92JNE1

011084

DAY 3

GAC FIELDTRIP
BRALORNE GOLD MINE

By

J. Bellamy, Senior Geologist, Bralorne Project
L. W. Saleken, Exploration Manager

E & B Explorations Inc.

DAY 3: BRALORNE GOLD MINE

J. Bellamy and L. W. Saleken

INTRODUCTION

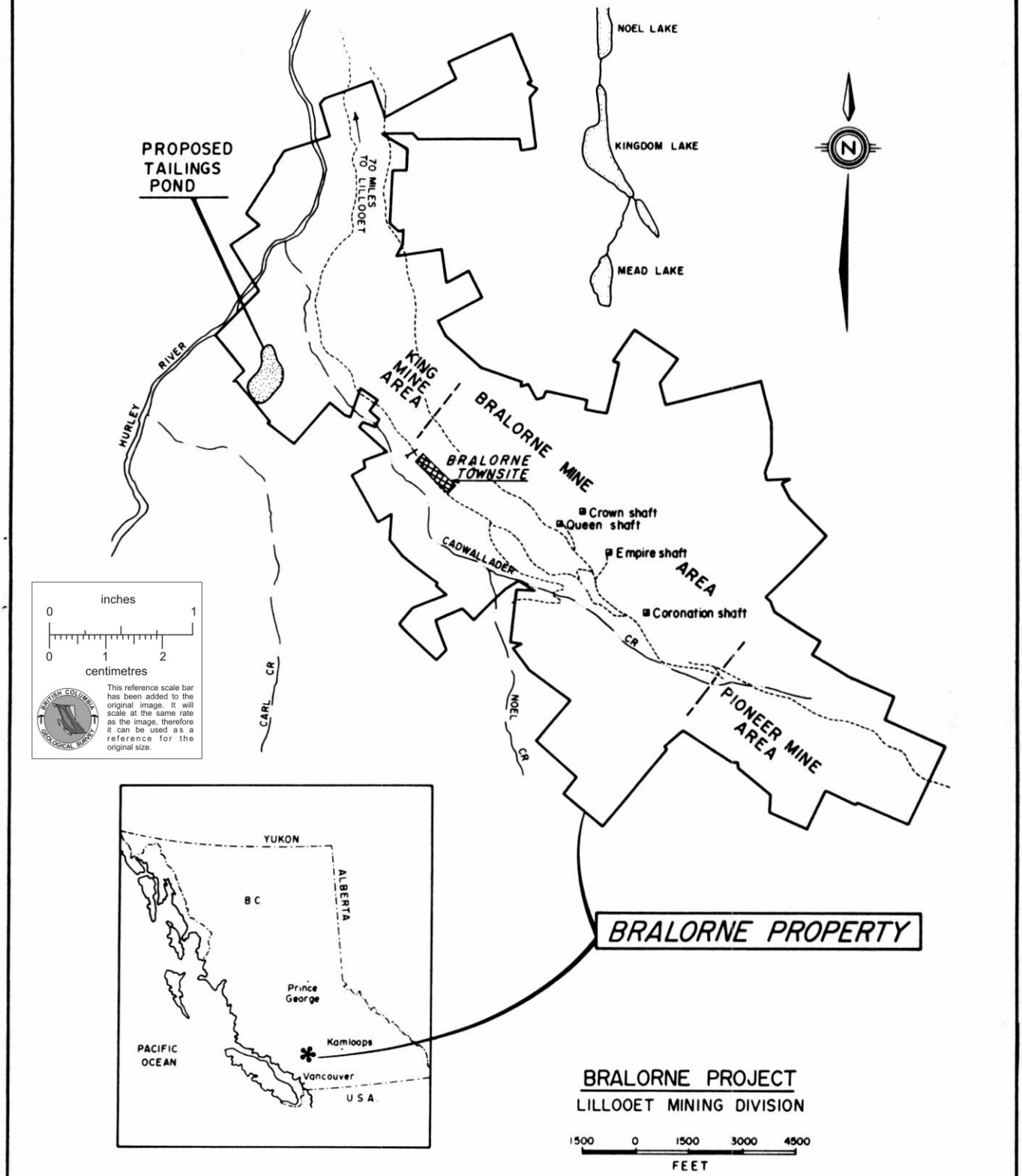
The Bralorne-Pioneer gold-bearing quartz deposits occur along the eastern flank of the Coast Range batholith in the Bridge River district of the Lillooet Mining Division. The minesite is approximately 160 kilometres due north of Vancouver and 100 kilometres west of Lillooet (Fig. 1.1). The property consists of 133 Crown-granted claims and fractions and lies immediately east of the confluence of Cadwallader and Noel Creeks (Fig. 3.1). The claims are jointly held by E & B Explorations Inc., Vancouver, British Columbia and Bralorne Resources Ltd., Calgary, Alberta with E & B Explorations Inc. having the majority interest.

In the mid-1800's prospectors working west from the Fraser River entered the Bridge River area and discovered placer gold deposits along the Cadwallader and Bridge Rivers. The first lode claims on the present Bralorne site were staked on subcropping quartz veins in 1896. Subsequent vein development continued intermittently under the Lorne Amalgamated Mining Company and a successor company, Lorne Gold Mines Ltd. until 1931, when Lorne Gold Mines Ltd. was taken over by Bralco Development and Investment Company. In 1932 the company was reorganized to form Bralorne Mines Ltd. which continued to mine the Lorne and Bradian lode claims using a 90 tonne-per-day floatation mill. The Pioneer mine, located southeast of the Bralorne operation (Fig. 3.1), commenced production in 1928 using a similar sized mill.

In 1959 the Pioneer and Bralorne operations were merged and mining was subsequently discontinued at Pioneer. The Bralorne-Pioneer Company continued to mine the gold veins in the Bralorne section of the vein system until 1971, at which time the company ceased operations due to high mining costs and unfavourable economic conditions. In an effort to revitalize the Bralorne operation, E & B Explorations Inc. entered into an agreement in 1980 with Bralorne Resources Ltd. with the intention of bringing the property into production.

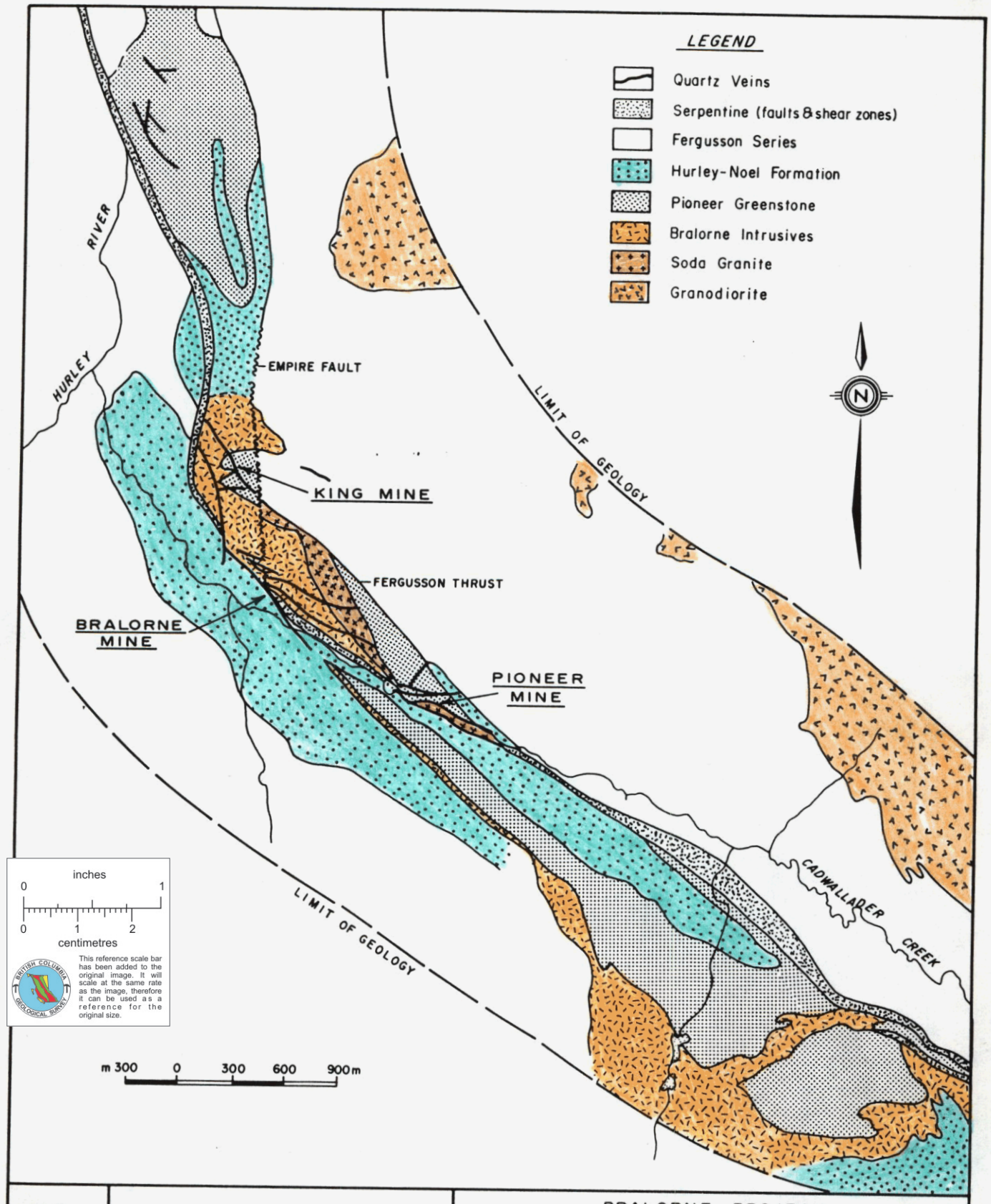
REGIONAL GEOLOGY AND SETTING

The general geology of the Bridge River area is shown on Figure 3.2; the productive gold-bearing zone occurs within a regional northwest-striking fault lens that cuts Permian to Jurassic sedimentary/volcanic rock units



E & B EXPLORATIONS INC. VANCOUVER CANADA	BRALORNE PROJECT
	LOCATION MAP

DATE	OFFICE	DEPARTMENT	MAP INDEX NO.	SCALE	DRAWING NO.
					FIG 3.1



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

and is known as the Cadwallader fault lens. These units lie between the main Coast Range batholith and the smaller outlying Bendor plutons. Intruding this fault structure are small granitic to ultrabasic stocks and dykes. The Cadwallader fault lens is an intricate fault system comprised of interlacing reverse, normal, and strike-slip faults that form a structural lens approximately 2 kilometres wide and up to 5 kilometres long (Fig. 3.2). The gold veins in the fault lens have been mined to a depth of over 1.8 kilometres (Figs. 3.4 and 3.5). The depth persistence of these veins is attributed to the Cadwallader fault system being a deep-seated crustal structure that is related to the continental Fraser fault system.

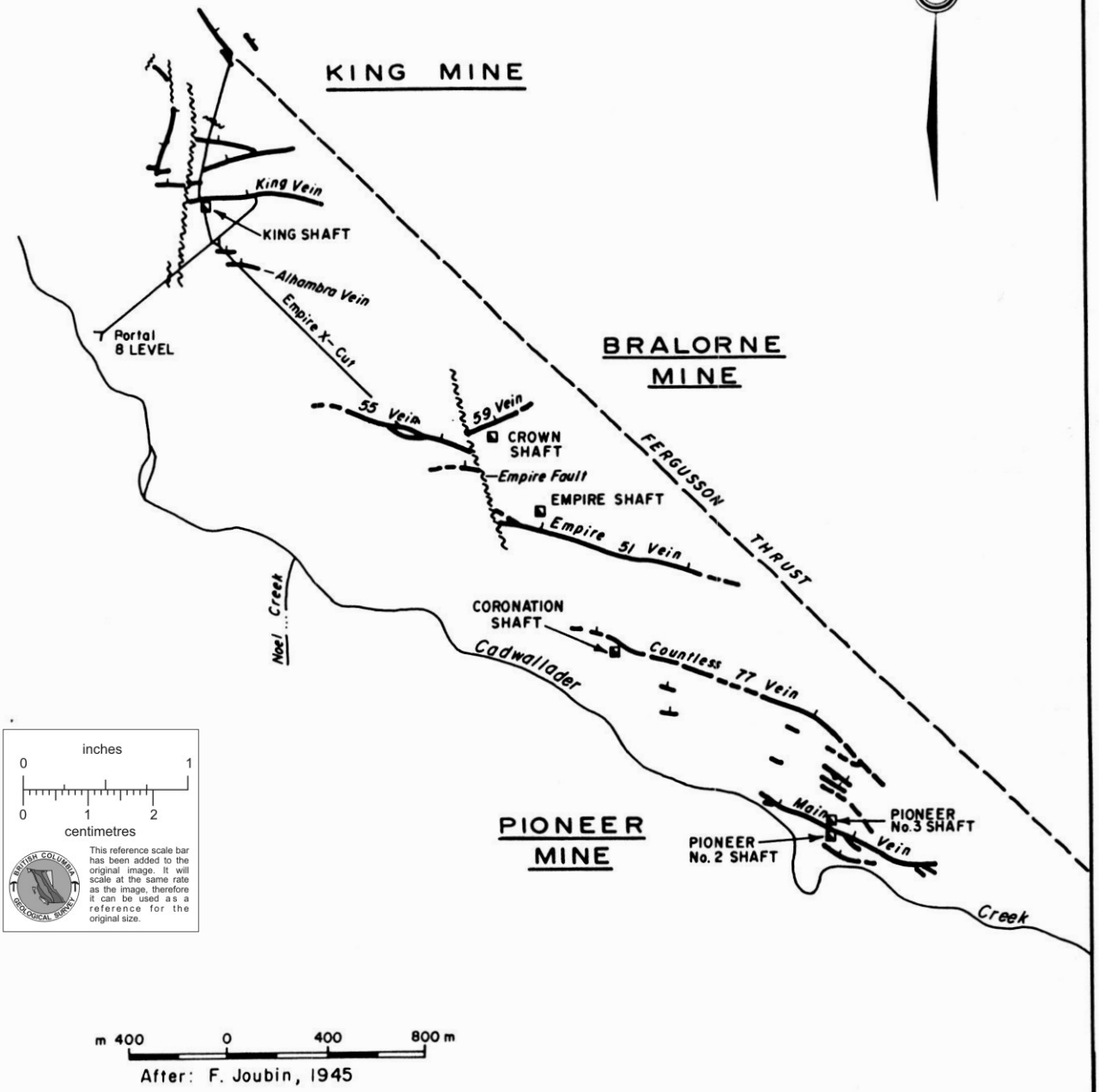
STRUCTURAL FRAMEWORK

The Cadwallader fault lens is bounded on the southwest by the Cadwallader fault and on the northeast by the Fergusson thrust fault (Fig. 3.3). The Cadwallader strikes northwesterly and dips vertically to steeply southwest. This fault ranges from 15 to 300 metres in width and is composed of gouge-covered shear planes that bound and interlace slickensided serpentine. Displacement along the fault is unknown as it trends approximately parallel to the bounding Hurley-Noel sedimentary and volcanic rocks. The Fergusson thrust fault (Fig. 3.3.) is a northwest-striking, 60 to 80-degree northeast-dipping structure that thrusts Permian Fergusson sedimentary/volcanic rocks over the younger formations. The relative age relationships of the bounding faults are unclear but assumed to be contemporaneous. The faults were active over a long period of geologic time thus creating a structural setting condusive to the emplacement of the diorite/greenstone bodies that host the gold-bearing quartz veins. The movement within the fault lens was never static during the hydrothermal activity responsible for the gold solutions as is evidenced by the multi-banded quartz veins containing high-grade gold values.

ROCK UNITS

Fergusson Series

The Fergusson series of Permian age, include the oldest rocks in the district (McCann, 1922) and are comprised of intercalated cherts, thinly banded argillites with minor lenses of limestone, quartzites, and andesitic volcanic rocks. The series is steeply dipping and has been highly sheared and folded.



E & B EXPLORATIONS INC. VANCOUVER CANADA			BRALORNE PROJECT		
			VEIN SYSTEMS		
DATE	OFFICE	DEPARTMENT	MAP INDEX NO.	SCALE	DRAWING NO.
				1: 24,000 or 1"=2000'	FIG 3.3

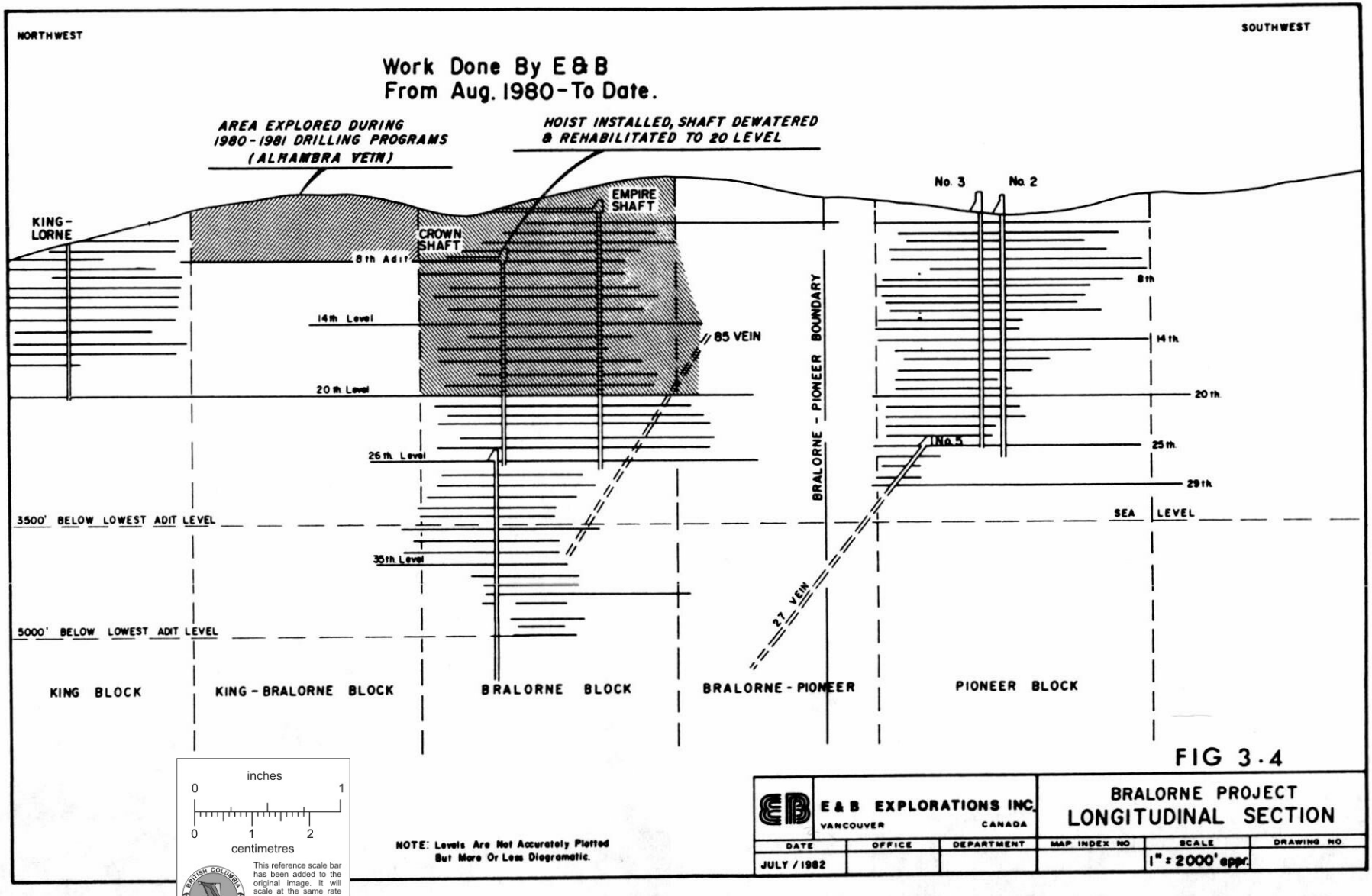

NORTHWEST
SOUTHWEST
Work Done By E & B
From Aug. 1980 - To Date.
AREA EXPLORED DURING
1980 - 1981 DRILLING PROGRAMS
(ALHAMBRA VEIN)
HOIST INSTALLED, SHAFT DEWATERED
& REHABILITATED TO 20 LEVEL
KING - LORNE
CROWN SHAFT
EMPIRE SHAFT
No. 3
No. 2
8th Adit
8th
14th Level
14th
85 VEIN
20th Level
20th
BRALORNE - PIONEER BOUNDARY
No. 5
26th Level
25th
29th
3500' BELOW LOWEST ADIT LEVEL
SEA LEVEL
35th Level
27 VEIN
5000' BELOW LOWEST ADIT LEVEL
KING BLOCK
KING - BRALORNE BLOCK
BRALORNE BLOCK
BRALORNE - PIONEER
PIONEER BLOCK
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.
NOTE: Levels Are Not Accurately Plotted But More Or Less Diagramatic.
E & B EXPLORATIONS INC.
VANCOUVER
CANADA
BRALORNE PROJECT
LONGITUDINAL SECTION
DATE
OFFICE
DEPARTMENT
MAP INDEX NO
SCALE
DRAWING NO
JULY / 1982
1" = 2000' appr.

FIG 3.4

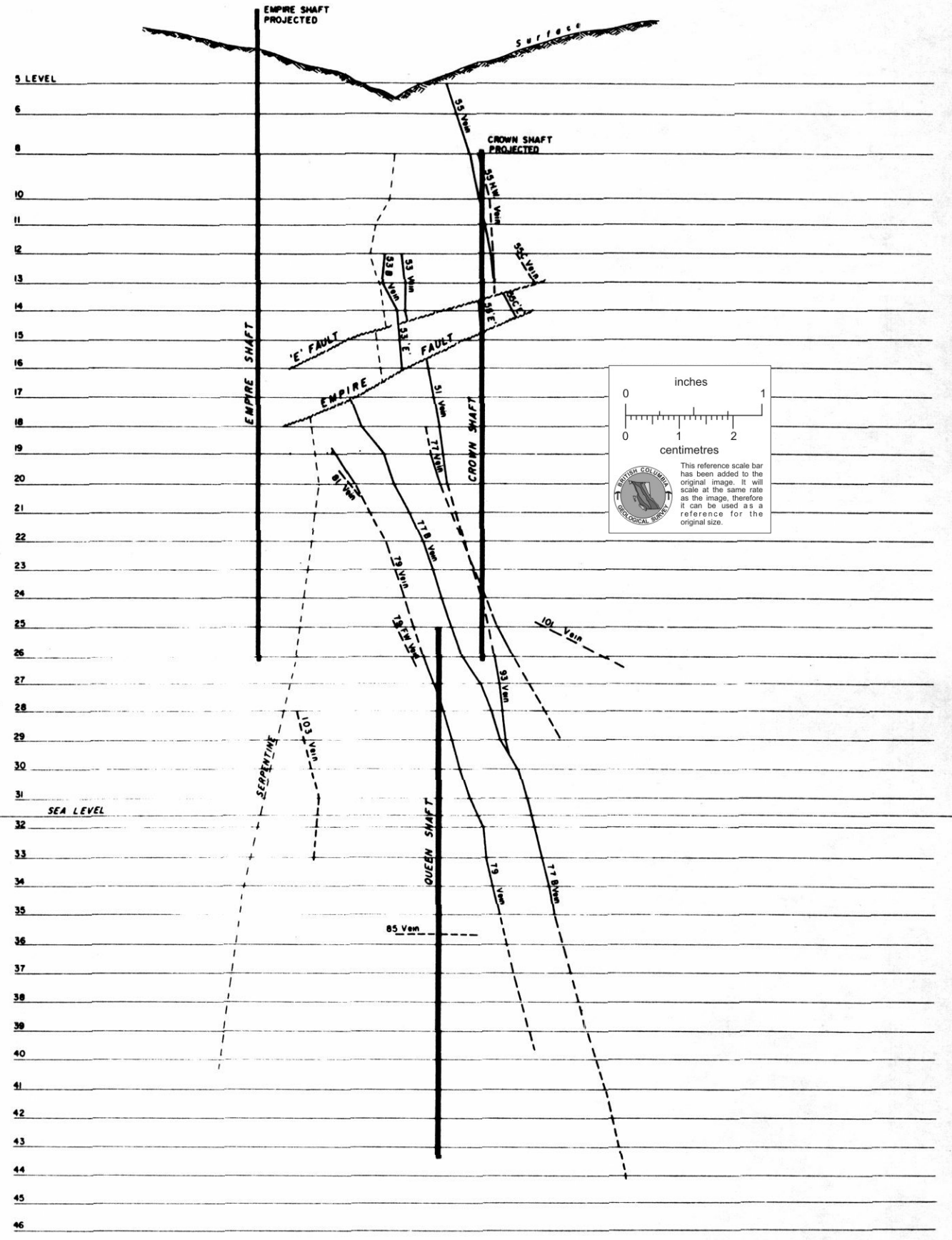


FIG 3.5

MAP SCALE
72 0 72 144 216 m
300 0 300 600 Ft
MTS

E & B Explorations Inc.

BRALORNE PROJECT

SKETCH OF VEINS
LOOKING SOUTH

OFFICE	DEPARTMENT	MAP INDEX NUMBER	SCALE	DRAWING NUMBER

Hurley-Noel Formations

Conformably overlying the Fergusson series are a thick section of Triassic-Jurassic sedimentary/volcanic rocks of the Hurley-Noel Formations that are cut or bounded by the Cadwallader fault. These units strike northwest, dip steeply south, and are comprised of finely banded argillites, tuffs, limestones, conglomerates, and a middle section of andesites. This volcanic member, which lies above the lower Noel sedimentary unit, is locally called the Pioneer greenstone and is found in transition with the Bralorne diorite in the eastern portion of the Cadwallader fault lens.

Pioneer Greenstone

This volcanic unit, which is approximately 300 metres thick, consists of andesitic flows and pyroclastic rocks that have been metamorphosed to a massive homogeneous greenstone. The greenstone is more competent than the sedimentary units of the Hurley-Noel Formations and hosts most of the gold-quartz veins.

Bralorne Diorite

The Bralorne diorite is a medium-grained augite-amphibole-bearing rock which occurs as an elongate stock north of the Cadwallader shear zone. This large differentiated body is the principal host to all the Bralorne veins. The rock ranges from a mottled, coarsely crystalline diorite to a fine crystalline greenstone. By nature it is both intrusive and gradational into the Pioneer greenstone implying either that the diorite formed as a result of granitization of the andesite or that the diorite was derived from the same differentiated magma.

Soda Granites

The Bralorne soda-rich intrusive rocks occur only within the Cadwallader fault lens. They form vertical, dyke-like intrusive bodies approximately 2 kilometres in length and up to 700 metres in width which trend tangentially to the bounding fault structures from hangingwall toward the footwall. The soda granites cut the Pioneer greenstones to the east but are both intrusive and gradational into Bralorne diorite to the west. The rock is a massive, fine to coarsely crystalline, highly albititic, brittle granite which has patchwork hybrid zones in the adjoining diorites. Albitite dykes composed of aphanitic albitite trend

northwesterly from fingers in the soda granite and parallel some of the vein systems.

Presidental Intrusive Rocks

The Cadwallader shear zone is occupied by serpentinized peridotite up to 150 metres wide that is sheared, chloritic, talcose, and schistose. This zone is rarely carbonated, silicified, or mineralized. The serpentine consists chiefly of mesh antigorite and a crystalline antigorite called bastite.

GOLD-BEARING VEINS

Vein Structure

The wallrock control for the Bralorne-Pioneer veins are the greenstone/diorite bodies that are competent enough to sustain brittle fractures. Veins that strike tangentially to the Cadwallader fault lens constitute the bulk of the known gold-quartz bodies in the Bralorne-Pioneer area.

Two distinct vein types, fissure veins and tension veins, occupy the conjugate fracture system in the Cadwallader fault lens. The fissure veins strike west-northwest and dip steeply north, while the wider tension veins strike northeast and dip about 45 degrees to the northwest. Along strike and down dip, the fissure veins are broken into en echelon segments that thicken with deflections in vein strike and dip and are separated from the adjoining lens by tangential shears and/or cross-over fractures. Tension veins, which are shorter, strike more east-west and usually lack hangingwall or footwall shear zones. They are usually broken into short vein sections which may not merge with one another. In general, the steepest portion of the gold-bearing quartz veins are the richest in gold and exhibit strong tangential quartz ribbon banding within the quartz lens. This banding indicates that the veins have had a complex structural history.

Vein Mineralogy

Quartz forms more than 90 per cent of the vein gangue with minor amounts of calcite, mariposite, talc, and scheelite. The latter minerals are locally restricted to fine bands parallel to the vein walls. Metallic sulphides, mostly pyrite, pyrrhotite, sphalerite, and arsenopyrite,

comprise 3 per cent of the vein. Free visible gold occurs in and adjacent to the fine black laminated ribbon-quartz structures. Minor elements occurring with the gold include arsenic, antimony, lead, zinc, and titanium, and occasional nickel and manganese.

Vein wallrock alteration consists primarily of carbonatization with alteration widths, in part, dependent upon the sulphide content of the vein. Iron carbonate and albite along the vein shears often results in a wallrock altered to a platy quartz-sericite schist and/or chlorite-carbonate-sericite schist.

Vein Economics

During the 40 years of operation, production from the Bralorne mine (including King and Pioneer after merger included) was 4 931 967 tonnes of ore grading 18 grams gold per tonne which produced 79 681 kilograms of gold. The ore was free milling and recovery from 1961 was approximately 95 per cent. The mine was never ore poor and maintained a constant cutoff of 10.0 grams gold per tonne.

In the Bralorne-Pioneer vein system, production came from 19 of the 52 known veins. The two most productive veins were the 77 vein and the 27 vein (Figs. 3.4 and 3.5), with the former having been mined over a vertical interval of 1 500 metres. In the upper levels shrinkage stoping was the most common mining method with cut-and-fill being used at depth or where there were rock stability problems. Stope widths ranged from 1 to 2 metres on veins 0.3 to 6 metres in width.

Entry to the Bralorne mine workings is from the main 8th level haulage drift which extends 2 072 metres from the portal to the Crown shaft station. The Crown shaft contains the main production hoist which provides access from the 8th level to the 26th level. A duplicate shaft, the Empire, extends from 3rd level to 26th level and is used for supply and safety access. The 26th level is the next main haulage drift and connects the Crown shaft to the Queen shaft. The Queen hoist extends to the 43rd level where a series of declines provided haulage access to the 45th level. Production ceased on the 45th level in 1971 and the mine was allowed to flood.

Since 1980, E & B Explorations Inc. has reopened the 8 level main haulage drift, rehabilitated the Crown shaft, which included the installation of a new production hoist, and dewatered the Bralorne workings to the 20th level. The geology of the Bralorne 8 and 20 levels is shown on Figures 3.6A, 3.6B, and 3.6C and Figures 3.7A, 3.7B, and 3.7C. A total of 5 030

metres of surface drilling and 3 400 metres of underground drilling were completed during the exploration and resampling programs. The resampling of selected ore blocks and the evaluation of the old Bralorne data has indicated that above the 2 600 level there exists some 816 300 tonnes of ore grading 8.5 grams gold per tonne above a 4.7-grams gold per tonne cutoff. An unknown amount of additional tonnage exists below the 2 600 level and in outlying vein systems throughout the fault lens.

ACKNOWLEDGMENTS

We thank the management of E & B Explorations Inc., particularly H. G. Ewanchuk, president, and P. Saxton, manager of operations, for allowing publication of this data. Contributions by D. Flynn, chief mine engineer, and S. Wilkinson, geologist, and other members of the Vancouver office staff are gratefully acknowledged.

SELECTED BIBLIOGRAPHY

Cairnes, C. E. (1937): Geology and Mineral Deposits of Bridge River Mining Camp, British Columbia, Geol. Surv., Canada, Mem. 213.

Campbell, D. D. (1980): Ore Potential at Bralorne Mine, Int. Repts., Nov. 1, 1964, Sept. 19, 1980.

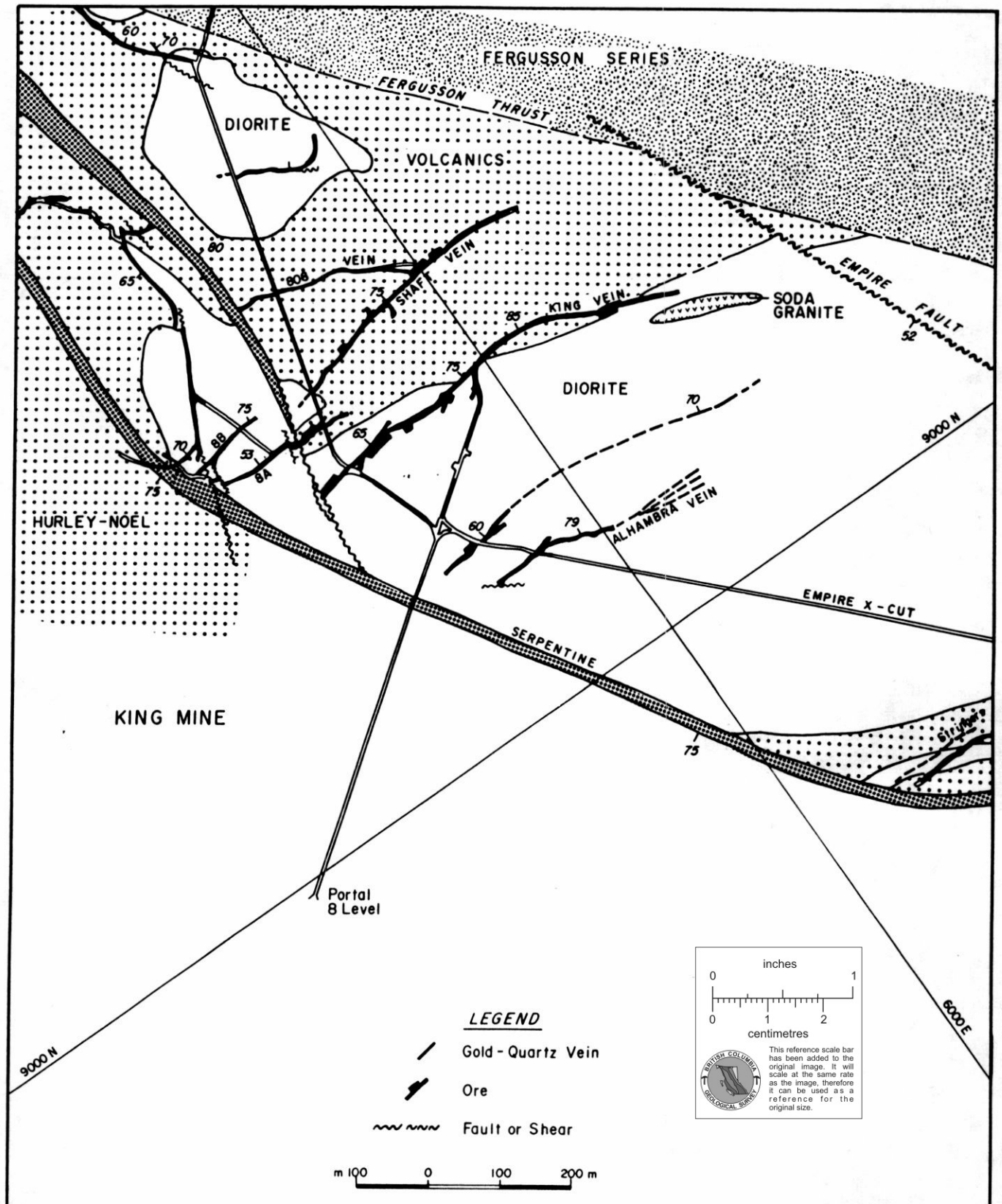
Joubin, F. R. (1948): Structural Geology of the Bralorne and Pioneer Mines, Western Miner, July 1948, pp. 39-50.

McCann, W. S. (1922): Geology and Mineral Deposits of the Bridge River Map-Area, British Columbia, Geol. Surv., Canada, Mem. 130.

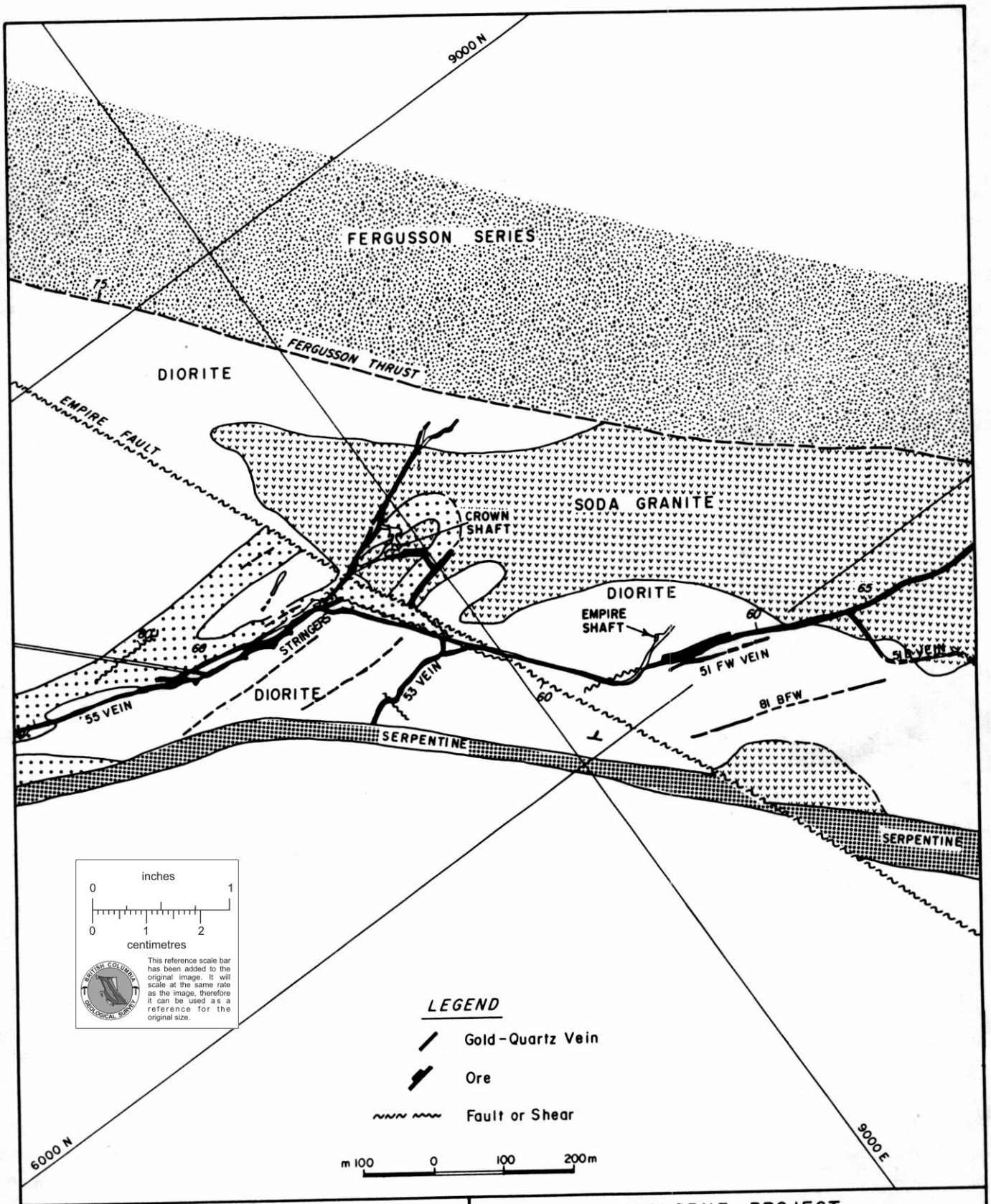
Poole, A. W. (1955): The Geology and Analysis of Vein and Fault Structures of the Bralorne Mine, C.I.M., Nov. 1955.

Stevenson, J. S. (1947): Geology and Mineral Deposits of the Bridge River Map-Area, unpub. thesis.

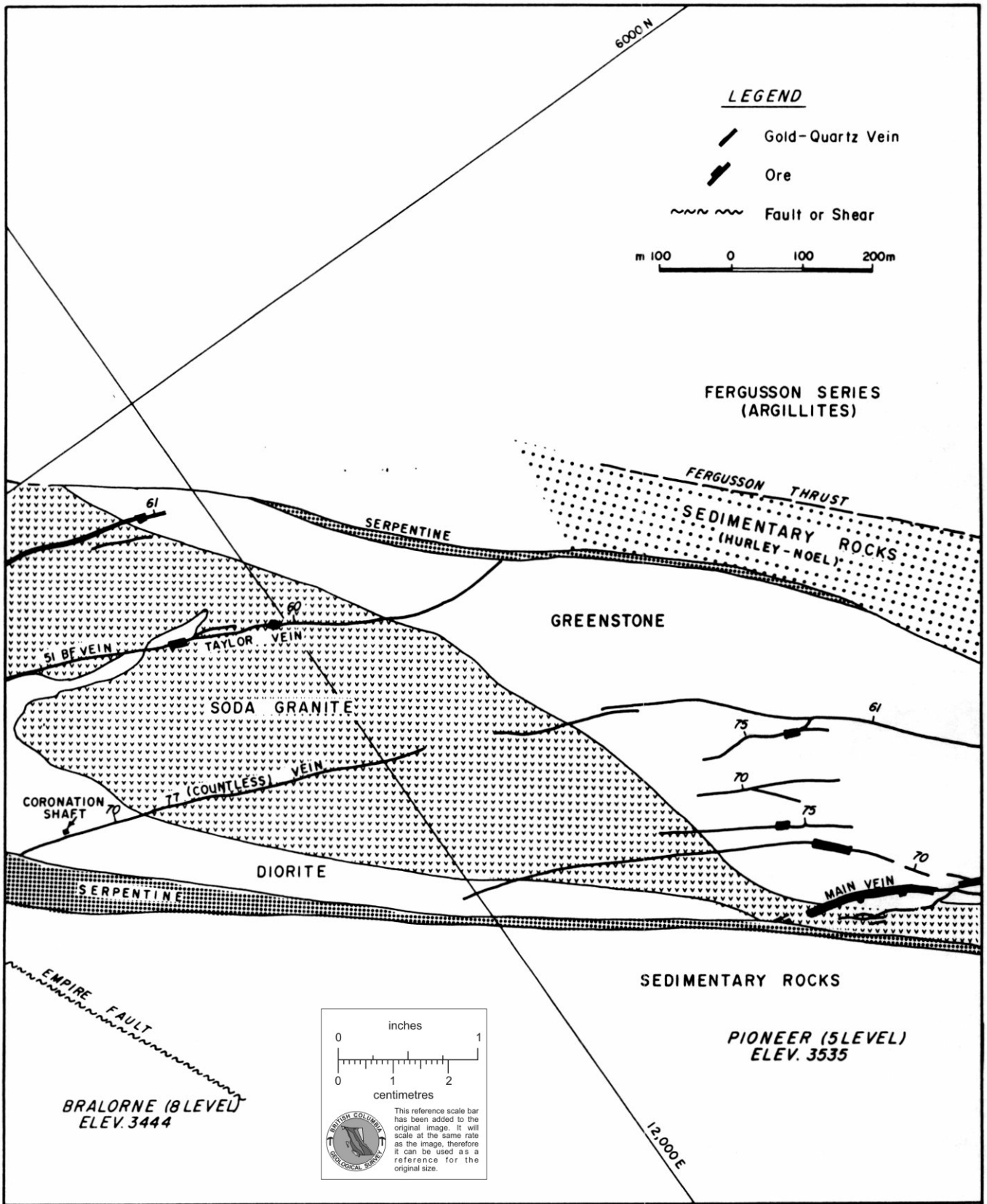
Weeks, J. P. and James, D. H. (1961): Bridge River Mineral Area, British Columbia, C.I.M., Sept. 29, 1961.



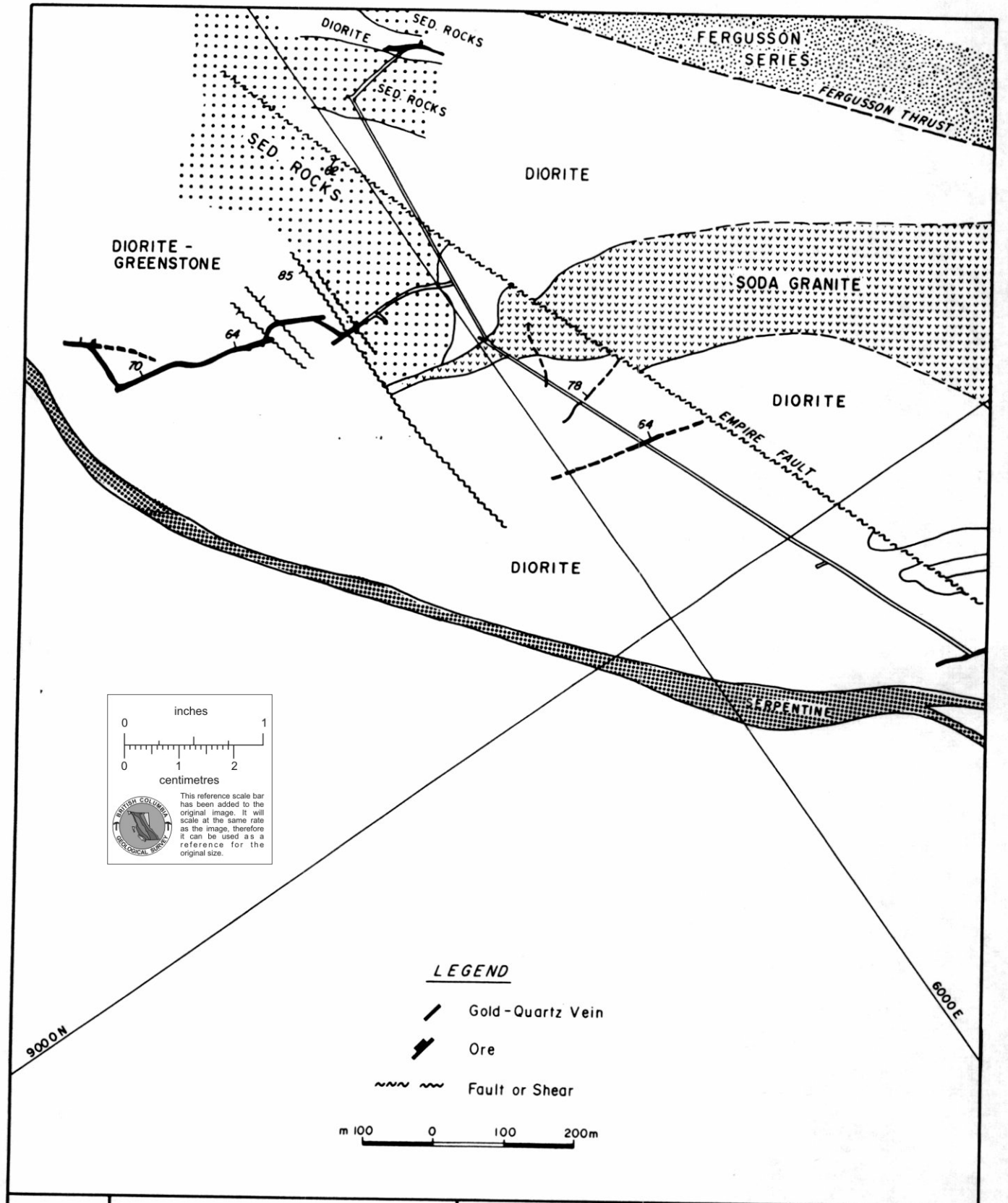
E & B EXPLORATIONS INC. VANCOUVER CANADA			BRALORNE PROJECT GEOLOGY BRALORNE - 8 LEVEL PIONEER - 5 LEVEL		
DATE	OFFICE	DEPARTMENT	MAP INDEX NO.	SCALE	DRAWING NO.
				1: 7200	FIG 3.6A



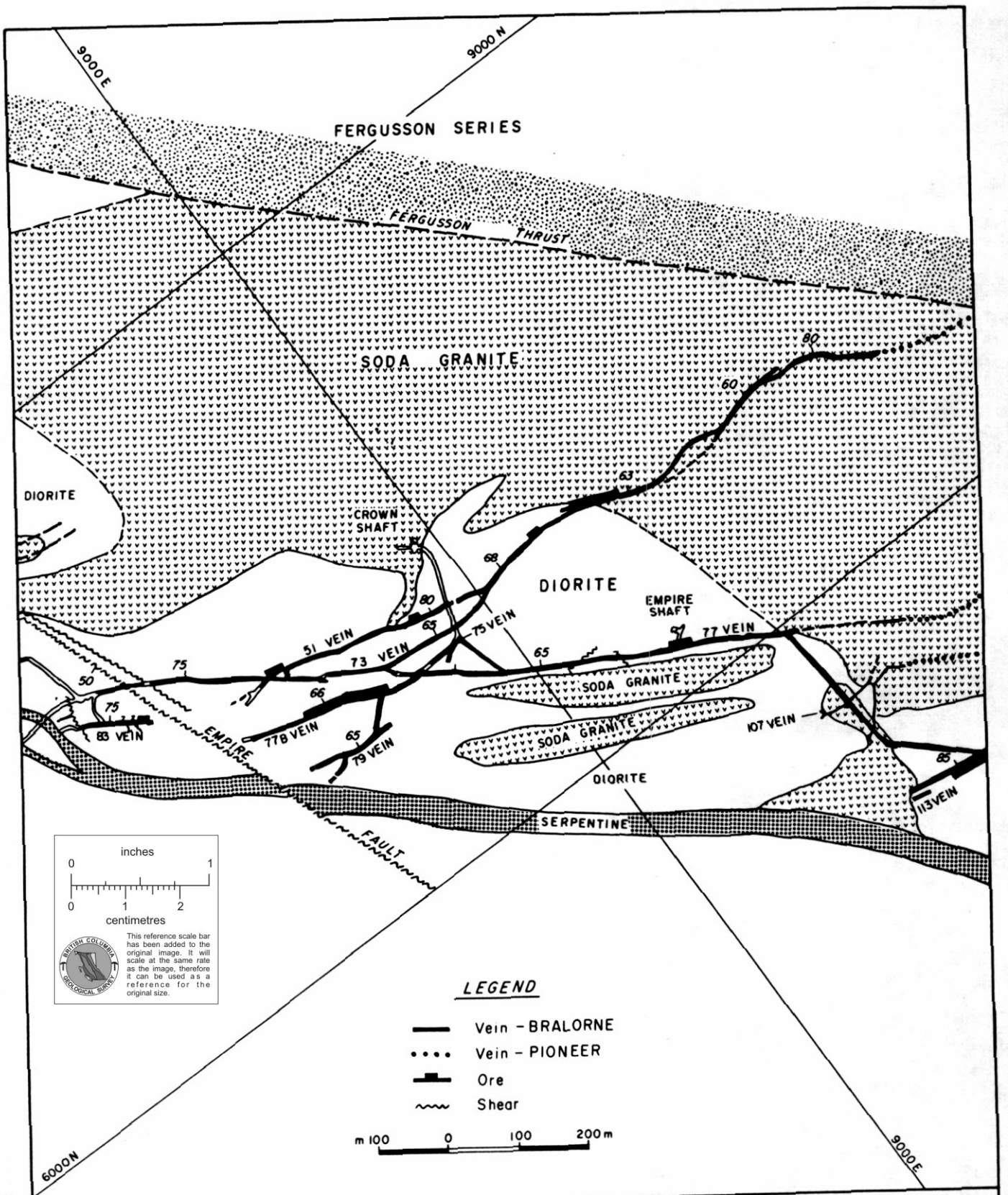
E & B EXPLORATIONS INC. VANCOUVER CANADA			BRALORNE PROJECT GEOLOGY BRALORNE - 8 LEVEL PIONEER - 5 LEVEL		
DATE	OFFICE	DEPARTMENT	MAP INDEX NO.	SCALE	DRAWING NO.
				1: 7200	FIG 3.6B



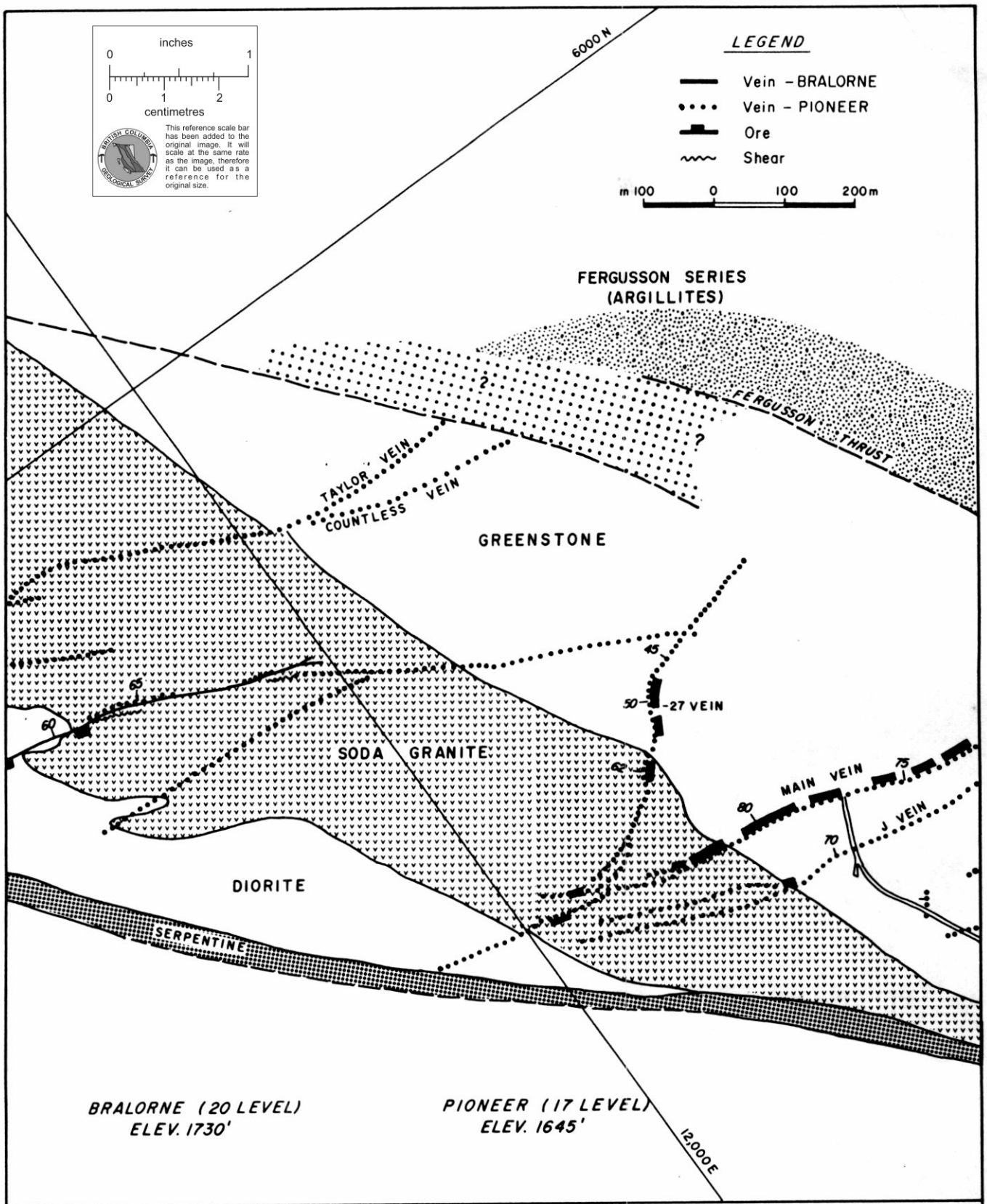
E & B EXPLORATIONS INC. VANCOUVER CANADA	BRALORNE PROJECT GEOLOGY BRALORNE - 8 LEVEL PIONEER - 5 LEVEL				
DATE	OFFICE	DEPARTMENT	MAP INDEX NO.	SCALE	DRAWING NO.
				1: 7200	FIG 3.6C



E & B EXPLORATIONS INC. VANCOUVER CANADA			BRALORNE PROJECT GEOLOGY BRALORNE - 20 LEVEL PIONEER - 17 LEVEL		
DATE	OFFICE	DEPARTMENT	MAP INDEX NO.	SCALE	DRAWING NO.
				1: 7200	FIG 3.7A



E & B EXPLORATIONS INC. VANCOUVER CANADA			BRALORNE PROJECT GEOLOGY BRALORNE - 20 LEVEL PIONEER - 17 LEVEL		
DATE	OFFICE	DEPARTMENT	MAP INDEX NO	SCALE	DRAWING NO.
				1:7200	FIG 3.7B



E & B EXPLORATIONS INC. VANCOUVER CANADA			BRALORNE PROJECT GEOLOGY BRALORNE - 20 LEVEL PIONEER - 17 LEVEL		
DATE	OFFICE	DEPARTMENT	MAP INDEX NO.	SCALE	DRAWING NO.
				1:7200	FIG 3.7C