lithic clasts. Biotite is an abundant interclast and pervasive component. The rock is cut by a microfracture or veinlet composed of carbonate, chlorite and actinolite. It is flanked by an envelope (apparent bleaching) in which the matrix biotite is converted to actinolite.

Sample 8 consists of a minutely fine-grained aggregate of felsitic plagioclase. Carbonate and cryptocrystalline epidote are pervasive accessories - probably of diagenetic/metamorphic origin. The rock is essentially devoid of quartz, and resembles an andesitic ash tuff. It is cut by veinlets of carbonate, with quartz, sericite, epidote and pyrite. These are flanked by envelopes in which the felsite is somewhat enriched in K-spar, and in which epidote is depleted.

Sample 9 is a breccia of vari-sized angular fragments of biotitized volcaniclastics. These include ash tuff or siltstone similar to Sample 10, and wackes similar to Sample 7, but lacking plagioclase crystal clasts and composed largely of lithic clasts of sericitized felsite. There are also a few fragments of chert. The fragments are cemented by a biotite-rich phase with disseminated pyrite and associated chlorite and carbonate.

Sample 10 is a minutely fine-grained felsitic material. It is strongly biotitized, and closely resembles the ash tuff or mudstone units of Sample 1. The biotite is probably a thermal metamorphic effect. The rock is fractured and cut by intersecting veinlets composed of carbonate and quartz, with intergrown chlorite, epidote, actinolite and pyrite.

B. SULFIDE SUITE

1. S-Zone:

Samples 1 and 2 (from DDH 23) consist of massive to semi-massive pyrite. Pyrrhotite and chalcopyrite are minor accessories. Sphalerite is essentially absent.

The gangue consists of granular quartz with patches (fragments? unsilicified remnants?) of apparent volcanic material - composed of felsitic plagioclase, more or less sericitized and with minor intergrown chlorite, biotite and carbonate. The quartz penetrates the granular mosaic of pyrite as intergranular networks and veinlets.

2. T-Zone:

Samples 3, 4, 5 and 6 (from DDH 1 and 3 and the T-Zone trench) are of somewhat more varied character.

In Sample 3 the sulfides are a mixture of pyrite and sphalerite in heterogenous, partly rimming/banded intergrowth with a gangue which is distinguished by high contents of epidote, carbonate and biotite - as well as the predominant quartz and felsitic plagioclase.

Samples 4 and 5 have fresh pyrrhotite as the dominant sulfide component. Sphalerite is a major component in Sample 4, and an accessory, together with pyrite, in Sample 5. Both samples show crudely banded textures. The gangue in Sample 4 is predominantly quartz and chlorite, and plagioclase is apparently absent; minor

proportions of epidote, actinolite and garnet are present. Chlorite is also prominent in Sample 5. There appears to be a strong association of sphalerite and chlorite in these samples. The general sulfide/silicate relationships suggest a possible volcanogenic/exhalative origin.

Sample 6 (from the T-Zone trench) consists of massive pyrrhotite with vari-sized, fragment-like inclusions of gangue (predominantly quartz with accessory chlorite and possible plagioclase). Sphalerite is the accessory sulfide component. There is also a minor zone of rather coarse chalcopyrite as pockets in quartz.

No obvious evidence was seen of multiphase mineralization or of fracturing of sulfides. The impression is of contemporaneity of sulfides and gangue (sedex environment?), with subsequent recrystallization/metamorphism.

No gold could be found in the sectioned material.

Individual petrographic descriptions are attached.

J.F. Harris Ph.D.

SAMPLE 89-10 28.5m (Slide 91-195X)
BEDDED VOLCANICLASTIC (META-GREYWACKE/SILTSTONE)

Estimated mode

Plagioclase	56
Quartz	1
Biotite	28
Actinolite	11
Sphene)	3
Rutile)	
Carbonate	trace
Apatite	trace
Opaques	1

This is another fine-grained feldspathic rock with pervasively developed biotite. It shows laminar (bedded) variations in grain size and in the abundance of biotite.

The thin section confirms that 50 - 60% of the sectioned portion is of similar general type to 89-1 52.3m., consisting of close-packed, even-sized (0.05 - 0.15mm) plagioclase (and very minor quartz) crystal clasts, and felsitic lithic clasts.

This variant differs from the other greywacke sample in that crystal clasts are dominant, and in that the evenly distributed interclast network phase consists predominantly of green (actinolitic) amphibole, as meshwork to sub-radiate clusters of acicular needles. Biotite is a minor accessory intergrown with the amphibole.

The other 40% of the sectioned portion consists of a thin, slightly finer-grained bed in which the abundant interclast component is almost entirely red-brown biotite. This is followed by a notably finer (silt-sized) unit, composed of 10 - 30 micron plagioclase clasts, and evenly flecked with fine-grained, non-oriented biotite and specks of sub-opaques (rutile and/or sphene).

The sample is traversed by a few irregular/pockety veinlets of carbonate, quartz and actinolite, and by thread-like microfractures delineated by strings of biotite.

This sample is a bedded sequence of thermally metamorphosed volcaniclastics in which the presence of actinolite vs biotite presumably reflects original compositional parameters.

SAMPLE 89-10 53.0m. (Slide 91-196X) DIORITE PORPHYRY

Estimated mode

Plagioclase	77
K-feldspar	5
Quartz	2
Biotite	7
Sericite	5
Epidote	trace
Carbonate	3
Apatite	trace
Sphene	trace
Opaques	1

Macroscopic examination (see off-cut) indicates that this is a porphyritic igneous rock of intrusive aspect, containing abundant feldspar phenocrysts, 0.5 - 5.0mm or more in size.

The thin section shows that the phenocrysts consist predominantly of plagioclase, of sharply defined, euhedral form. These exhibit mild to strong pervasive alteration to minutely felted sericite.

There are also scattered phenocrysts of K-feldspar (orthoclase). These are generally rather large, and sometimes poikilitically incorporate smaller grains of sericitized plagioclase. The K-spar itself is fresh.

A third type of phenocryst is of mafic composition - now totally altered to equant/elongate, sub-prismatic clumps, 0.2 - 2.5mm in size - of fine-grained, secondary-type, olive-green biotite with intergrown accessory carbonate and occasional epidote. They are most likely derived from original hornblende.

Rare, rounded phenocrysts of quartz, 0.2 - 0.6mm in size, are present, but the abundance of quartz in this rock is generally low (and insufficient to justify classification as granodiorite).

The phenocrysts are set in an even, minutely microgranular/felsitic groundmass of grain size 10 - 30 microns. This is devoid of mafics, and appears to be composed mainly of plagioclase, though it may contain an indeterminate proportion of accessory quartz. It locally shows a K-rich composition at the contact of some of the plagioclase phenocrysts (see stained off-cut).

Accessories are rare, small euhedra of apatite and sphene, and disseminated subhedra of pyrite, 0.05 - 0.5mm in size - typically closely associated with the altered mafic phenocrysts.

SAMPLE 89-6 9.1m. (Slide 91-193X) ALTERED ANDESITE

Estimated mode

Plagioclase	32
Quartz	2
Sericite	31
Carbonate	31
Chlorite	4
Hornblende(?)	trace
Apatite	trace
Opaques	trace

This sample appears to be a porphyritic volcanic rock showing strong pervasive alteration.

The thin section reveals that it is now composed predominantly of minutely fine-grained intergrown sericite and carbonate. This occurs as abundant, angular, prismatic to diffuse patches, 0.4 - 2.0mm in size, which appear to represent totally altered phenocrysts. These were probably mainly plagioclase. There are also some which contain relatively higher proportions of carbonate, together with intergrown chlorite and micron-sized opaques. These sometimes show diamond-shaped pseudomorphic forms, and apparently originated as hornblende.

The altered phenocrysts are set in an equigranular groundmass of plagioclase, 0.1 - 0.2mm in size, with minor accessory quartz. The groundmass plagioclase also shows strong, pervasive alteration (sericitization/carbonatiziation), though less intense than in the case of the phenocrysts. Quartz also forms rare, small, amoeboid phenocrysts.

Sparsely disseminated relict (unaltered) grains of accessory apatite and specks of disseminated opaques are the remaining components.

The altered phenocrysts tend to show a partial preferred orientation, presumably related to flow, and the rock is tentatively identified as an altered andesitic extrusive.

SAMPLE 89-6 13.0m. (Slide 91-194X)
ALTERED ANDESITE PORPHYRY AND BIOTITIZED COUNTRY ROCK

Estimated mode

Porphyry		
	Plagioclase	78
	Quartz	2
	Sericite	11
	Biotite	2
	Carbonate	5
	Opaques	2
Country rock		
	Plagioclase	20
	Quartz	2
	Sericite	30
	Biotite	46
	Carbonate	trace
	Opaques	2

The sectioned portion of this sample embraces the contact between a fine-grained, sparsely porphyritic felsic dyke(?) and the presumed country rock - or xenolith thereof.

The porphyry unit consists predominantly of a microgranular, locally microlitic aggregate of plagioclase, of grain size 0.03 - 0.1mm. Minor quartz and disseminated opaques are accessories.

The groundmass shows partial pervasive alteration, in the form of flecks and irregular pockets of fine-grained sericite and carbonate.

Phenocrysts consist of sparsely scattered, euhedral, often growth-zoned plagioclase crystals, 0.2 - 0.8mm in size; and altered mafics, of similar or occasionally larger size, consisting of various proportions of intergrown carbonate and red-brown biotite.

The groundmass shows local flow orientation of constituent plagioclase laths tangential to phenocrysts. The oriented fabric is more uniformly developed adjacent to the contact, which is also demarked by a 1mm zone of enhanced pervasive sericitization. Local fragmentation and incorporation of the wall-rock is also seen at the contact.

The country rock is a fine-grained, structureless, non-foliated, altered felsite of generally similar type to 89-3 35.4m.

The original plagioclase matrix is only occasionally recognizable, as diffuse remnants. For the most part it is obliterated by intense pervasive sericitization.

Biotite (brown, minutely felted, non-oriented) is another abundant constituent - possibly superimposed on the sericitization of the matrix. It occurs as an even, pervasive impregnation throughout.

Sample 89-6 13.0m. cont.

Scattered, individual clasts of plagioclase and quartz, 0.03 - 0.1mm in size, are probable relict primary constituents in what is apparently a hornfelsed ash tuff or volcanic mudstone.

This unit is cut by occasional hairline veinlets of quartz and minor carbonate, and by microfractures delineated by coarser biotite development.

Disseminated pyrite occurs as sporadic clusters of rather coarse subhedra (0.1 - 1.0mm). These are partly associated with the veining and partly independent of it.

SAMPLE 89-5 104.0m. (Slide 91-191X) BASALT/DIABASE

Estimated mode

Plagioclase	44
Pyroxene	20
Hornblende	2
Secondary biotite(?)	24
Carbonate	5
Talc) Sericite)	1
Rutile) Opaques)	4

This rock is a meshwork-textured basalt or diabase with rather abundant, totally altered mafic phenocrysts.

The latter are 0.5 - 5.0mm in size and of rounded to equant/prismatic form. They are composed of various proportions of an olive-brown, fibrous/felted material (secondary biotite or amphibole?) and carbonate. In the case of the prismatic pseudomorphs, the carbonate forms cores, and the brown material occurs as rims and cellular networks - sometimes with intergrown talc and/or sericite. In the more rounded forms carbonate is absent, and the feature consist of clumps of minutely fibrous/spherulitic brown material. In a few cases these are ill-defined and incorporate lath-like plagioclase and hornblende groundmass components.

The carbonate-rich type are clearly pseudomorphs - possibly after olivine. The rounded spherulitic masses have more the appearance of amygdules. The same olive-brown secondary product occurs in interstitial mode in the groundmass.

The latter is an even, randomly-oriented, meshwork intergrowth of fresh plagioclase and augite, of grain size 0.05 - 0.2mm. The plagioclase exhibits lath-like form, and the augite is as angular interstitial grains. Olive-brown secondary biotite(?) is another interstitial component. Red-brown basaltic hornblende is a minor accessory, and individual, equant/angular grains of Fe-Ti oxides, 20 - 50 microns in size, occur evenly disseminated throughout.

SAMPLE 89-5 108.5m. (Slide 91-192X) DIABASE

Estimated mode

Plagioclase	40
Augite	23
Secondary biotite(?)	21
Talc/Sericite	8
Hornblende	1
Carbonate	2
Rutile) Opaques)	5

This is a rock of generally similar type to the previous sample (89-5 104.0m.), but is of perceptibly coarser grain size. The altered mafic phenocrysts are also somewhat different, and generally smaller.

The matrix consists of a meshwork intergrowth of fresh plagioclase and lilac-coloured titanaugite of grain size 0.1 - 0.5mm. The pyroxene occurs both interstitial to the plagioclase laths and as elongate prismatic grains similar to the plagioclase. Acicular grains of red-brown hornblende are occasionally seen.

Olive-brown, felted, secondary material, sometimes with intergrown fine-grained carbonate, is a minor interstitial component. Individual equant granules of rutile and opaque oxides are abundant, evenly disseminated accessories.

Altered mafic phenocrysts are 0.2 - 1.0mm in size. They are of angular prismatic form (sometimes as 6-sided pseudomorphs) and typically consist of cores of felted white micaceous material (talc? sericite?) with rims and cellular networks of the olive brown (secondary biotite or amphibole) component. Only rarely do they include carbonate. They most likely originated as olivine.

The amygdule-like variant seen in 89-5 104.0m. appears absent.

SAMPLE 89-1 52.3m. (Slide 91-186X)
BIOTITIC VOLCANICLASTIC (GREYWACKE)

Estimated mode

Plagioclase	47
Quartz	5
Biotite	40
Carbonate	1
Actinolite	2
Chlorite	1
Epidote	1
Apatite	trace
Rutile	1
Pyrite	2

Macroscopic examination of this sample (see etched off-cut) indicates that it is an evenly granular rock of feldspar-rich composition, with abundant dispersed biotite.

These observations are confirmed in thin section, where the rock is found to consist essentially of a totally non-foliated aggregate of equant, sub-angular grains of fresh plagioclase and minor quartz, and of lithic clasts of minutely felsitic material. The crystals are in the size range 0.05 - 0.15mm, and the lithic clasts occasionally reach 0.2mm.

The other major constituent is biotite (pleochroic from near colourless to mid brown). This occurs in minutely felted, randomly oriented form, as more or less clearly defined, compact clumps comparable in size to the feldspathic clasts, and in more dispersed form throughout the rock. In the latter mode, the biotite impregnates felsitic clasts to varying degrees, and forms an interclast network/matrix phase. Local flecking of plagioclase crystal clasts is also observed.

Accessories are tiny specks, wisps and rimming concentrations of rutile and cryptocrystalline epidote, and sparsely disseminated grains of pyrite.

The sectioned area is traversed by a 1mm veniform zone composed of carbonate, chlorite and actinolite. This appears ill-defined in the thin section, and is flanked by an envelope in which the matrix biotite is largely converted to acicular actinolite. An off-shoot of this veinlet/replacement zone contains segregations of pyrite.

This rock shows unmistakeable clastic texture, is best described as an andesitic volcanic wacke. The high content of non-oriented biotite may be evidence of thermal metamorphism.

SAMPLE 89-1 23.5m. (Slide 91-184X)
ANDESITIC ASH TUFF

Estimated mode

Plagioclase	68
Carbonate	13
Sericite	5
Epidote	8
Quartz	1
Pyrite	5

Macroscopically (see off-cut) this rock appears to be a very fine-grained, essentially non-foliated aggregate of plagioclase, with minor disseminated pyrite. The sectioned area includes several thin, sub-parallel veinlets or laminae of unetched material containing local clumps and strings of coarser pyrite.

In thin section it is found to consist predominantly of a homogenous, equigranular matrix of felsitic plagioclase, of grain size 5 - 10 microns. This contains sparsely scattered, equant/ angular grains of coarser plagioclase and minor quartz, to 50 microns in size.

Carbonate is relatively abundant, as small flecks and prismatic grains, 20 - 100 microns in size, throughout the matrix. Some of these may be pseudomorphs of plagioclase crystals. Carbonate also occurs in close association with disseminated pyrite grains, and forms discontinuous hairline threads with and without pyrite.

Other accessories are sericite, as pervasive, tiny, sub-parallel flecks throughout the matrix, and cryptocrystalline epidote as micron-sized disseminations. The latter concentrates, as abundant, "fluffy" clusters, in certain concordant bands.

The prominent concordant veinlets (0.5 - 2.0mm thick) are composed mainly of varigranular carbonate, with intergrown accessory quartz, sericite and, in one case, epidote. Pyrite, as subhedral grains, 0.1 - 1.0mm in size, occurs as clumps and short strings.

The stained off-cut suggests that the matrix adjacent to the veinlets is slightly enriched in potassium.

The thin section shows that the same zones are relatively depleted in disseminated epidote (which is coarser and more abundant farthest from the veinlets).

The weak laminar variations and textural compositional features of this rock suggest that it is a mildly metamorphosed andesitic ash tuff.

SAMPLE 89-1 42.85m. (Slide 91-185X)
PYRITIC BIOTITIZED VOLCANICLASTIC BRECCIA

Estimated mode

Plagioclase	50
Quartz	2
Sericite	15
Biotite	15
Chlorite	3
Carbonate	5
Pyrite	10
Chalcopyrite	trace

This is a mineralized rock showing much more clear-cut textural features than the other sulfidic samples of the suite. It also differs in that the sulfides consist of monomineralic pyrite, without associated pyrrhotite, sphalerite or chalcopyrite.

The sectioned area clearly consists of angular fragments, 5 - 25mm in size, of felsitic material, set in a pyrite-impregnated matrix or cementing phase.

Thin section examination reveals that the fragments are of related but texturally varied type - being volcaniclastics, ranging from featureless ash tuffs (or volcanic mudstones) to fine-grained wackes.

The former type consists of an aggregate of minutely felsitic plagioclase, of grain size 5 - 20 microns, evenly speckled with abundant, tiny, randomly-oriented flecks of sericite. Accessories are minute granules of apatite and dust-sized rutile. Fine-grained carbonate forms sporadic, diffuse clusters, and there are sparse, tiny flecks of biotite. Quartz is notably rare, and these rocks appear to be of leuco-andesitic (keratophyritic) composition.

The wacke variants consist of close-packed, sub-rounded to angular clasts, 0.05 - 0.2mm in size, of sericitized felsite, plus occasional quartz grains or chert clasts. These are cemented by a matrix phase of chert, felsite and, sometimes, felted biotite. Note the lack of plagioclase crystal clasts.

A few equant patches of monomineralic granular quartz, 0.05 - 3.0mm in size, appear to be fragments in their own right - probably of quartzite or recrystallized chert.

The matrix/interstitial phase cementing the coarser blocks consists of abundantly biotitic felsite with clusters of pyrite. The biotite is a pale brown (phlogopitic?) variety of randomly felted habit, and of grain size 0.02 - 0.1mm. Minor carbonate and quartz are accessories.

The pyrite consists of somewhat rounded, euhedral-subhedral individuals, 0.02 - 0.2mm in size, locally coalescing to mosaic

patches of granoblastic aspect. The pyrite clumps and strings are often - though not always - mantled and cemented by flaky chlorite, occasionally with carbonate. Extremely rare, minute flecks of chalcopyrite are the only accessory sulfide.

The pyritic/biotitic phase can sometimes be seen to incorporate and partially assimilate smaller clasts of the mudstone/wacke material but, in general, fragment contacts are notably sharp, and the rock appears totally undeformed.

The biotite may be a product of subsequent thermal metamorphism. Its preferential development in the matrix phase probably reflects a primary difference in composition of the latter (possibly a pyritic, ferromagnesion clay-rich material of exhalative affinities?).

SAMPLE 89-3 35.4m. (Slide 91-188X)
BIOTITIZED ASH TUFF WITH VEINLET ALTERATION

Estimated mode

Matrix	
Plagioclase	37
Biotite	35
Epidote) Rutile)	1
Veinlet zones	
Quartz	12
Carbonate	4
Epidote	2
Actinolite	2
Biotite	1
Chlorite	2
Pyrite	4

Macroscopic examination of the etched off-cut indicates that this is a fine-grained, structureless, feldspathic rock resembling 89-1 23.5m., but cut by more extensive and irregular veniform zones.

In thin section it is confirmed as texturally similar to 89-1 23.5m., but is distinctive in having a high content of biotite.

It consists essentially of a matrix of felsitic plagioclase, of grain size 5 - 15 microns, strongly and rather evenly pervaded by flecks, and semi-coalescent patches and networks, of felted brown biotite of similar grain size. Dust-sized sub-opaques (cryptocrystalline epidote and/or rutile) are a minor, evenly disseminated accessory.

The veniform zones range from 0.2 - 2.0mm in thickness, and appear to be developed along mutually intersecting and offsetting fractures - defining a coarse breccia structure. They consist of various proportions of carbonate and quartz, with intergrown chlorite, epidote, actinolite and coarse pyrite.

In thin section these zones are often ill-defined, and sometimes show envelopes of modified matrix (enriched in biotite and/or epidote, depleted in biotite, etc.). Actinolite, where present, is generally an embryonic form, developing as acicular intergrowths in carbonate.

The rock appears to be a biotitized ash tuff, with fracture-controlled alteration and/or veining. The mineralogy of the alteration assemblage suggests skarnic affinities.

SAMPLE 89-23 132.3m. (Slide 91-197X)
SEMI-MASSIVE PYRITE

Estimated mode

Quartz	21
Plagioclase	8
Sericite	6
Chlorite	2
Actinolite	1
Epidote	1
Carbonate	1
Pyrite	58
Pyrrhotite	1.5
Chalcopyrite	0.5

This is a strongly sulfidic sample in which pyrite is the dominant constituent. Accessory sulfides are very minor.

As can be seen by macroscopic examination of the polished thin section, the pyrite is in the form of compact granular masses which are extensively broken up and cemented by intergranular permeations and veinlets of the quartz-rich gangue component.

The latter seemingly consists of extensively silicified, possibly fragmental or brecciated volcanic material. The latter survives as sporadic, more or less extensive patches of microgranular plagioclase, more or less strongly sericitized. These alternate with areas of varigranular, locally lamellar-textured quartz.

Gradational stages are also seen where the quartz occurs as fragment-like or phenocryst-like clumps in an altered feldspathic matrix, and where the quartz areas contain wisps and small patches of sericite, chlorite, cryptocrystalline epidote and/or granules of probable actinolite - possibly representing altered host-rock remnants. Local development of brown, fibrous/spherulitic carbonate is seen in some of the quartz areas.

The sulfides are principally homogenous, compact pyrite. Grain fabric in this material is seldom distinguishable, but it probably consists of a tight, finely granular mosaic. The absence of euhedral grain shapes is notable. Contacts of the pyrite masses with the networks and pockets of gangue are typically irregular, and suggestive of marginal replacement or intimate intergrowth (co-genesis or co-recrystallization).

The accessory sulfides are pyrrhotite - largely modified to a dusty, brown, locally colloform variant - and minor chalcopyrite. They typically occur in intergrowth with the peripheries of the pyrite masses at the contact with gangue, and also form fine disseminations and complex intergrowths in feldspathic/sericitic gangue. Traces of pyrrhotite and chalcopyrite are seen as rare, tiny, interstitial inclusions within the compact pyrite.

SAMPLE 89-23 133.9m. (Slide 91-198X) MASSIVE PYRITE

Estimated mode

Plagioclase	5
Quartz	12
Chlorite	trace
Sericite	1
Biotite	1
Carbonate	1
Pyrite	75
Pyrrhotite	4
Chalcopyrite	1
Sphalerite	trace
Galena	trace

This is a strongly sulfidic sample consisting essentially of a compact, mosaic aggregate of pyrite.

The non-sulfide component consists of granular quartz and patches of igneous-textured material composed predominantly of aggregates of plagioclase, partly altered to (and/or intergrown with) sericite, secondary biotite, carbonate and chlorite. These areas commonly contain more or less abundant, intimately intergrown/disseminated sulfides - particularly pyrrhotite, the main accessory component. Quartz clumps within the altered volcanic material tend to be free of sulfides.

The silicates - particularly quartz - also pervade the massive sulfides as a network of threads and semi-connected pockets. The slide includes a few late stringers of fibrous-textured, brown carbonate. These cross-cut both sulfides and silicate gangue.

The sulfides consist predominantly of homogenous pyrite. Accessory components are pyrrhotite, chalcopyrite and sphalerite, in decreasing order of abundance. These occur closely associated, in consistent textural relationship to the pyrite, concentrating peripheral to the pyrite masses and occasionally penetrating them as veniform/intergranular bodies.

The accessory suite, particularly pyrrhotite and sphalerite, often show a close association with patches of the altered volcanic component, occurring as irregular disseminations and clumps within the silicates, and segregating as coarser pockets in the peripheral portions of the adjacent pyrite.

The pyrrhotite shows partial alteration to a colloform-textured, "dusty", brownish variant and/or to minutely fine-grained secondary pyrite.

No gold could be found despite an extensive search.

SAMPLE 89-1 73.8m. (Slide 91-187X)
PYRITE-SPHALERITE META-FRAGMENTAL(?)

Estimated mode

Quartz	16
Plagioclase(?)	12
Biotite	7
Chlorite	1
Actinolite	trace
Carbonate	9
Epidote	22
Pyrite	19
Sphalerite	13
Pyrrhotite	1
Chalcopyrite	trace

This sample consists of a complex, irregular intergrowth of sulfides and polymineralic gangue. The latter is of distinctive composition, compared to the other sulfide-rich samples of the suite, being notably high in epidote, together with substantial accessory carbonate and biotite.

Quartz occurs as areas of sub-polygonal granular mosaic of grain size 30 - 100 microns. There are also sporadic pockets of generally coarser granularity, and rare, phenocryst-like individuals, 0.3 - 1.0mm in size. It also occurs in intimate intergrowth with, and as sporadic lumps within, areas of finer-grained mosaic (10 - 70 microns) which probably consist principally of plagioclase.

Some patches of coarser plagioclase, having the aspect of partially recrystallized phenocrysts, are also seen. Estimation of the relative proportions of quartz and plagioclase is difficult.

The plagioclase-rich patches are often distinguished by a substantial content of disseminated biotite and, to a lesser degree, brown carbonate. The biotite is a pale olive brown variety, occurring as clumps of non-oriented, equant grains of granoblastic aspect, often closely associated with sulfides.

Occasional patches of the felsitic plagioclase have abundant intergrown chlorite. Actinolite is also occasionally seen, as sporadic acicular clusters.

Epidote occurs as small clumps and more extensive equigranular patches and networks, closely associated with the concentrations of sulfides. In this context it is often accompanied by pockets of brown, high-relief carbonate (possibly siderite). Some epidote also occurs in cryptocrystalline form, as diffuse clusters and wisps in the areas of biotitic felsite.

The rapid, ill-defined variations in mineralogy and texture in this rock suggest that it is of fragmental volcanic affinities, probably modified by recrystallization.

Sample 89-1 73.8 cont.

The sulfides consist essentially of pyrite and sphalerite, in approximately equal proportions. They occur as clumps, irregular patches and networks, and partially coalescent disseminations throughout the heterogenous host. For the most part the pyrite and sphalerite tend to be segregated as separate clumps, but some intergrowth is also seen. The sulfide segregations and patches of impregnation appear to define a crudely banded and/or rimming relationship to the cryptofragmental host.

The pyrite forms streaks, clusters and aggregated clumps of subhedral, occasionally skeletal grains, 0.02 - 1.0mm or more in size. It includes some areas (mainly peripheral to the clumps) of fine-grained, dusty appearance. These may be secondary after pyrrhotite - rare, unaltered examples of which are also seen.

The sphalerite forms irregular granules, 0.02 - 0.2mm in size, commonly coalescing to network clumps with intimately intergrown gangue (especially epidote and/or carbonate). In a few cases the sphalerite forms extensive segregations which are host to included euhedral/subhedral pyrite individuals. It is also seen in interstitial relation to pyrite aggregates - though more commonly the two sulfides are well segregated.

The sulfide/gangue relationships are totally devoid of veining features or apparent structural control. Rather, they suggest syngenetic or closely contemporaneous formation, probably in an exhalative/pyroclastic environment, with subsequent concomittent recrystallization.

SAMPLE 89-3 45.3m. (Slide 91-189X)
SPHALERITE-RICH SEMI-MASSIVE PYRRHOTITE

Estimated mode

Quartz	16
Chlorite	12
Carbonate	2
Epidote	1
Actinolite	1
Garnet	1
Pyrrhotite	47
Sphalerite	20
Chalcopyrite	trace
Pyrite	trace

This sample is an intimate intergrowth of sulfides (pyrrhotite with notably abundant sphalerite) and gangue. In part it shows a distinct laminar fabric, apparently disturbed and/or contorted in a 2cm central, sphalerite-rich zone.

Plagioclase and/or altered volcanic remnants are apparently absent in this sample, whilst skarn-type minerals - such as epidote, actinolite and garnet - are notable accessories.

The material throughout consists essentially of an intimate, 3-component intergrowth, of pyrrhotite, sphalerite and gangue in various proportions. The scale of this intergrowth is generally in the range 20 - 200 microns, but scattered, coarser, more or less inclusion-free areas of pyrrhotite to 1mm or more, and of sphalerite to 0.3mm are seen. The sectioned area embraces three more or less distinct textural/mineralogical zones, in crudely banded relationship.

At one end of the slide, a 4 - 7mm zone of compact pyrrhotite is matrix to rounded/irregular islands of granular quartz. This zone is essentially free of sphalerite, but contains sparse flecks of accessory chalcopyrite in the pyrrhotite.

This passes, by way of a transitional zone of mixed pyrrhotite and sphalerite in which the gangue includes relatively more chlorite, to a 2cm zone consisting essentially of intimately intergrown sphalerite and gangue with only sporadic pockets of pyrrhotite. The gangue in this zone is predominantly chlorite, plus pockets of carbonate and areas of microgranular quartz containing relatively abundant granules of epidote and actinolite.

The other end of the slide consists of predominant pyrrhotite, in which sphalerite occurs as laminae of fine-grained, elongate inclusions. It also forms patches interstitially intergrown with microgranular quartz and chlorite, and/or with coarse subhedral/ skeletal grains of colourless, microfractured garnet.

SAMPLE 89-3 45.6m. (Slide 91-190X)
SEMI-MASSIVE PYRRHOTITE

Estimated mode

Quartz	16
Plagioclase	3
Chlorite	11
Sericite	1
Carbonate	4
Pyrrhotite	55
Pyrite	6
Sphalerite	4
Chalcopyrite	trace

This sample consists of semi-massive sulfides (predominantly pyrrhotite) in intimate intergrowth with silicate gangue. The form of the intergrowth can readily be seen by macroscopic examination of the polished thin section, where a crudely-banded structure is discernable. One 2cm band shows extensive, irregular patches of greenish (chloritic) material incorporated within pyrrhotite. The remainder of the sectioned area consists of pyrrhotite speckled with abundant, small, equant/elongate clumps and semi-continuous strings of quartz, whose distribution defines an incipient foliation.

The gangue in the 2cm band consists principally of minutely felted, compact chlorite - grading to intimate intergrowths of chlorite with quartz, microgranular plagioclase and sericite. Some of the compact chlorite areas contain sericite as random, porphyroblast-like flakes. There are local pockets of sparry carbonate and intergrown quartz. Contacts between the pyrrhotite and chloritic gangue are complex and mutually interpenetrating.

Sphalerite ia a prominent accessory in this portion, occurring as disseminated flecks in the pockets of chloritic gangue, and as gangue-packed segregations at the contact with the adjacent pyrrhotite. Sphalerite also forms intermittent laminar zones of irregular flecks and pockets, 10 - 100 microns in size, within the compact pyrrhotite - particularly near the borders of the zone.

Pyrite occurs as sub-rounded, anhedral grains, 0.2 - 4.0mm in size, within the pyrrhotite of this zone. It sometimes shows partial rimming by sphalerite and/or chalcopyrite, which are also seen as sparse inclusions within the pyrite.

The gangue component in the other portion of the slide is varigranular anhedral quartz with rare patches of carbonate. The quartz occurs as sharply defined, rounded to irregular "islands" within a matrix of pyrrhotite. Minor sphalerite and traces of chalcopyrite occur in the pyrrhotite, mainly on the contacts of quartz clumps.

The pyrrhotite in this sample is totally fresh and only feebly magnetic.

T-ZONE TRENCH (Slide 91-183X)
PYRHHOTITE WITH QUARTZ

Estimated mode

Quartz	27
Plagioclase(?)	5
Chlorite	4
Carbonate	1
Sericite	trace
Pyrrhotite	58
Sphalerite	4
Chalcopyrite	1
Arsenopyrite	trace
Pyrite	trace

Macroscopic examination of the polished thin section shows that this sample consists of a matrix of pyrrhotite containing vari-sized, fragment-like masses of silicate gangue. The latter range from sub-equant bodies up to 1cm or so in size to areas of more or less abundant, smaller silicate "islands" (possibly representing partially assimilated coarser masses) in the 1 - 2mm size range. A few, irregular, crudely-banded zones consist of compact sulfides with minimal intergrown gangue.

The gangue in this sample consists essentially of a vari-granular, anhedral aggregate of quartz, of grain size 30 - 300 microns. Chlorite is the principal accessory, as disseminated, intergranular flecks, and as occasional felted pockets - especially marginal to sphalerite concentrations. Brown carbonate forms rare, individual granules and sporadic pockets.

Diffuse patches and networks of finer-grained texture and lightly turbid appearance within the quartz aggregate are probably plagioclase, representing remnants of original felsitic host rock (see patchy development of white etched areas on the off-cut block). The relative paucity of feldspathic remnants correlates with a notably low content of sericite.

Pyrrhotite forms a compact matrix in which a sub-polygonal mosaic grain fabric, on the scale 0.05 - 0.2mm (comparable to that of the quartz gangue), is distinguishable in cross-polarized light. The granularity is occasionally emphasized by threads of secondary pyrite.

Sphalerite occurs within the pyrrhotite as disseminated flecks and laminar trains thereof, 5 - 100 microns in size. It also occurs as pockets within islands of gangue, and as patches and lenses packed with tiny inclusions of pyrrhotite.

Chalcopyrite is mainly confined to a zone at one end of the slide, where it forms more or less discrete pockets, 0.1 - 1.0mm in size, in quartz. A single euhedral grain of arsenopyrite was seen.

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SERVICES

MINERALOGY AND GEOCHEMISTRY

534 ELLIS STREET, NORTH VANCOUVER, B.C., CANADA V7H 2G6 TELEPHONE (604) 929-5867

In account with: Cathedral Gold Corp.,
P.O. Box 84,
800-601 West Hastings St.,
VANCOUVER, B.C.
V6B 5A6

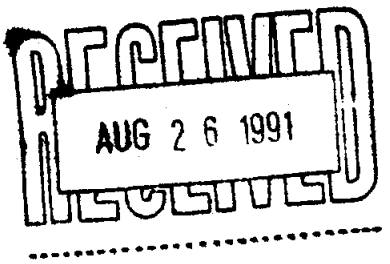
Invoice 91-38

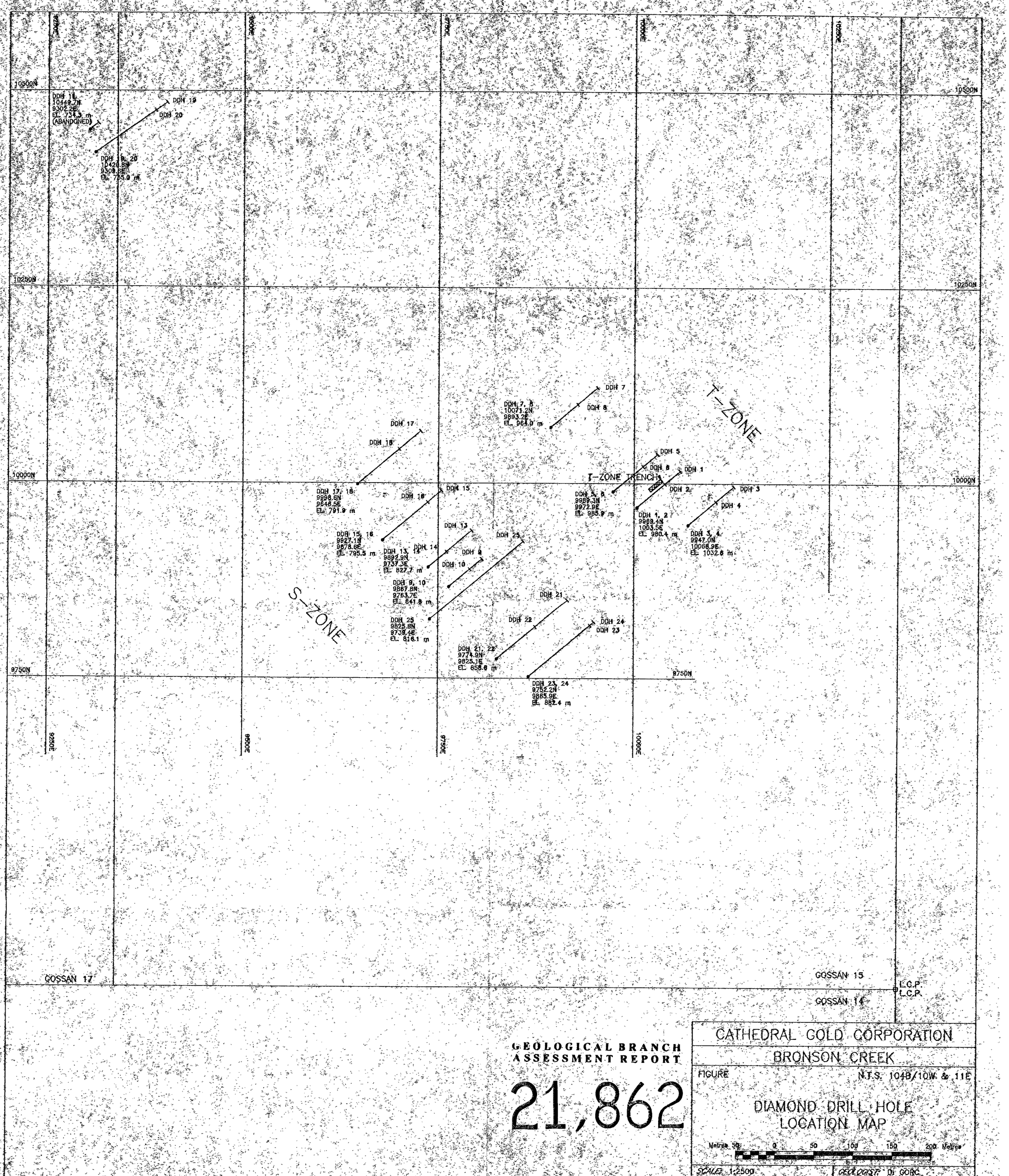
August 23rd, 1991

Charges for professional services re petrographic study of rocks from the Bronson Project (#8102) fro Dennis Gorc.

Preparation (including impregnation and staining) 9 thin sections and 7 polished thin sections:		$ 170.00
Microscopic examinations and report:		1150.00
Photomicrography:		260.00
		$ 1580.00
	G.S.T.	110.60
	Total:	$ 1690.60

G.S.T. No. R113237655





GEOLOGICAL BRANCH
ASSESSMENT REPORT

21,862

CATHEDRAL GOLD CORPORATION

BRONSON CREEK

FIGURE

N.T.S. 104B/10W & 11E

DIAMOND DRILL HOLE
LOCATION MAP

Metres 50 0 50 100 150 200 Metres

SCALE: 1:2500

GEOLOGIST: D. GORC

DATE: MAY 1990

DRAWN BY: S.W./S.C.L.