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BRALORNE CAMP

and

PACIFIC EASTERN CLAIMS

Review and Exploration Potential

92 J 10 & 15

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March 1984

INTRODUCTION

This report is based mainly on a paper study of the fairly voluminous available literature,and on talks with several other parties currently interested in the area. My own field experience is restricted to areas in the district but well outside the main Bralorne camp.

BRIDGE RIVER DISTRICT

General Aspects

Encompassing the Bralorne mine is a NW-SE trending synclinal belt of Permian to Jurassic oceanic sediments, some 10 km wide, cored by an elongate soda granite stock, augite diorite, and andesitic greenstone. The core is bordered by major faults which have partly coextensive serpentine bodies.

An interesting aspect of the district is that the synclinal belt is slightly arcuate, and that together with several mineralized and topographical features, it forms a district-scale elliptical feature roughly centred on the 4 km by 10 km 57 m.y. old Bendor batholithic stock (see attached map by Drysdale, 1922).

Drysdale's mapping implies a steep batholithic contact, as does the steepness of the axial planes of the adjacent folded sediments and the apparent lack of vertical zoning in the veins.

One reasonable explanation incorporating all the above features is that (a) the Bendor batholith was intruded forcefully with concommitant compression and uplift and (b) it is now well-unroofed. Forceful intrusion has been inferred by one obvserver for the diorites, and these are a probable early differentiate of the same batholith. Contact metamorphic effects of the batholith reach some 1 km or more from the contact, just barely into the Bralorne camp.

Somewhat older (70 vs 57 m.y.) batholithic rocks are present on the SW side of Bralorne. These too could be implicated in the folding, as could plate tectonism. Low angle thrusts are not known in the area but the presence of oceanic basin rocks (the Bridge R.-Cache Ck. assemblage) between island arc assemblages is curious. At the very least the evidence necessitates a suture zone of major extent. According to Monger (1977) this zone is 1400 km long, and the curious juxtaposition of assemblages is either an obduction or entrapment phenomenon.

The greenstone and the soda granites are also taken, on the basis of contact relations, to be comagmatic with the Bendor batholith, though having earlier and slightly differing dates of emplacement. The accompanying table (Fig.1) provides the most reasonable stratigraphic succession, but doubts remain e.g.

1. As to the age of the serpentine
2. Whether the Cadwallader series is later than or partly correlative with the Fergusson rocks and
3. The age of mineralization. A 47 m.y. date is available from the Minto vein but this is not necessarily the age of the Bralorne mineralization.

Fig. 1 BRALORNE AREA

PERIOD		FORMATION	LITHOLOGY	ALTERATION	VEIN HOST
		BENDOR intrusives 57 m.y.	Granodiorite,* related dykes	None	Never
TERTIARY			Albitite dykes*(quartz feldspar porphyry, feldspar hornblende porphyry, and other felsites)	Minor quartz-sericite-py-asp	Rarely
		Serpentine	Serpentine	Carbonate-silica (unrelated to Au) Talc(near W.end of veins)	Rarely
CRETACEOUS		BRALORNE intrusives 62m.y. (near Arizona mine, 67 m.y. on dyke at Minto)	Soda granite(sodaclase tonalite* or albite quartz diorite)*	+ Quartz-sericite-carbonate	Sometimes
			Augite diorite* (augite sodaclase diorite)	+ Early stage: clinozoisite or prehnite + quartz Later: ankerite, sericite, silica, local py and chlorite	Often
		COAST PLUTONIC COMPLEX (73 to 78 m.y.)	Quartz diorite		
TRIASSIC	Cadwallader Series	HURLEY group	Sediments: argillaceous, tuffaceous and limy		
		PIONEER formation	Greenstone lavas*(possible minor rhyolite ?) (possible u m flows)	Early?: carbonate Later: quartz-albite py-asp Local: Kaolin(BRX) Biotite (Pioneer)	Often
		NOEL	Sediments: argillaceous and tuffaceous. (Possibly correlate with Ferguson)		
Permian (to mid Jurassic?)		FERGUSSON group (Bridge River Series)	Cherty sediments and some lavas	Lavas have ankerite, py, asp.	

* Probably one family

The ultramafics (mainly serpentine) represent particularly puzzling occurrences with respect to age, mode of emplacement on mineralization. Later writers have favoured an intrusive origin, hot or cold, or both. Earlier ones suggested an extrusive origin for at least some of the ultramafics, based on the frequent presence, albeit with faulting, at the contacts between the Pioneer and Noel Formations. This would also imply an earlier age than the post-diorite/pre-mineralization age otherwise suggested for the serpentlne. Virtually no mineralization in the Bralorne-Pioneer camp cuts the serpentines. These have, on the contrary been regarded as dams to hydrothermal flow, an interpretation which is probably correct. Nevertheless some care is needed not to totally write off the serpentines as potential host rock. In almost identical systems in California, the serpentine itself is a common host. It is also a host to some small deposits to the NE on the Yalakom Fault zone.

Relation to other Districts

A most interesting comparison can be made to other districts within, and even outside, the Cordillera.

The striking common features (as listed on the accompanying table) are the grades, metal ratios, great vertical extent, general lack of vertical zoning, relation to major faults, proximity to serpentine and mineralogy. An indisputable similarity is present in the Coquihalla belt, B.C. and the Grass Valley and Mother lode districts of California. Deposits in the Juneau district of Alaska, the Timmins of Ontario, the Kalgoolie of Australia and the Cassiar of B.C. may also belong in this class.

Fig. 2

SHARED CHARACTERISTICS OF SEVERAL Au DISTRICTS

	Bralorne B. C.	Coquihalla B.C.	Grass Valley Calif.	Mother Lode Calif	Juneau Alaska	Timmins Ontario	Kalgoolie Australia
Av. grade Au,oz.	0.5		0.5	0.3		0.5	0.4
Au:Ag Ratio	1:5	1: 6	1:3·7	1: 10		1:6·5	1: 8
Vertical extent mining; m	1830		+1300	+1740		Deep	
Veins: Nature	Ribbon	Cavity	Cavity & ribbon	Fissure fill			
% sulphides	3	2	Up to 20	3.5			
sulphides	Py, asp	Py,asp, po	Py, asp minor b.m	Py,asp minor b.m.			Py
gangue	Qtz, mari, talc,ank, rutile	Qtz	Qtz,ank, cal, ser	Qtz,ank, cal,mari.	Qtz,rutile cal,carb, alb,adul, ser,mari, tm	Qtz,cal, alb,ortho-cl, ank, ba,tm	Qtz, ank, cal
Wallrock: Lithology	Greenstone Granite Diorite	Greenstone felsite, seds	Granod.	Seds, greenstone, franitics		Syenite, feld.por., lavas,seds.	Dolorite
Alteration	Qtz,ser, ank,alb,	Alb,fuch	Ser,ank chl,epi	Ank,ser	Alb	Ser,fuch, carb,qtz	Chl,ank cal,ser
Non-vein ore	Network q. at Dan Tucker?	Rpcmt? in seds Qtz.net works		Ank,ser alb,qtz bodies in greenstone & schist		Sil,ank, fuch bodies	
Relation of ore to serpentine	Close	Close	Close, occasionally within	Close,	Close?	Ultramatic flows only	Close
Distance of ore to batholith,km	1½	5		5 to 15		3	

Three useful conclusions emerge from this comparison:

a) The composition of the felsic intrusives is unimportant. It is likely that their significance lies in ground-preparation capacity and possibly as heat sources for local hydrothermal cells.

b) Non-vein type Au mineralization is often present, e.g. as in the Idaho deposit in the Coquihalla belt. There is no obvious reason why such deposits should not also be present in the Bridge River district

c) The ores have close proximity to serpentine bodies, but not necessarily the reverse. The relationship appears to be indirect, mediated by structure. Alteration associated with the serpentine may provide a precipitating factor for Au deposition.

Tectonic Setting

Monger (1977), emphasized the distinctive features of a 1400 km x 75 km belt that he called the Cache Creek-Bridge River oceanic assemblage, which includes the Fergusson and Cadwallader rocks. The choice of mega-tectonic mechanisms responsible for the emplacement of this assemblage has yet to be resolved among the academics sutured to sliding sheets, but the Bridge River area has attracted much attention as a result of their efforts. John Potter at U. of Washington has just completed a thesis on the Bridge River Complex itself, and Margaret Rusmore, also in Washington, is half way through assembling a dissertation on the Cadwallader series. She has also worked in some detail in Grass Valley, California and confirms the similarity of geological setting to that of Bralorne.

Meanwhile Jim Monger has been examining the Ashcroft area where Bridge River rocks also occur. Out of all this interest it is probable that new information regarding the setting of the Bralorne deposits will arise, with attendent aid to exploration. For example, trace element analyses of the Bridge River (Fergusson) rocks were carried out by Potter, and similar analyses by Rusmore of the Cadwallader rocks in 1984 will allow a comparison that may substantially affect our understanding of the host structures at Bralorne.

BRALORNE-PIONEER MINES

Economics:

Production:

Bralorne (including king section)	5.5 m.t. @ 0.51 oz/t.Au
Pioneer	2.5 m.t. @ 0.54 oz/t.Au

Cut-off grade: (at closure) 0.3 oz/t.Au

Mine Depth: 1830 m below surface
Temperature at botton 135°F

Reserves: In 1982 E & B Explorations estimated total (including inferred) reserves at 915,115 t. @ 0.25 oz/t.Au, based on a cut-off of 0.14 oz/t. and a mining width of 122 cm.

Upon closure, good grade ore was present at the deepest mine level and the deposit can be considered open at depth.

Metal Ratio : Au:Ag = 1:5

Veins

The veins comprise notably ribboned quartz fissure fillings with local footwall brecciation. Some 20 to 40% of the veins encountered proved to be productive.

The best grades are reported to be present in undulating rather than straight veins, near vein branchings, and near serpentine bodies.

The ore systems appear to have a rhythmic distribution, being centred at intervals of roughly 1.7 km along the mineralized belt.

A major feature is the consistency of grade, mineralogy and Au:Ag ratio over the full vertical extent of the workings. Vein minerals comprise approximately 3% total sulphides, including pyrite and arsenopyrite with minor base metals and scheelite. The gangue includes some calcite, mariposite, talc, ankerite, and rutile. Wall rock alteration includes quartz, sericite, ankerite, albite, pyrite and arsenopyrite. In general the walls are depleted in Si and Na and enriched in Co_2, H_2O, S, and K_2O.

Host Rocks:

The major hosts are an andesitic greenstone, an augite diorite and a soda granite. The relationships between these three are suggestive of a co-magmatic origin, supplied perhaps by the Bendor granodiorite batholith 1½ km to the north. There are very minor vein incursions into sediments adjacent to the volcanic-intrusive complex.

Ore Controls

These are:

1. The structural belt parallel to the batholithic contact, bounded in part by the major Cadwallader and Fergusson Faults.
2. The mainly linear serpentine bodies which lie adjacent to the above major faults. The serpentine may be effective either by damming (channeling) hydrothermal fluids or by the chemistry of its associated talc-rich alteration halo.*
3. The periphery of the soda-granite - almost certainly a structural rather than chemical control.
4. Flexures in the Cadwallader Fault, present at both the King and the Bralorne proper.

* One writer (Coveney, 1971), in relation to the remarkably similar Grass Valley mineralization, has suggested that hydrogen released by crushed magnetite could act as a Au precipitant in such situations.

PACIFIC EASTERN CLAIMS

General Description

These claims cover a 6½ km strike length, roughly on line with the King-Pioneer deposits. It incorporates ground formerly known as the Pioneer Extension, the Plutus, the President Group and the Dan Tucker. The Paymaster, Red Hawk, and Bramoose all lie within a km of the Pacific Eastern claim boundary.

A total of some 1400 m of drifting and cross-cutting has been carried out at the western end of the claims as well as some exploration drilling, but the assay records are incomplete. Relogging of the core was undertaken by J.S. Stevenson in 1953 however and his logs are available.

The Cadwallader and Fegusson Faults certainly extend through this ground, but there are two possible loci for the former. All the Bralorne-Pioneer lithologies are present, though in differing proportions, and there is in addition some feldspar porphyry dyking. The major change appears to be that a greater width of greenstone and diorite and a lesser of the soda granite are found within the Pacific Eastern block. Locally intense sericite, carbonate and talc alteration is reported.

A moderately well developed vein system is present also, but reports on mineralization are sparse. The principal vein where drifted on has 0.58 oz/ton Au over a 33cm width and 28m length, and where winzed, average values of 0.15 oz/t. over 48cm x 10.5m and 0.2 oz/t over 44cm x 29m. Other reports are vaguer e.g. "Free gold" in drill hole S13, "some spectacular values", etc.

The narrow granite on the Pacific Eastern ground is stated to be more broken than at Bralorne. This fracturing could be pre-ore in that at least one vein is present in it, with a length of 36m and a width of 122 to 336cm. No mention is made however of mineralization in this vein.

At the other (E) end of the claims block on the former Dan Tucker group shears up to 15m wide are reported to contain a 1m wide section of crushed quartz (or quartz stringers) within greenstone near albite dykes. Occasional free gold was seen in the quartz. This is not particularly exciting but two other features add to this areas exploration potential. These are the presence of serpentine on both sides of the showing and the probability of a major fault flexure or flexures in this vicinity (Map 431A) (E & B Fig. 3.2).

Exploration Methods

No modern prospecting techniques appear to have been employed on the Pacific Eastern ground. Au:Ag and Au:W ratios may prove to be useful. Also volatiles, such as Hg. An interesting sidelight is that methane is being produced in fairly substantial quantities from at least one location within the Pacific Eastern workings, attesting to a currently open fracture system.

Warren (personal communication) states that he found biogeochemically anomalous Au (up to 7.3 ppb, dry weight, in Douglas Fir) in a few samples taken from the Pacific Eastern ground. He estimates a conservative threshold at 5 ppb with background levels of 1 to 3 ppb. His sampling over the King section of the Bralorne mine yielded values between 3.7 and 7.2 ppb. This is interesting in view of the fact that no placer Au has been found upstream from the Pioneer mine in

Cadwallader Creek. However much of the creek sediments must originate from much further upstream and from high on the steep valley walls, effectively masking residual sediments in the creek floor.

Harrop (1984), in a somewhat theoretically oriented computor study of mineral deposits in the Bridge River District, has studied Au:Ag ratios. Production records suggest a moderate increase in ratio with depth within the Bralorne and King deposits (combined) but a weak decrease with depth at the Pioneer. The significance is not entirely clear, but a refinement of this study could yield a good pragmatic exploration guide.

One obvious and cheap surface approach is by magnetometer. This would have the very important advantage not only of outlining the ultramafic zones and probably the greenstone but of showing flexures in the major serpentinized faults. The interpretation can be supplemented in part by a precise knowledge of bedrock depths. Associated electro-magnetic work could do much to additionally outline the major fault structures.

Reopening of the workings at Pacific Eastern will be initially expensive. It seems probable that much of the 150m long adit is caved. For this reason the Bema group and Stevenson have suggested surface drilling prior to any attempt to re open the mine. Such drilling too will be expensive in view of the deep bouldery overburden in Cadwallader Creek and necessary depth of penetration. However it should be emphasized that the spacing of these drill holes can be fairly sparse. A longitudinal section of the Pioneer Mine shows major stoping, and therefore ore, to comprise some 60% of the area of the entire section. This is quite a high ore to waste ratio.

This fact, along with the size and strike separation of the King, Bralorne and Pioneer mines,suggest that a series of drill holes spaced at 1km intervals along the belt would have had an approximately 80% chance of yielding an ore grade intersection in one of the 3 deposits.

Summary of Potential

1. The claims are located within the same structurally and lithologically anomalous slice as the highly productive Bralorne-Pioneer mines.

2. Favourable contributory factors include the presence of vein systems with associated Au of sub-economic but interesting tenor and extent.

3. Two zones within the 6½ km strike length of the claim block are known to have promise. This length, and the theoretical consideration of rhythmic distribution of deposits, suggest the possibility of at least one more, - perhaps in the vicinity of the former Plutus ground.

4. Theoretical data now becoming available may provide new insights on ore emplacement.

5. Modern exploration techniques have not been applied to the Pacific Eastern ground, and several are directly applicable. Except for surface mapping only 12% of the favourable trend has been explored with intensity.

CONCLUSIONS

The potential of the Pacific Eastern ground represents a valuable opportunity for participation in the immediate vicinity of a proven and pre-eminent mining camp..

The high initial exploration costs are ameliorated by the quantity of data already collected and by the availability of Normines Resources Ltd. as a contributing partner.

Unless the terms of partnership are particularly onerous, participation by Kerr Addison Mines Ltd. is strongly recommended.

SPECIFIC RECOMMENDATIONS	Approx. Cost
1. Preliminary studies covering metal ratios and relation to other (epithermal) deposits in the district. Examination of Pacific Eastern core logs, and core itself if available.	$ 5,000.
2. Surface program: Geological mapping, Magnetometer and EM work, on scale 1:5000.	90,000.
3. Diamond drilling from surface 2-500m holes at E & W ends of claims.	150,000.
4. Fill-in drilling reconnaissance on 500m to 1 km intervals along trend, re-opening of Pacific Eastern workings, etc., as desirable.	?

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REFERENCES

Anderson, P. (1976) - Oceanic Crust and Arc-Trench Gap Tectonics in Southwestern British Columbia, Geology,Vol.14, pp. 443-446.

Buddington & Chapin,(1929) - Paper on Au deposits of SE Alaska, USGS Bulletin 800.

Cairnes, C. (1937) - Geol. and Min. Deposits of Bridge River mining camp, GSC Mem. 213.

Clark, (1970) - Au Districts of California, Calif. Division Mines & Geol. Bulletin 193

Coveney, R. (1971) - Hydrogen and Serpentinite - their roles in the localization of Au ores at the oriental Mine, Alleghany, California, in Econ. Geol. Vol.66, No. 8, p. 1265.

Harrop, J. - Talk on Bridge River District, U.B.C. 14 Mar 84.

Johnson, (1940) - Grass Valley Area, U.S.G.S. Prof. Paper 194.

Joubin, F. (1947) - Structural Geology of the Cadwallader Gold Belt - a thesis prepared for B.C. Engineering Assoc.

McCann, W. (1922) - Geol. and Min. Deposits of Bridge River. map area, G.S.C. Mec. 130.

Monger, J.W.H. (1977)- Upper Paleozoic Rocks of the Western Cordillera and Their Bearing on Cordilleran Evolution, Cdn. Jour. Sci. Vol. 14, pp. 1832-1859.

Monger, J.W.H., Souther, J.G., and Gabrielse, H. (1972) Evolution of the Canadian Cordillera: A Plate Tectonic Model, Am. Jour.Sci., Vol. 272, pp. 577-602.

Potter, J. (1983) - Geology of the Bridge R. Complex: A Record of Mesozoic Convergent Tectonics, pHD thesis, U. of Wash.

References - cont'd.

Rusmore, M. - Study of Cadwallader series, a dissertation in progress at U. of Washington.

Ray, G. - Carolin Mine - Coquihalla Au Belt, A paper presented at C.I.M. Convention, Smithers, Oct. 1983.

Ray, G et al - Some Au Deposits of the western Cordillera, in GAC/MAC/CGU Fieldtrip Guidebook #8,Vol.1, May 1983.

Warren, H. (1982) - and Barakso, J. The Development of Biogeochemistry as a Practical Prospecting Tool for Au - Western Miner, February 1982.

Wright, R.L., Nagel, J., and McTaggart, K.C. (1982): Alpine Ultramafic Rocks of Southwestern British Columbia, Cdn.Jour. Earth Sci., Vol. 19, pp. 1156-1173.

Other References:

G.S.C. Summ Rep. 1191, 1912,1916,1928,1932,1933.

BCDM, Minister of Mines Reports 1881 - 1945.

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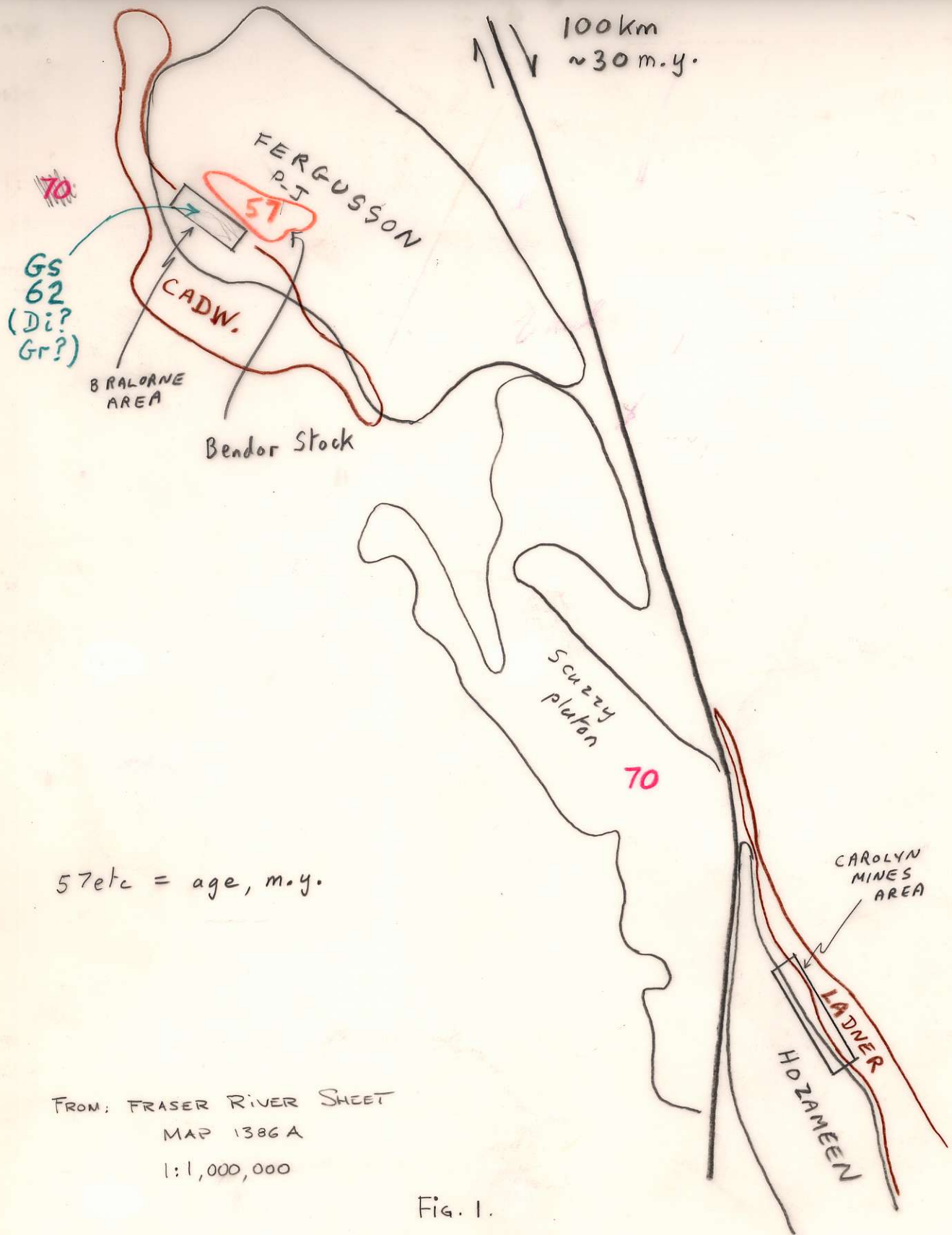

57 etc = age, m.y.

FROM: FRASER RIVER SHEET
MAP 1386A
1:1,000,000

Fig. 1.

Fig. 2.

PERIOD		FORMATION	LITHOLOGY	ALTERATION	VEIN HOST
		MINTO UN 47m.y. BENDOR intrusives 57 m.y.	Granodiorite,* related dykes	None	Never
TERTIARY			Albitite dykes*(quartz feldspar porphyry, feldspar hornblende porphyry,and other felsites)	Minor quartz-sericite-py-asp	Rarely
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			Augite diorite* (augite sodaclase diorite)	+ Early stage: clinozoisite or prehnite + quartz Later: ankerite, sericite,silica, local py and chlorite	Often
		COAST PLUTONIC COMPLEX (73 to 78 m.y.)	Quartz diorite		
TRIASSIC	Cadwallader Series	HURLEY group	Sediments: argillaceous, tuffaceous and limy		
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		NOEL	Sediments: argillaceous and tuffaceous .(Possibly correlate with Ferguson)		
Permian (to mid Jurassic?)		FERGUSSON group (Bridge River Series)	Cherty sediments and some lavas	Lavas have ankerite, py, asp.	

LEGEND

CENT
- Q — Fluvio-glacial deposits
- 3 — Rexmount porphyry underlain by remnants of sediments containing lignite

OCENE?
- 2 — Bendor batholith (quartz-diorite)

LOWER ACEOUS
- K — Eldorado series

)WER ACEOUS
- I — Augite-diorite stock + soda granite
- Limestone lenses

)PER ASSIC
- T2 — Cadwallader series

)PER ASSIC
- T1 — Shulaps volcanics (serpentine) incl. greenstone
- Limestone lenses

YLVANIAN-RMIAN
- P-P — Bridge River series

Symbols

- Geological boundary (defined)
- Geological boundary (assumed)
- 60° — Dip and strike
- Vertical strata
- Glacial striæ
- © — Chromite
- Ⓜ — Magnesite
- Ⓐ — Antimony
- Placer claims
- × — Prospects

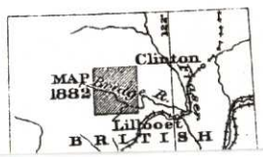
123°00′ 122°50′ 122°40′

50′ 50′

Longitude West from Greenwich

C. O. Senécal, *Geographer and Chief Draughtsman.*
A. Braidwood *and* A. Joanes, *Draughtsmen.*

GSC Mem. 130



inches 0 1 — 0 1 2 centimetres

This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.

Geology by Drysdale.

BRIDGE RIVER

(BETWEEN REXMOUNT AND GUN LAKE) 1/125,000 ~ 2mi = 1in.

LILLOOET DISTRICT

BRITISH COLUMBIA

Fig. 3.

Geology by C. W. Dr

W. H. B

Surveys and

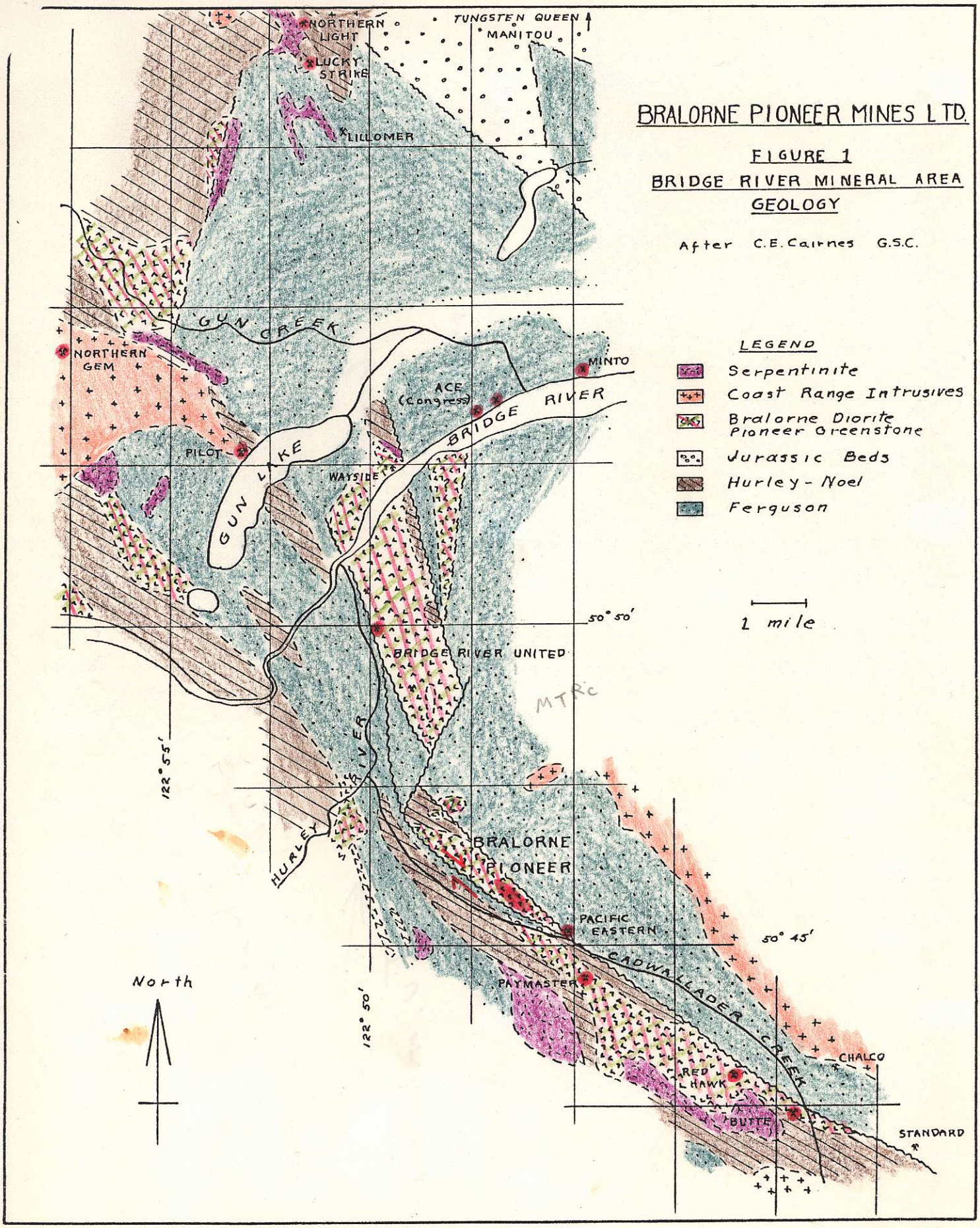
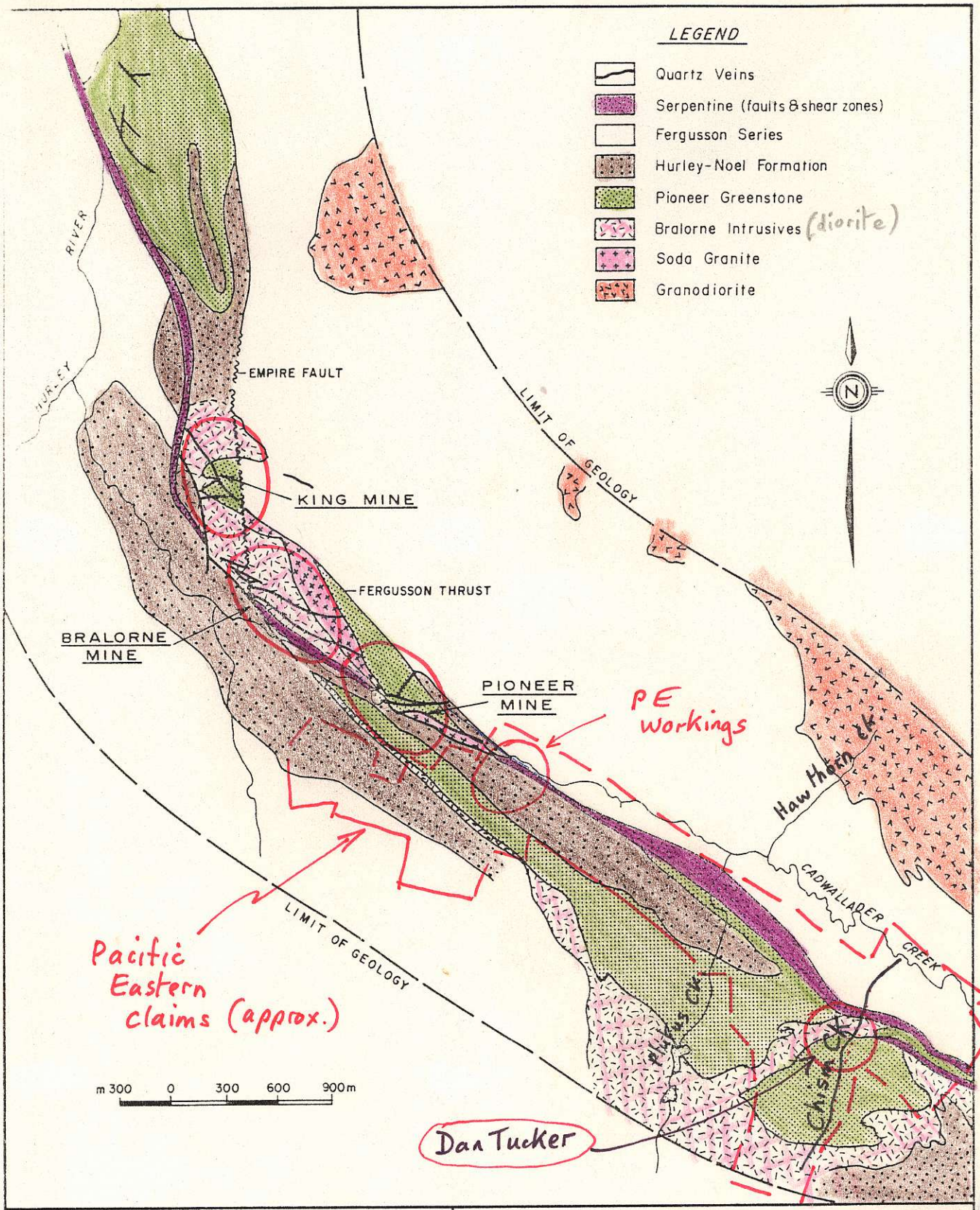

BRALORNE PIONEER MINES LTD.
FIGURE 1
BRIDGE RIVER MINERAL AREA
GEOLOGY
After C.E. Cairnes G.S.C.
LEGEND
Serpentinite
Coast Range Intrusives
Bralorne Diorite
Pioneer Greenstone
Jurassic Beds
Hurley - Noel
Ferguson
1 mile
NORTHERN LIGHT
LUCKY STRIKE
LILLOMER
TUNGSTEN QUEEN
MANITOU
GUN CREEK
NORTHERN GEM
MINTO
ACE (Congress)
BRIDGE RIVER
PILOT
GUN LAKE
WAYSIDE
50° 50'
BRIDGE RIVER UNITED
MTRc
122° 55'
HURLEY
RIVER
BRALORNE
PIONEER
PACIFIC EASTERN
50° 45'
CADWALLADER CREEK
PAYMASTER
122° 50'
CHALCO
RED HAWK
BUTTE
STANDARD
North

Fig. 4

Fig. 5



E & B EXPLORATIONS INC. VANCOUVER CANADA			BRALORNE PROJECT		
			GENERAL GEOLOGY		
DATE	OFFICE	DEPARTMENT	MAP INDEX NO.	SCALE	DRAWING NO.
				1: 31680 or 1" = 1/2 mi.	FIG 3.2

Fig. 6

MAP 431A
Cairnes, 1935
1" = ½ mile

14 Bendor quartz diorite
8,9 Granite, diorite
11,12 ultramafics
6 Pioneer greenstone
5,7 Cadwallader seds.
3,4 Fergusson seds.

45'00"

MT. FERGUSSON

BENDOR MOUNTAINS

CADWALLADER MOUNTAINS

Creek

Hawthorn Creek

Holland Creek

Pioneer Mine

Pioneer Extension

Mix

Cadwallader Creek

Paymaster

Plutus

Chism Creek

Dan Tucker

Red Hawk

Butte

Piebiter Creek

Bramhoose

Aggie Cr.

Copp Cr.

Mostly drift covered

Dam

Ditch

inches
0 1 2
0 1 2 3 4 5
centimetres

FERGUSSON OVERTHRUST FAULT

SEE APPENDIX 'G'

SEE APPENDIX 'F'

CADWALLADER "BREAK"

BRALORNE MINES

Cadwallader Creek

Noel Creek

Sediments and Serpentine

Top of beds

PIONEER MINES

Pioneer Greenstone

Hurley Sediments

Serpentine

Interbanded Diorite and Greenstone

Sediments

PACIFIC EASTERN MINES

PACIFIC EASTERN CROSSCUT

PACIFIC EASTERN SHAFT

SEE APPENDIX 'H'

CLAIM BOUNDARY

INS

Blackbird = 55 vein

53 vein

59 vein

Ida May = Empire = 51 vein = 40 vein

Coronation = Countless = 77 vein

Pioneer A = Main vein

Hanging wall B vein

Footwall vein

40 vein (projected)

FAULTS

A Empire = Blackbird fault

0 500 1000 1500 METRES

0 1000 2000 3000 4000 5000 SCALE FEET

GEOLOGY BY:
J. S Stevenson correspondence 1983
G. Nordin, BEMA INDUSTRIES, 1983
E. R. Joubin 1948,
STRUCTURE OF CANADIAN ORE DEPOSITS,
C. I. M. M. JUBILEE VOLUME

WITH MODIFICATIONS BY
W G. STEVENSON, P.ENG.

APPENDIX 'E'

LEGEND

Soda granite

Diorite

Serpentine

Hurley sediments

Pioneer greenstone

Fergusson series

Pacific Eastern claim boundary

Fault

Geological contact

Synclinal axis; anticlinal axis

Vein

Bedding

Shaft

NORMINE RESOURCES LTD.

PACIFIC EASTERN PROJECT

GEOLOGY
BRALORNE-PIONEER-
PIONEER EXTENSION AREA

DATE: 83·06·14	JOB NO.: 83-16
APPROVED BY:	FIG. NO.: 5

W. G. STEVENSON AND ASSOCIATES LTD.
CONSULTING GEOLOGISTS

Fig. 7

See Appendix 'F'

See Appendix 'E'

FERGUSSON THRUST FAULT

CADWALLADER BREAK

Holland · Coronation · Countless · Pioneer Mine · Pioneer Extension · Mix · Paymaster · Dan Tucker

McKinley · President Extension · Crazy Ck. · Nomad Ck. · Hawthorne Ck. · Pluto Ck. · Noel Ck. · Chism Ck.

122°-45' W · 50°-45' N

GEOLOGY BY:

J. S. STEVENSON CORRESPONDENCE, 1983
G. NORDIN, BEMA INDUSTRIES, 1983
C. E. CAIRNES, GSC MEMOIR 213, 1933, 1934
F. R. JOUBIN, 1948, STRUCTURE OF CANADIAN ORE DEPOSITS, C.I.M.M. JUBILEE VOLUME
J. S. STEVENSON, 1983

WITH MODIFICATIONS BY W.G. STEVENSON, P. ENG.

APPENDIX 'D'

LEGEND

ANTICLINE AXIS

SYNCLINE AXIS

ADIT

GEOLOGICAL CONTACT

CREEK

CLAIM BOUNDARY

CONTOURS (IN FEET)

CENOZOIC

8 — PLEISTOCENE to RECENT

CRETACEOUS

BENDOR INTRUSIVES

7 — Hornblende – biotite quartz diorite

PRESIDENT

6 — Peridotite, dunite, serpentine

JURASSIC

BRALORNE INTRUSIVE

5 — Soda granite, augite diorite, gabbro

JURASSIC - TRIASSIC

4 — HURLEY FORMATION - argillaceous - tuffaceous sediments, minor limestone, conglomerate

3 — PIONEER FORMATION - andesite, greenstone, tuff, breccia

2 — NOEL FORMATION - argillaceous - tuffaceous sediments, conglomerate, tuff breccia

PERMIAN

FERGUSSON SERIES

1 — Basalt, andesite, thin bedded chert, argillite.

0 1000 2000 3000 4000 5000 6000 FEET

0 500 1000 1500 METRES

NORMINE RESOURCES LTD.

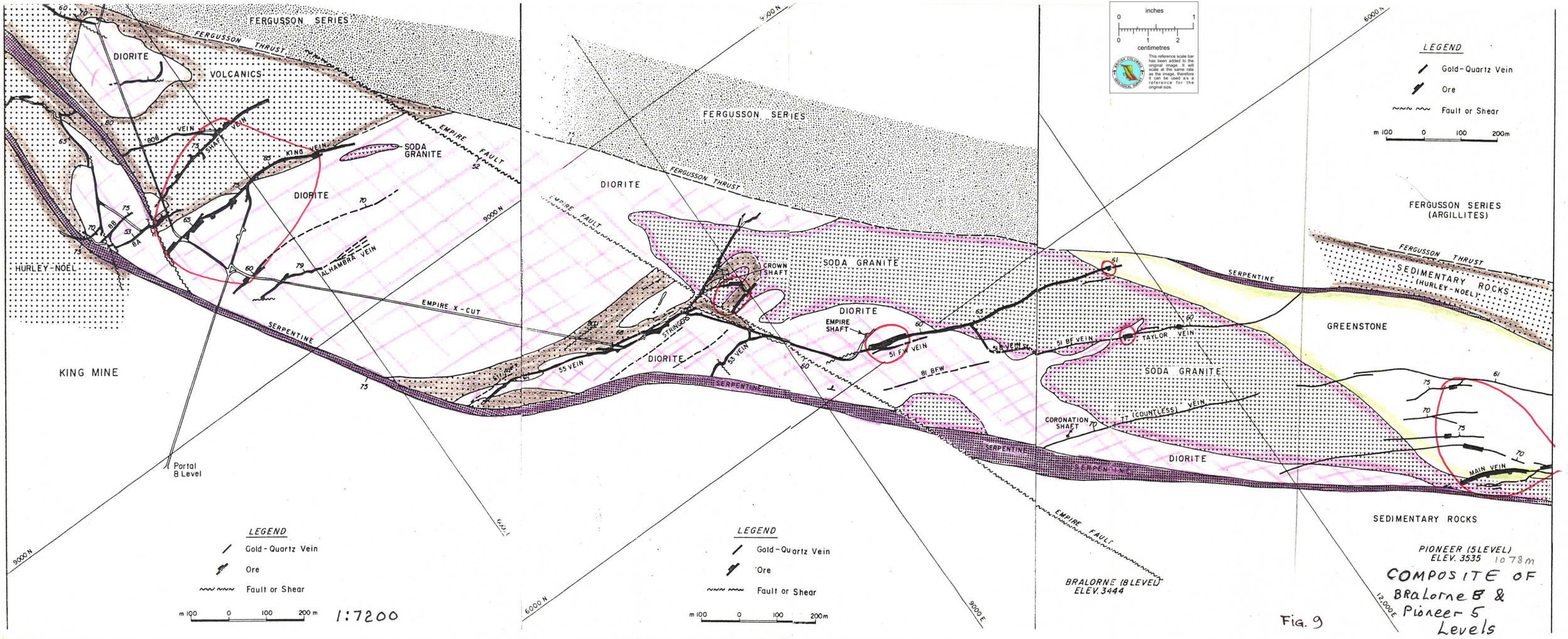
PACIFIC EASTERN PROJECT

DISTRICT GEOLOGY

DATE: 83-11-03	JOB NO.: 83-16
APPROVED BY:	FIG NO.: 4

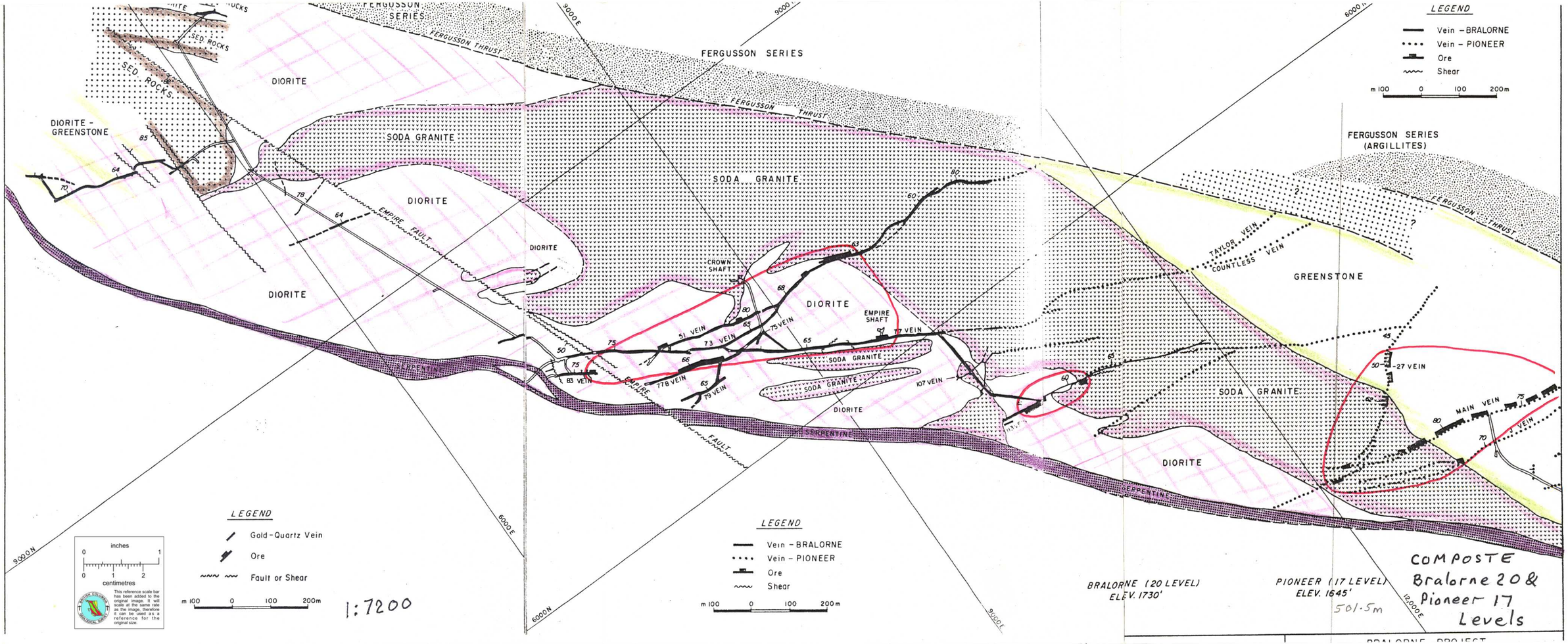
W. G. STEVENSON AND ASSOCIATES LTD.
CONSULTING GEOLOGISTS

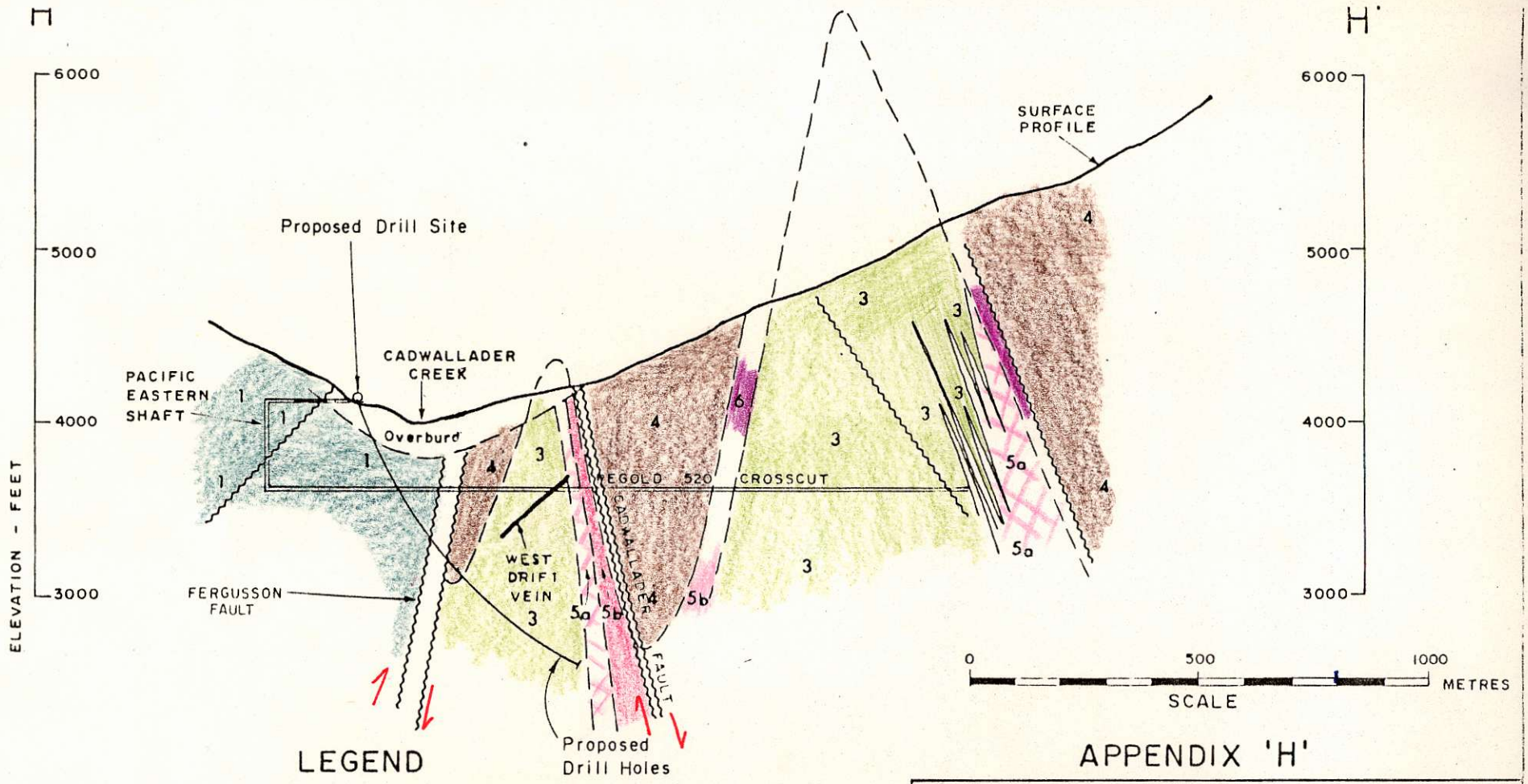
Fig. 8



COMPOSITE OF BRALORNE 8 & PIONEER 5 LEVELS

Fig. 9


FERGUSSON SERIES
FERGUSSON THRUST
SED. ROCKS
DIORITE
DIORITE - GREENSTONE
SODA GRANITE
EMPIRE FAULT
CROWN SHAFT
EMPIRE SHAFT
51 VEIN
73 VEIN
75 VEIN
77 VEIN
83 VEIN
778 VEIN
79 VEIN
107 VEIN
SERPENTINE
FAULT
9000E
6000E
9000N
6000N
FERGUSSON SERIES (ARGILLITES)
TAYLOR VEIN
COUNTLESS VEIN
GREENSTONE
-27 VEIN
MAIN VEIN
J VEIN
12000E
LEGEND
Vein - BRALORNE
Vein - PIONEER
Ore
Shear
m 100 0 100 200m
LEGEND
Gold-Quartz Vein
Ore
Fault or Shear
m 100 0 100 200m
inches
centimetres
1:7200
BRALORNE (20 LEVEL) ELEV. 1730'
PIONEER (17 LEVEL) ELEV. 1645'
501.5m
COMPOSTE Bralorne 20 & Pioneer 17 Levels
FIG. 10



LEGEND

CRETACEOUS

6 — Serpentine

JURASSIC BRALORNE INTRUSIVES

5b — Soda granite

5a — Augite diorite

GOLD VEIN

JURASSIC-TRIASSIC

4 — HURLEY FORMATION – sediments

3 — PIONEER FORMATION – greenstone

PERMIAN

1 — FERGUSSON SERIES – greenstone, sediments

WITH MODIFICATIONS BY W.G. STEVENSON, P. ENG.

GEOLOGY BY:

J. S. STEVENSON CORRESPONDENCE, 1983

G. NORCIN, BEMA INDUSTRIES, 1983

F. R. JOUBIN, 1948, STRUCTURE OF CANADIAN ORE DEPOSITS, C.I.M.M. JUBILEE VOLUME

APPENDIX 'H'

NORMINE RESOURCES LTD.

PACIFIC EASTERN PROJECT

SECTION C - D

GEOLOGICAL CROSS SECTION OF PACIFIC EASTERN WORKINGS

DATE: 83 · 11 · 03	JOB NO.: 83 - 16
APPROVED BY:	FIG. NO.: 8

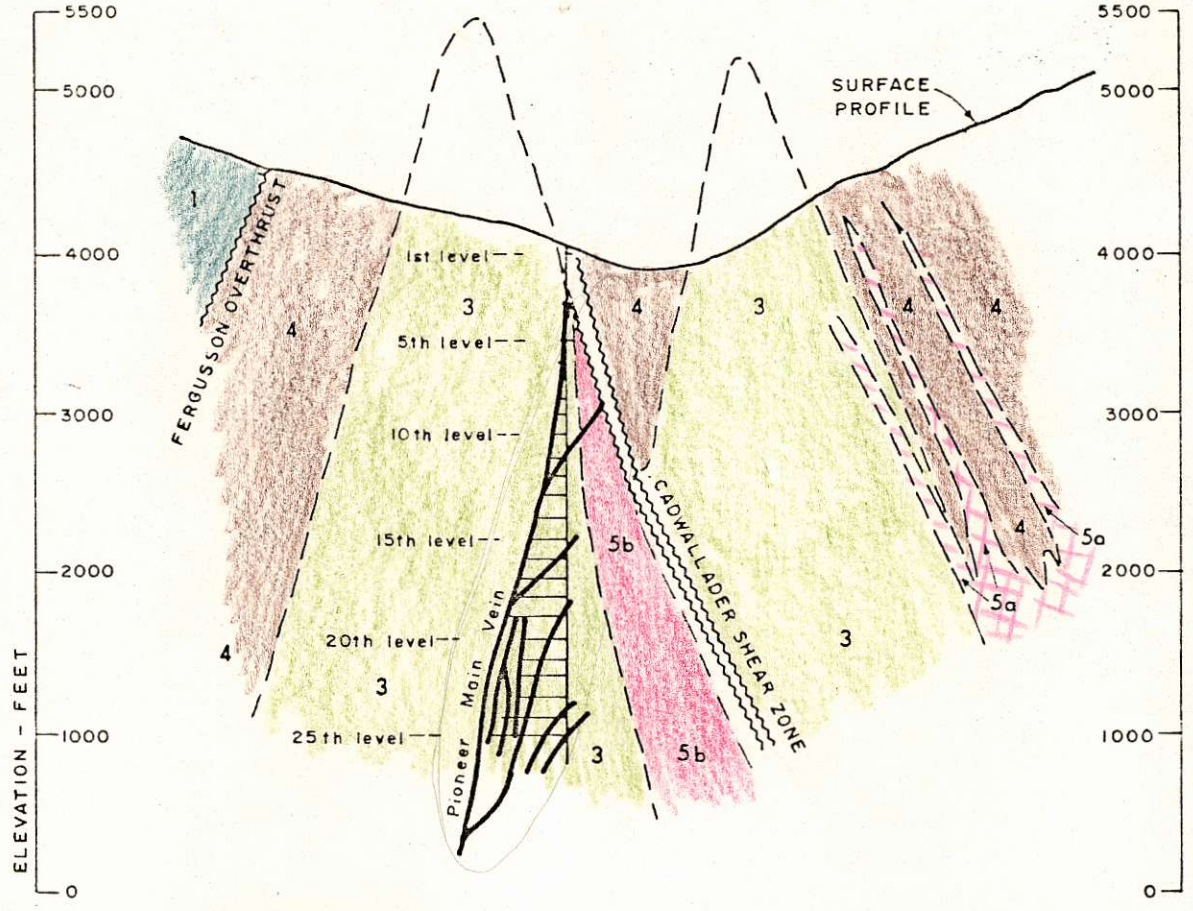
W. G. STEVENSON AND ASSOCIATES LTD.
CONSULTING GEOLOGISTS

FIG. 11

G

LOOKING SOUTHEAST

G'



LEGEND

CRETACEOUS

6 — Serpentine

JURASSIC
BRALORNE INTRUSIVES

5b — Soda granite

5a — Augite diorite

JURASSIC - TRIASSIC

4 — HURLEY FORMATION - sediments

3 — PIONEER FORMATION - greenstone

PERMIAN

1 — FERGUSSON SERIES - greenstone, sediments

GOLD VEINS

0 500 1000 METRES

SCALE

APPENDIX 'G'

NORMINE RESOURCES LTD.

PACIFIC EASTERN PROJECT

SECTION A - B

GEOLOGICAL CROSS - SECTION OF

PIONEER MINE

DATE:	83 · 11 · 03	JOB NO.:	83 - 16
APPROVED BY:		FIG. NO.:	6

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CONSULTING GEOLOGISTS

OLOGY BY:
G. NORDIN, BEMA INDUSTRIES, 1983
F. R. JOUBIN, 1948
STRUCTURE OF CANADIAN ORE DEPOSITS,
C.I.M.M. JUBILEE VOLUME

Fig. 12

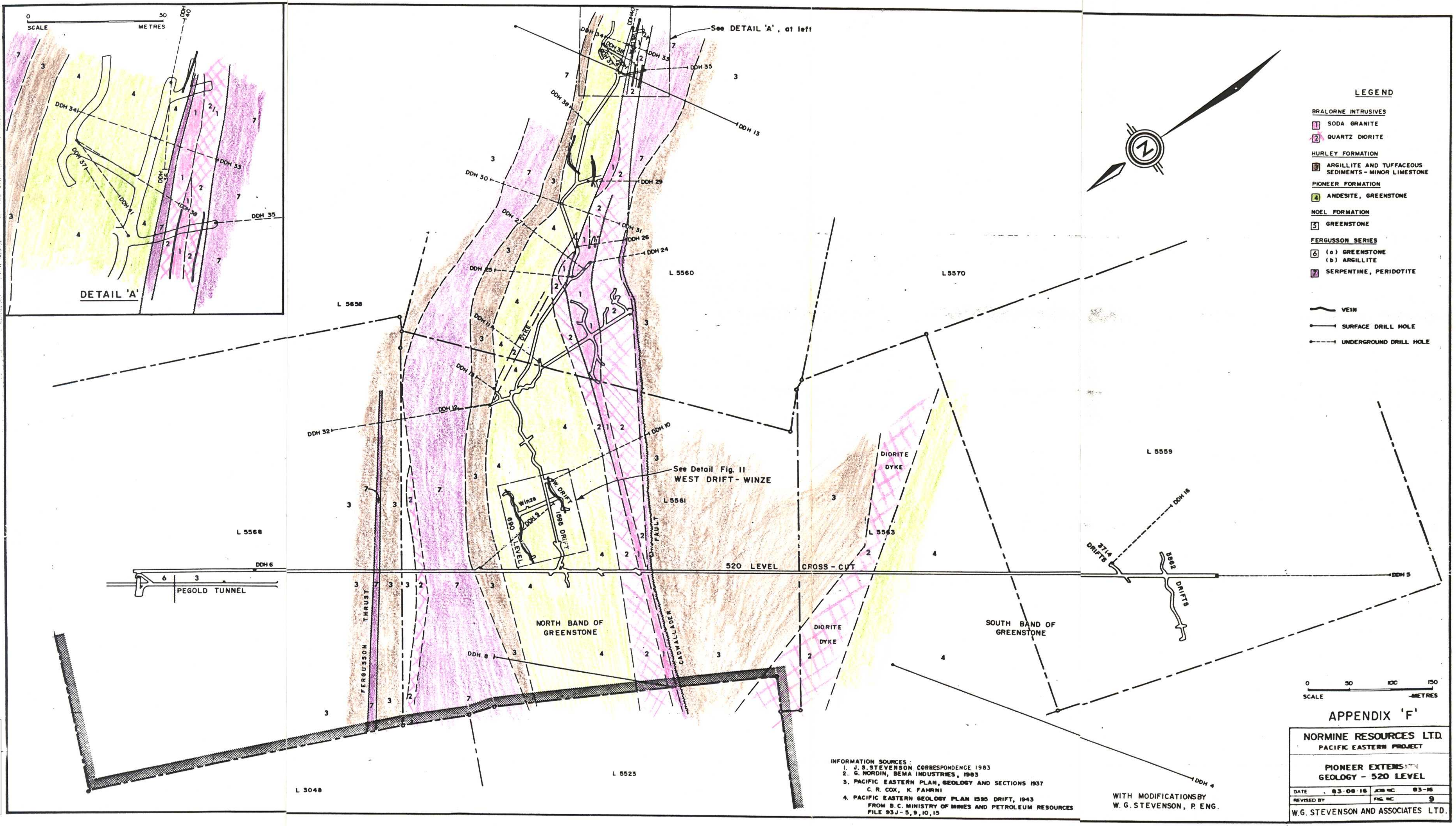

FIG. 13

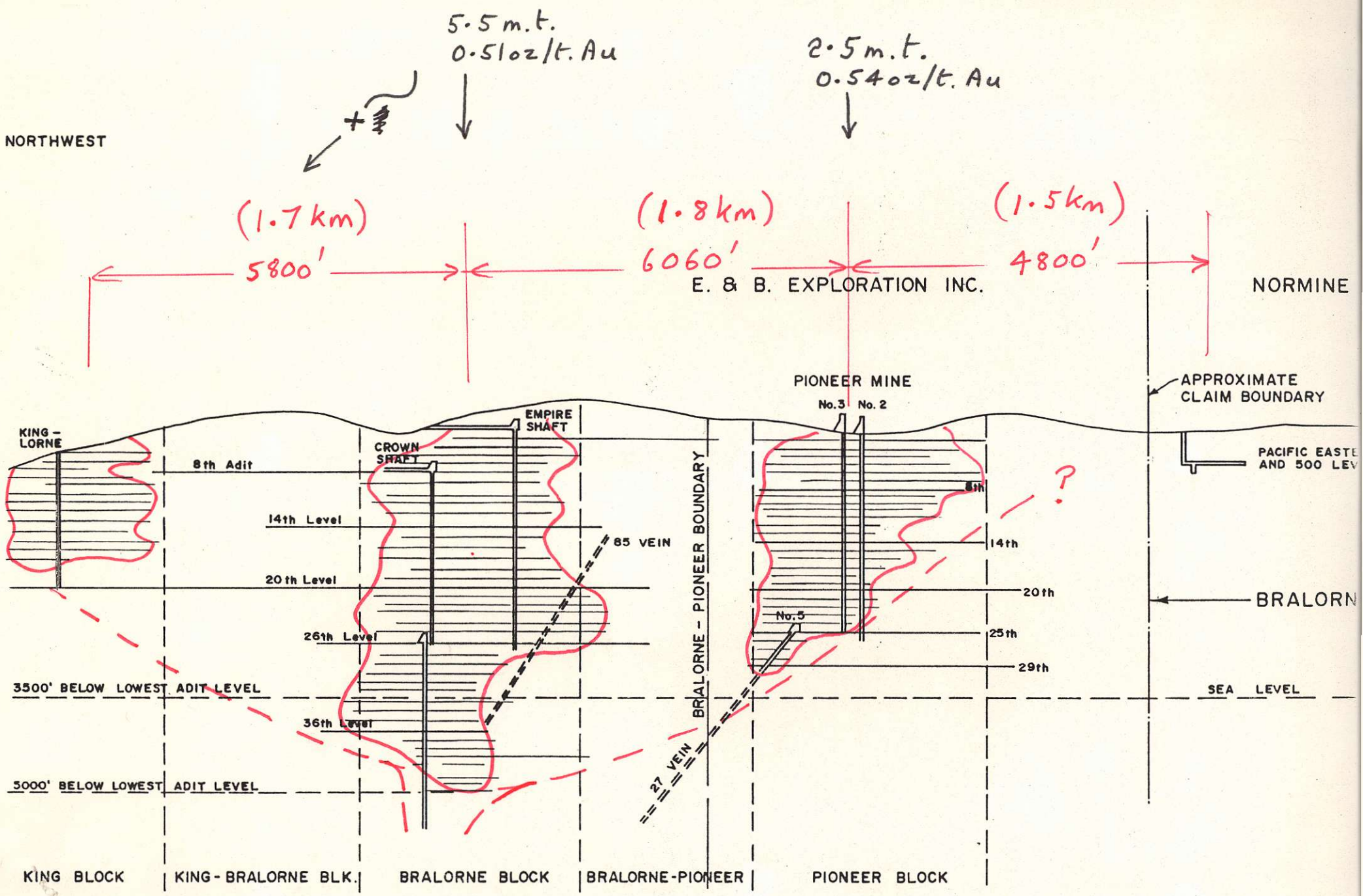
5.5 m.t.
0.51oz/t. Au
2.5 m.t.
0.54oz/t. Au
NORTHWEST
(1.7 km)
5800'
(1.8 km)
6060'
(1.5 km)
4800'
E. & B. EXPLORATION INC.
NORMINE
PIONEER MINE
No.3
No. 2
APPROXIMATE
CLAIM BOUNDARY
PACIFIC EASTE
AND 500 LEV
KING - LORNE
EMPIRE SHAFT
CROWN SHAFT
8th Adit
14th Level
20th Level
26th Level
36th Level
85 VEIN
BRALORNE - PIONEER BOUNDARY
8th
14th
20th
25th
29th
No.5
?
BRALORN
3500' BELOW LOWEST ADIT LEVEL
SEA LEVEL
5000' BELOW LOWEST ADIT LEVEL
27 VEIN
KING BLOCK
KING - BRALORNE BLK.
BRALORNE BLOCK
BRALORNE-PIONEER
PIONEER BLOCK

Fig. 14