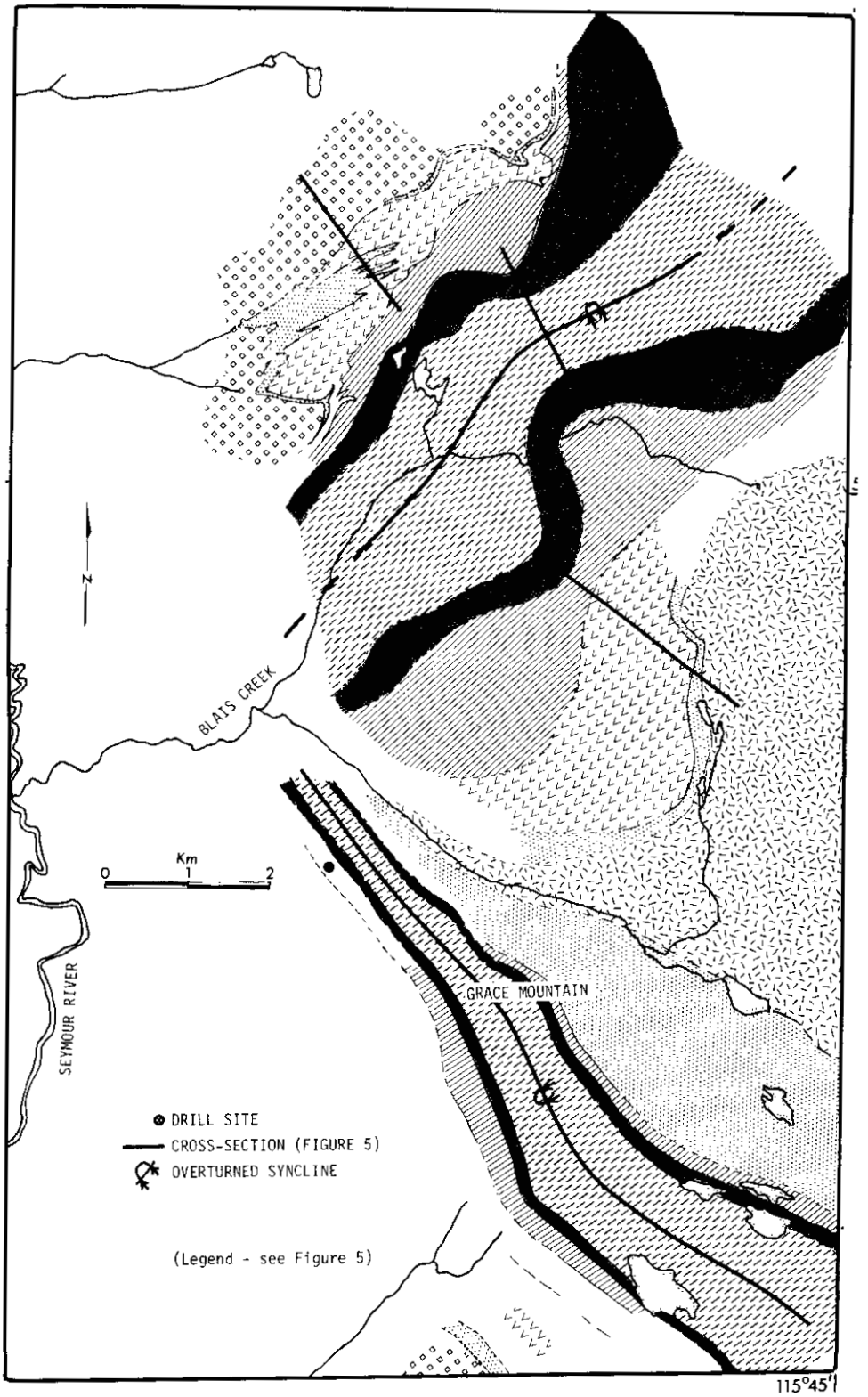

Figure 4. Regional geology of the Cottonbelt area.

COTTONBELT LEAD/ZINC DEPOSIT
(82M/7)

By Trygve Höy

INTRODUCTION

A study of the structure, stratigraphy, and mineralization of the Cottonbelt area along the western and northwestern margin of the Frenchman Cap gneiss dome was initiated in July 1978. The project will continue in 1979, extending the mapping around the north end of Frenchman Cap dome and southeastward to Fortynine Creek. This mapping will largely complete detailed stratigraphic and structural study of the southern (Fyles, 1970), western (McMillan, 1970), and northern periphery of Frenchman Cap dome.

Cottonbelt is one of a number of stratiform lead/zinc deposits in the Shuswap Complex. Ruddock Creek (Fyles, 1970), located approximately 30 kilometres north of the Cottonbelt area, is currently being drilled by Cominco Ltd. King Fissure, situated on the southern flank of Frenchman Cap dome, was drilled by Bralorne Pioneer Mines Limited in 1963, 1965, and 1966 (Fyles, 1970). Big Ledge, in the mantling gneisses of the Thor–Odin gneiss dome 60 kilometres south of Revelstoke, has been explored intermittently since the late 1920's (Höy, 1976).

The Cottonbelt property is located on the northwestern margin of the Frenchman Cap gneiss dome, 60 kilometres northwest of Revelstoke. The property received considerable attention in the 1920's, including drilling, trenching, and some underground work. Metallgesellschaft Canada Limited optioned the property in 1978 and in July drilled two holes in an attempt to intersect mineralization in the hinge zone of a synformal structure.

This report is based on three week's field work in the area in July 1978. Discussions with J. Kovacik and F. Wellmer of Metallgesellschaft and with W. J. McMillan of the Ministry of Mines and Petroleum Resources were most helpful. David Johnson provided cheerful and able field assistance.

STRUCTURE

The structure of the Cottonbelt area is dominated by a tight, early syncline that is draped around the northwestern margin of Frenchman Cap gneiss dome (Figs. 4 and 5). Mineralization in the Cottonbelt area occurs on both limbs of the syncline. The structure, informally named the Grace Mountain syncline, is the nose of a westerly closing fold that extends from just west of the Columbia River opposite Goldstream River, through the Cottonbelt area to south of Ratchford Creek (*see* following paper by Höy and McMillan). Minor structures related to this early (phase 1 ?) fold are uncommon. Tight to isoclinal, commonly rootless phase 1 fold hinges swing from southeasterly trends southeast of Blais Creek to southwesterly trends to the north.

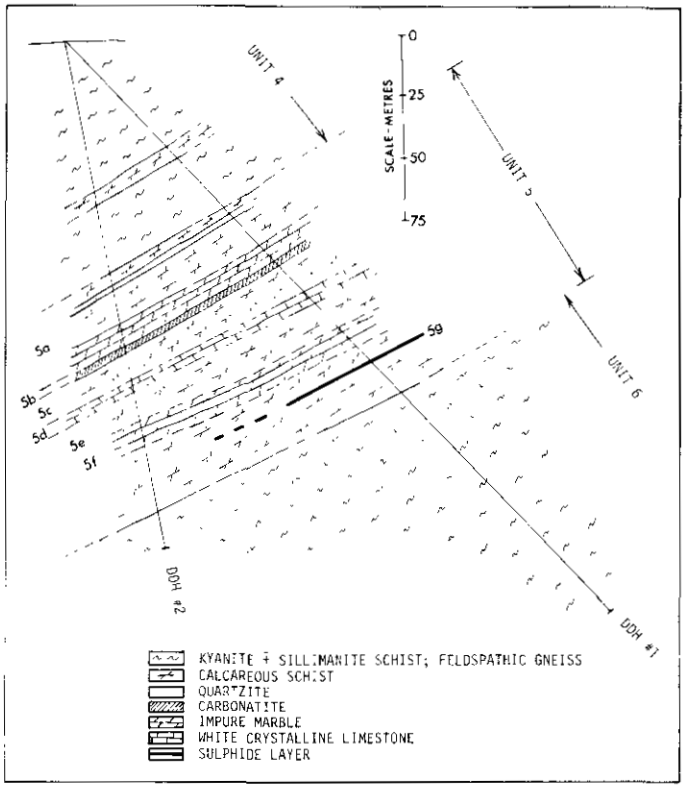

Figure 5. Composite vertical section through the Cottonbelt area (for location, *see* Figure 4).

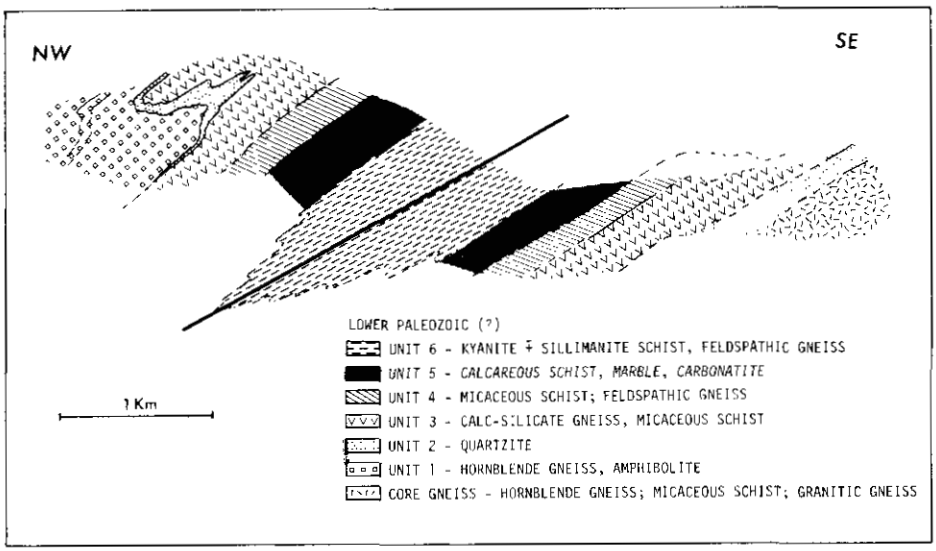

Figure 6. Detailed section through the upper mineralized limb of the Grace Mountain syncline (for location, *see* Figure 4).

The only phase 2 structure that is large enough to appear on Figure 4 is an S-shaped fold outlined by quartzite north of Blais Creek. It's axis plunges 20 to 30 degrees to the west. However, phase 2 mineral lineations and minor folds are abundant throughout the area. They plunge 30 to 40 degrees toward the west and southwest, south of Grace Mountain and swing to northwesterly plunges north of Blais Creek.

STRATIGRAPHY

Rock units comprise a sequence of quartzites, calcareous schists, marbles, and pelitic schists repeated on both limbs of the Grace Mountain syncline. A number of occurrences of crossbedded and graded quartzites in both the upper and lower limb provide reliable top determinations and allow a stratigraphic succession to be established.

The oldest rocks (unit 1) comprise a well-layered sequence of hornblende gneisses, minor amphibolites, and rare calc-silicate gneisses. A leucocratic, rusty weathering and more massive biotite-quartz feldspar layer several tens of metres thick within unit 1 contains disseminated molybdenite. It forms a prominent band structurally above the folded quartzite in the northwest corner of the map-area.

Quartzites of unit 2 stratigraphically overlie the banded gneisses. A well-exposed section on a cliff south of the north fork of Blais Creek shows that the quartzite grades upward from a coarser grained feldspathic grit unit, cemented by carbonate or silica, through thinner bedded, fine-grained quartzite to thinly interbedded quartzite and micaceous schist at the top. Crossbedded quartzites of unit 2 in the northernmost part of the map-area indicate that these northwestward-dipping beds are inverted. To the southwest, unit 2 is substantially thickened in the core of a phase 2 fold. East of Grace Mountain, crossbedded feldspathic quartzite is overlain to the west by a thick sequence of interlayered quartzite and micaceous schist. This sequence may result from complex interfolds of units 2, 3, and 4, or alternatively may reflect variations in the original sedimentary character of unit 2. To the south in the Perry River area, the same unit changes in character as it is traced northward. Near Bews Creek it is a relatively thin, pure quartzite. Northward it thickens considerably and further north, near Myoff Creek it forms a thicker sequence of interbedded quartzite, schist, and calc-silicate gneiss (McMillan, 1970).

Calc-silicate gneiss, impure marble, and micaceous schist of unit 3 are well exposed on both limbs of the Grace Mountain syncline along the north fork of Blais Creek. They are structurally thickened by northwesterly trending phase 3 folds in the south limb of the syncline.

Quartz feldspathic gneiss and micaceous schist of unit 4 overlie unit 3. They are in turn overlain by the 'Cottonbelt sequence,' unit 5, a heterogeneous package of dominantly calcareous rocks that hosts the Cottonbelt mineralization (Fig. 6). A buff-weathering carbonatite layer, lithologically similar to the 'type 2' carbonatite of McMillan (1974) is at the base or close to the base of the Cottonbelt sequence. It occurs on both limbs of the Grace Mountain syncline over a strike length of at least 16 kilometres. In the Perry River area, 15 kilometres to the southeast, it occurs at approximately the same stratigraphic level and there has also been traced intermittently along strike length of 15 kilometres westward (McMillan, 1970). In the Grace Mountain area, the carbonatite is stratigraphically overlain by calcareous schists and a calcareous to relatively pure white quartzite (5c). A grey-weathering, white limestone (5d) overlies the quartzite. The

limestone is one of the more distinctive and persistent marker units in the map-area. Interlayered micaceous and calcareous schists (5e), and an impure grey-weathering crumbly limestone (5f) overlie 5d. The sulphide layer (5g), enveloped by a thin layer of very siliceous calcareous schist and a garnet-sillimanite schist, defines the top of the Cottonbelt sequence. Elsewhere, calcareous and quartz-rich schists occur at the top of unit 5.

Unit 6, the youngest rocks in the map-area, comprise the core of the Grace Mountain syncline. They consist dominantly of kyanite and sillimanite schist, quartz feldspathic gneiss, and occasional thin quartzite layers.

MINERALIZATION

Mineralization in the Grace Mountain area comprises an oxide-sulphide layer that can be traced intermittently through a strike length of approximately 5 kilometres in the western (upper) limb of the Grace Mountain syncline and 2 kilometres in the lower limb. The succession of calcareous rocks that hosts the mineralization has been traced a further 5 kilometres northeastward from Blais Creek. There, mineralization is erratic, consisting mainly of disseminated magnetite and chalcopyrite in either an impure, very siliceous calc-silicate gneiss or in a rusty weathering white crystalline marble. Elsewhere, the 'mineralized layer' is represented by a zone of rusty weathering calcareous schist.

The sulphide layer in the Grace Mountain area has been trenched along virtually its entire length. It varies in thickness from a few tens of centimetres to approximately 2 metres. Mineralization generally consists of fairly coarse-grained sphalerite, magnetite, galena, and minor pyrrhotite in a dark green, pyroxene-amphibole-quartz-garnet 'skarn' rock or, as layers within a lighter coloured, more siliceous calcareous gneiss or as disseminated grains in a siliceous granular marble. Assay values of a grab sample and chip samples across the mineralized layer are listed below.

Sample No.	Sample Type	Ag *(ppm)*	Cu *(per cent)*	Fe *(per cent)*	Pb *(per cent)*	Zn *(per cent)*
CB 4–1	grab sample	30	0.0125	34.4	4.45	0.27
CB 4–2	30 cm chip	78	0.0155	18.3	7.81	0.87
CB 4–3	150 cm chip	65	0.007	19.1	11.25	1.03
CB 4–4b	120 cm chip	23	0.009	23.8	4.18	0.35
CB 4–4c	150 cm chip	52	0.006	30.0	6.75	1.40

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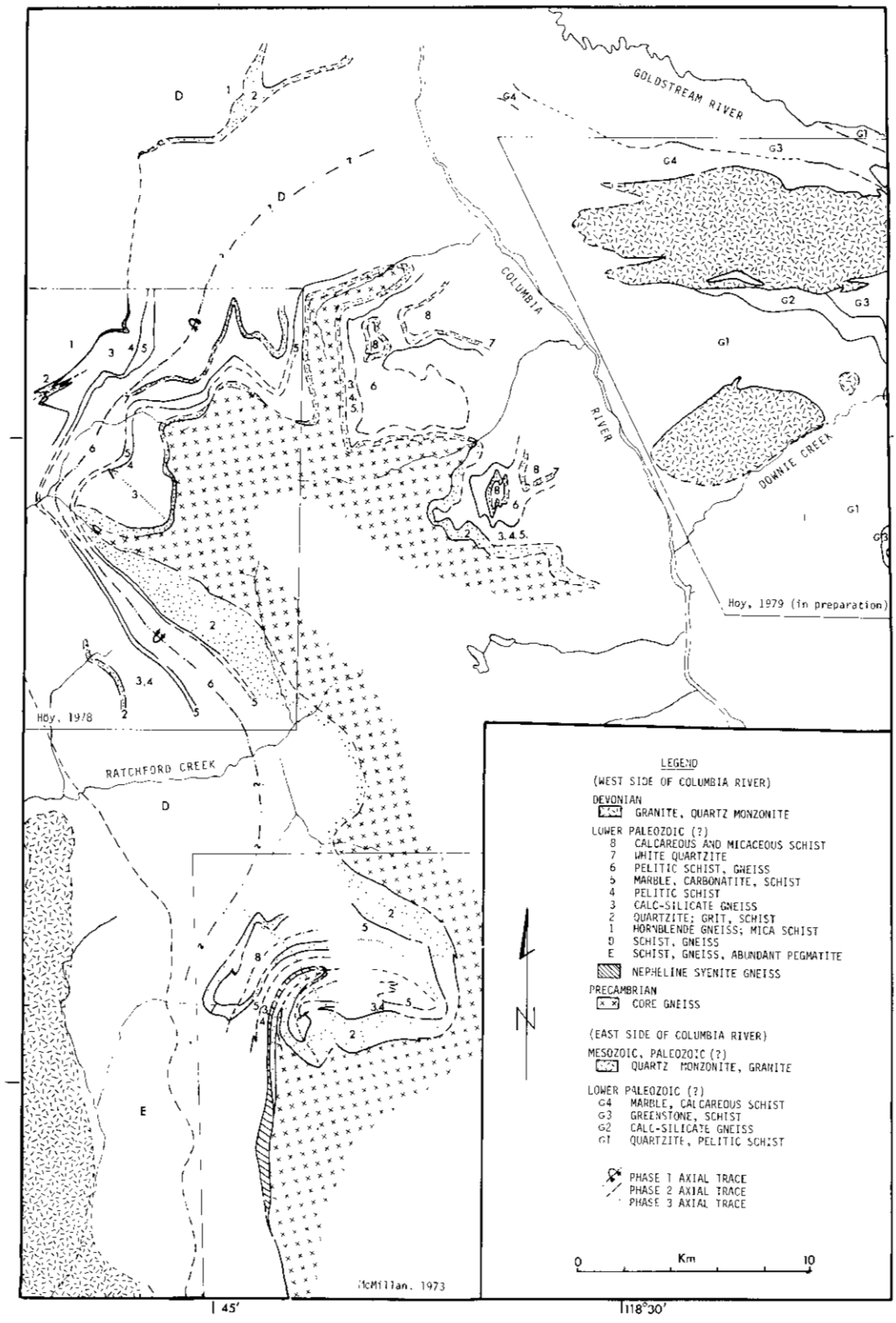

Figure 7. Regional compilation of the geology of the flanks of Frenchman Cap gneiss dome (from Fyles, 1969; Höy, 1979; Höy, 1978; McMillan, 1973; and Wheeler, 1963).