92C017-Blue Grouse 07

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92C-17

BLUE GROUSE MINE

Cowichan Copper Co. Ltd.

Possible Ore Control

1958

COWICHAN COPPER MINES LIMITED

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The ore shoots now being mined at the Cowichan Copper mine, the G-H orebodies and the E zone, show no directly observable reasons for being where they are, considered either separately or in relationship to one another. Successful exploration for additional ore shoots requires that some predictable structural pattern be recognized. Geological mapping of the mine workings and surface has failed to disclose any marker beds or groups of beds which can be traced far enough to illustrate the structures. There is, on the other hand, evidence to show that the more friable beds have been so broken up by rock movements that they cannot be traced continuously. A possible control of the distributions of ore shoots has been deduced from observed structural elements, and this control is thought to provide a reasonable explanation for the presently known occurrences and to indicate a basis for systematic exploration of the property.

The general geology of the mine area is described in Bulletin 37, B.C. Department of Mines, "Geology of the Cowichan Lake Area", by J.T. Fyles. Briefly, the rocks are Franklin Creek basalts and Sutton sediments all overlain on the east by sediments of the Nanaimo series. The ore occurs in skarn zones (G-H orebodies), and in less well garnetized and epidotized tuffaceous bands (E zone), interbedded with the basalts. The skarns probably are of sedimentary and tuffaceous origin (Fyles p. 54). The principal intrusive rock is a grey feldspar porphyry which occurs in bodies of very irregular shape. Faults are numerous but none have been shown to have displacements of more than a few tens of feet.

The largest body of skarn exposed in the present mine workings is a lenticular mass up to 350 feet long and up to 60 feet wide in horizontal section and plunging 35 degrees in a direction south 30 degrees west from surface to the 1100 level, a vertical distance of nearly 400 feet. No other skarn body of comparable size has yet been recognized but a number of smaller ones are seen in the workings. In a south-trending drift on the 1100 level several large skarn blocks are surrounded on three sides by basalt. Parts of these blocks exhibit thin banding closely folded. The blocks are believed to represent a boudinage structure in which the friable rocks have been fractured -- the fractures were filled and the blocks separated by flowage of the incompetent basalt. A similar separation of fractured skarn blocks is exposed on surface near the Sunnyside adit about one half mile south. The existence of boudinage structure offers a possible explanation why the skarn beds have not been traced for appreciable distances either in the workings or diamond drill holes. The altered tuffs are continuously exposed in the "E" zone for a horizontal distance of about 300 feet on the 1340 level and for a lesser length and in an offset position on the 1100 level. They have a fairly consistent attitude, at these places, strike north 10 degrees east, dip 65 degrees west.

Two directions of shearing have been recognized in and near the principal skarn body, strike north 10 degrees west, dip 45 degrees west; strike north 80 degrees west, dip 35 degrees south. Neither is strongly developed.

The structural elements upon which the following rationalization is based are:

1. The plunge of the principal skarn body, 35 degrees at south 30 degrees west.
2. The two shear directions, strike north 10 degrees west, dip 45 degrees west; strike north 80 degrees west, dip 35 degrees south.
3. The attitude of the E zone tuffs, strike north 10 degrees east, dip 65 degrees west.

The line of intersection of the two shear planes (Fig. 1) plunges 34 degrees in the direction south 29 degrees west. The attitudes of the planes bisecting the angles between the shear planes are shown to be strike north 34 degrees east, dip 82 degrees southeast, and strike north 40 degrees west, dip 35 degrees southwest.

If the two shear directions are conjugate, i.e. formed at the same time as a result of the same stress, their line of intersection is the intermediate axis of the structural system of which they are a part. The system may include folds as well as shear planes. Shear planes and folds bear a common relationship to one another if the line of intersection is common to all (Fig. 2). Since the line of intersection of the two shear planes has the same orientation as the plunge of the principal skarn zone it is reasonable to suppose that the skarn plunge is related to the shear system.

Of the two planes bisecting the angles between the shear planes, one must be the axial plane of the related folds. The two planes bisecting the angles between the shear planes (Fig. 1) are strike north 40 degrees west, dip 35 degrees southwest, and strike north 34 degrees east, dip 82 degrees southeast. The plane of the "E"-zone tuffs, strike north 10 degrees east, dip 65 degrees west, meets either plane (Fig. 3) on a line which plunges 34 degrees southwest on bearing south 29 degrees west. Taking either of these planes as the axial plane, which bisects the angle between the limbs of the fold, (Fig. 3) shows the attitude of the other limb of the fold must strike north 63 degrees east and dip 51 degrees southeast and that the north 34 degrees east plane must be the axial plane, because of the directions of the dip of the beds.

It is indicated, then, that the rocks in the mine area may have been compressed into a series of folds having limbs with strike north 10 degrees east, dip 65 degrees west; strike north 63 degrees east, dip 51 degrees southeast; an axial plane strike north 34 degrees east, dip 82 degrees southeast, and a plunge southwest at 35 degrees. This folding may control the distribution of ore shoots if the mineralization is allied to friable, permeable strata in the rock succession. The most likely places for such shoots to form would be on the crests or troughs of folds (G-H orebody); secondarily on limbs (E zone). Either could be influenced by crosscutting shears and fractures, formed at the time of the folding or later.

On Figure 5 the folding is shown applied to the G-H and E zones on the 1340 level and possible limits of the strike north 10 degrees west, dip 45 degrees west zone of movement are indicated.

Similar occurrences of mineralized skarn are exposed at the Sunnyside workings about one half mile south of the Cowichan workings. A garnet-epidote alteration zone has been traced from the Cowichan toward the Sunnyside (Fig. 4).

This indicates that the Cowichan and Sunnyside probably lie on the same zone of movement in which the folding is the dominant expression of the movement along the north 10 degrees west shear direction, i.e. that a north 10 degrees west, 45 degrees west fault zone appears here as a zone of folding and tensional fracturing (irregular porphyry bodies). Near north-south faults are shown by Fyles on the north side of Cowichan Lake, so similar structures may be expected elsewhere.

The foregoing is a theoretical analysis based on a limited number of structural observations. It provides a framework which may guide exploration. Its validity should be tested. If it helps to find orebodies it serves its purpose whether or not it proves exactly true.

This zone could be prospected by systematic drilling from both surface and underground bases. The folding pattern outlined could be applied to skarn and tuff intersections. Attempts also should be made to relate the presently isolated exposures of skarn and tuff in the underground workings to the postulated fold pattern. It is possibly significant that the alteration zone traced from the Cowichan grows weaker to the south as might be expected from a southerly plunging structure.

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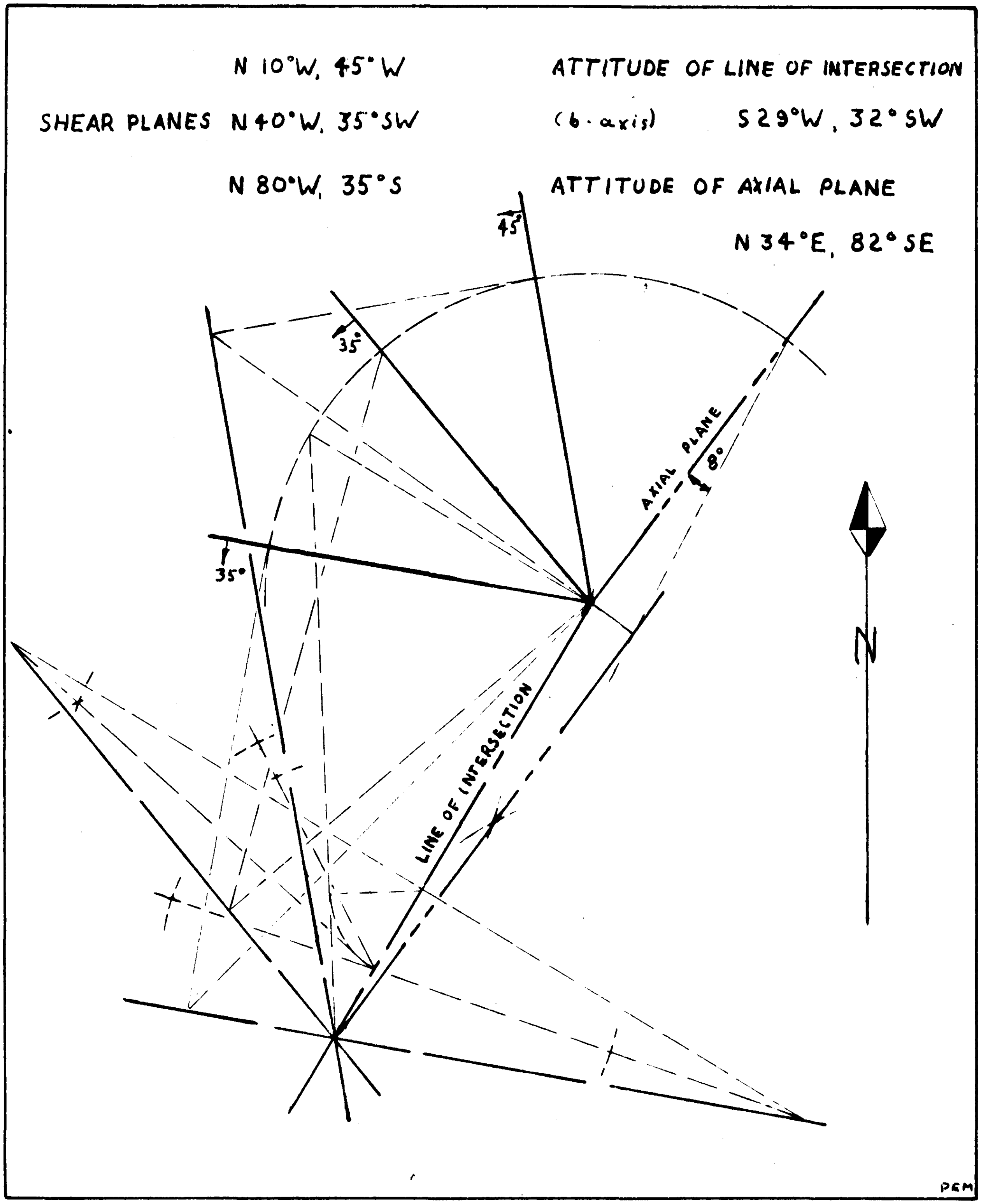
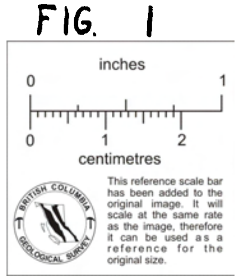


N 10°W, 45° W
SHEAR PLANES N 40°W, 35° SW
N 80°W, 35° S
ATTITUDE OF LINE OF INTERSECTION
(b-axis) S 29°W, 32° SW
ATTITUDE OF AXIAL PLANE
N 34°E, 82° SE
45°
35°
35°
AXIAL PLANE
8°
LINE OF INTERSECTION
N
PEM

FIG. 1



inches
0
1
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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.
BRITISH COLUMBIA GEOLOGICAL SURVEY

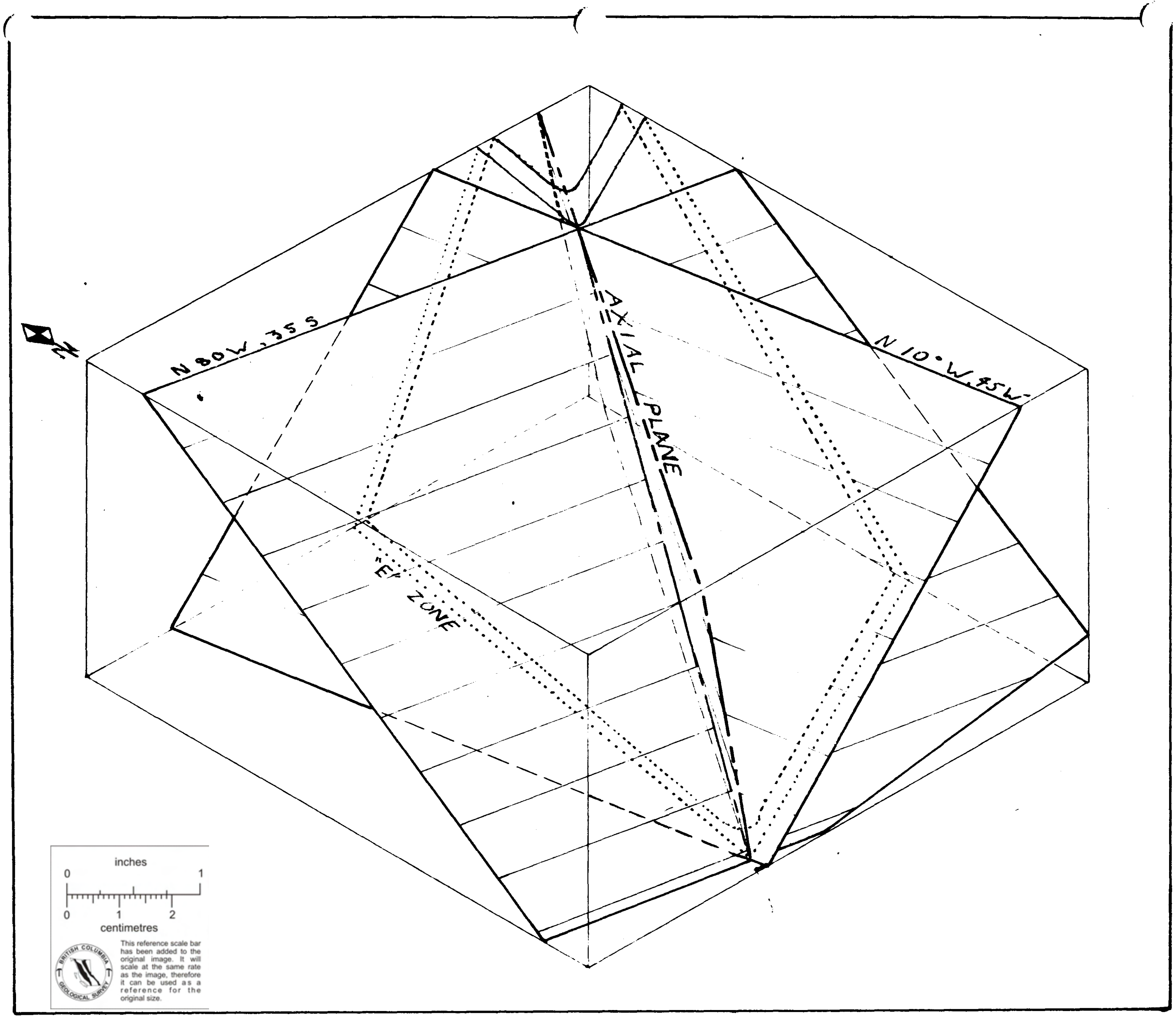

Fig. 2.

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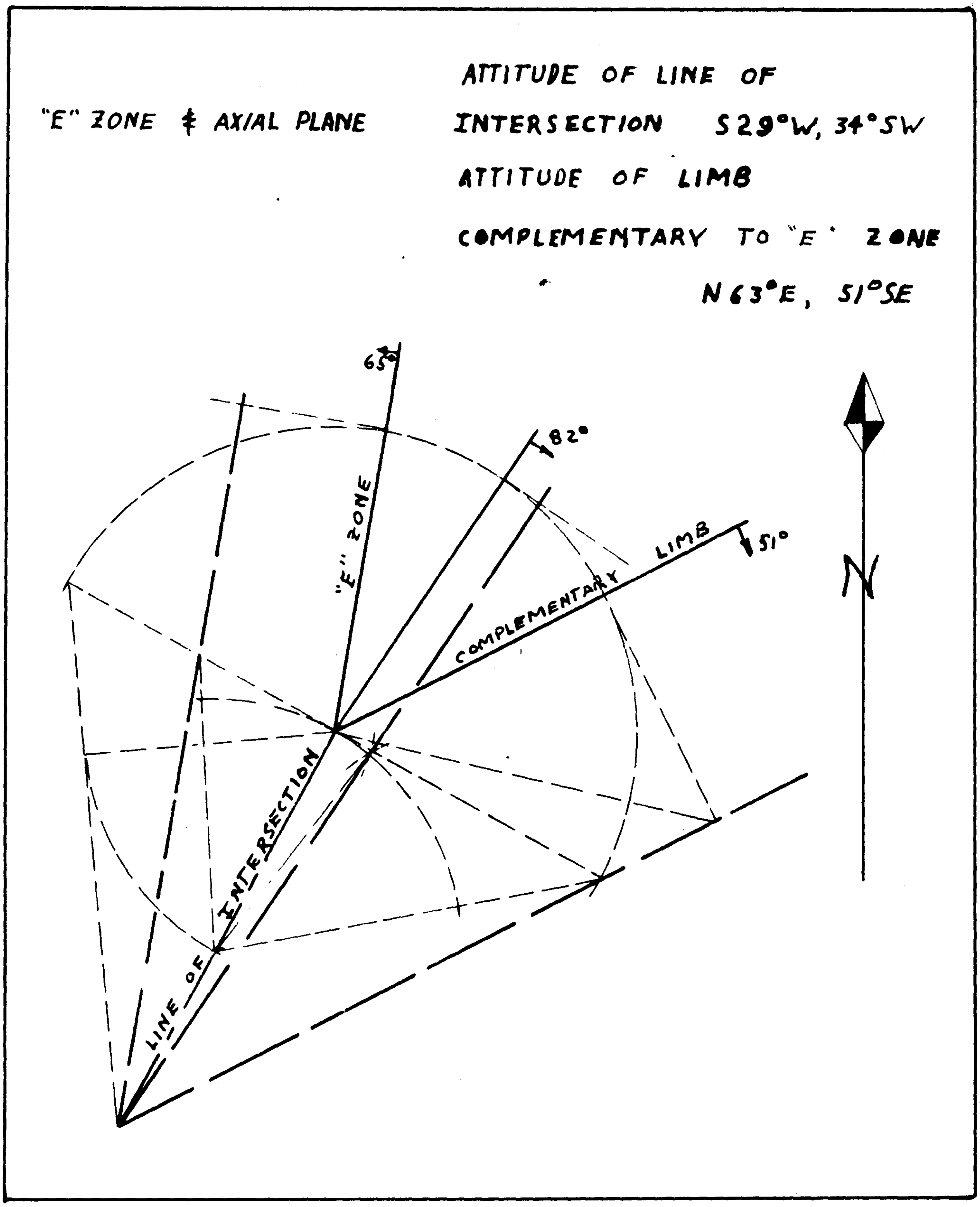
"E" ZONE & AXIAL PLANE
ATTITUDE OF LINE OF INTERSECTION S29°W, 34°SW
ATTITUDE OF LIMB COMPLEMENTARY TO "E" ZONE N63°E, 51°SE
65°
82°
51°
"E" ZONE
COMPLEMENTARY LIMB
LINE OF INTERSECTION
N

Fig. 3.

PEM

Fig.5.

BLUE GROUSE MINE
COWICHAN LAKE

SCALE 1" = 100'

JUNE 20-59
TRACED - PEM.

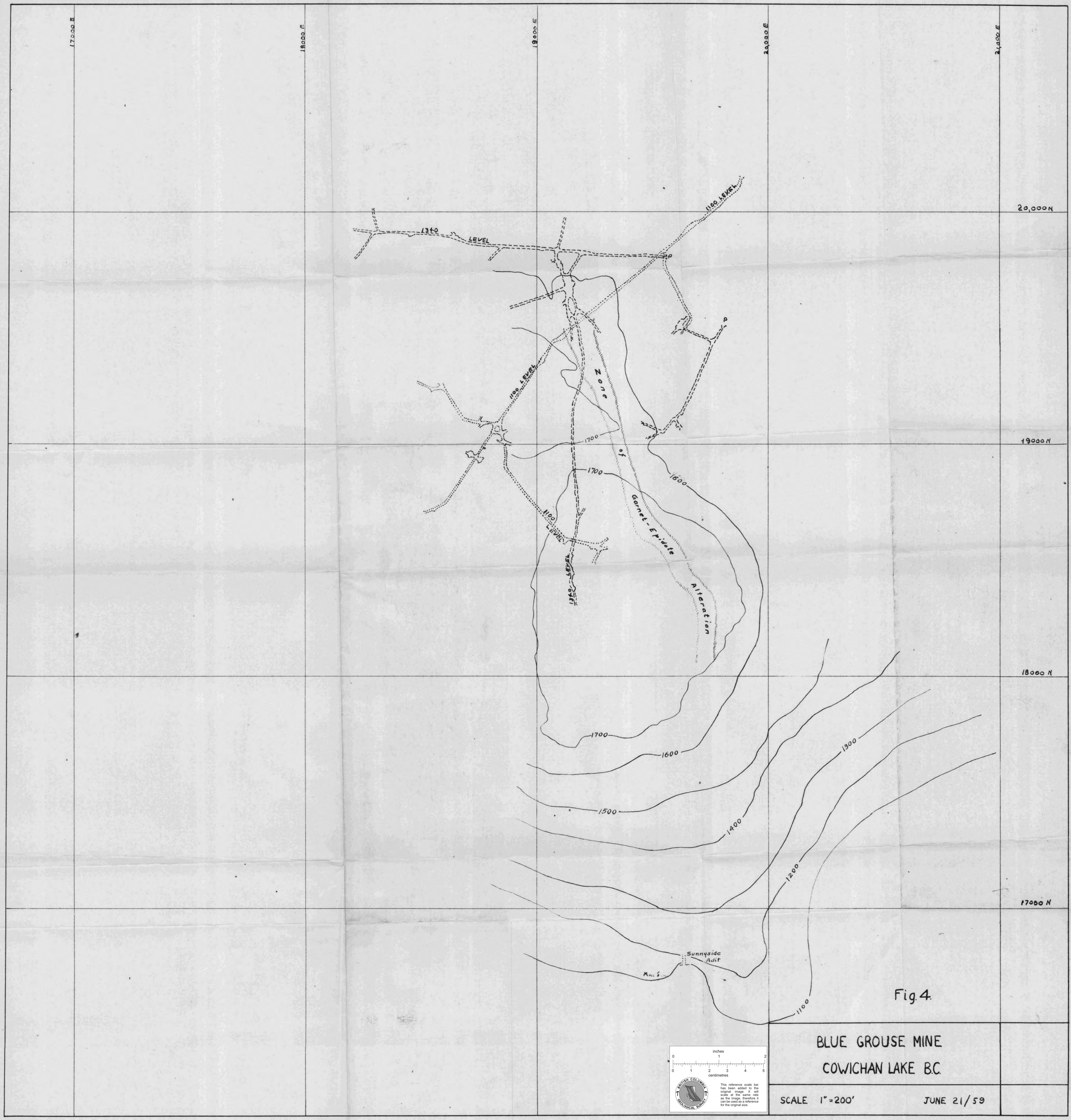

Fig. 4.

BLUE GROUSE MINE
COWICHAN LAKE B.C.