

ESTELLA-KOOTENAY KING AREA

(82G/12, 13)

By Trygve Höy

A study of the structure, stratigraphy, and lead-zinc mineralization of Purcell rocks in southeastern British Columbia was initiated during the 1976 field season when approximately 140 square kilometres of mountainous terrain east of the Rocky Mountain Trench in the Estella-Kootenay King area was mapped at a scale of 1:25 000. This mapping was extended to the north and east during the 1977 field season and will be released in early 1978 as a preliminary map. Regional mapping will be completed during the 1978 field season, and will include the Purcell rocks between the Wild Horse River in the south and east and Diorite Creek in the north.

The study is designed to determine the stratigraphic and structural setting and controls of lead-zinc mineralization in the Aldridge Formation and emphasizes the use of sedimentary structures and detailed stratigraphic correlations in interpreting the depositional environment of Purcell rocks. It is suggested that thickness and facies changes in the Aldridge Formation, which are apparent within the confines of the map-area, may be related to syndepositional faulting (Høy, 1976).

GEOLOGY

Structure: The structure of the area is dominated by a large, open, recumbent anticline. Its axial plane is west dipping and bedding in its upper limb, in the western part of the area, is easterly dipping while bedding in the lower limb is overturned to the west (section A-B, Fig. 2).

A number of north-trending, upright faults repeat the upper part of the Aldridge, the Creston, and the Kitchener Formations in the eastern part of the area, and later east-west-trending faults disrupt both the bedding and the north-south faults. A low angle, west-dipping fault in the northeast part of the map-area has displaced hangingwall rocks westward relative to footwall rocks (section C-D, Fig. 2).

Stratigraphy: The oldest rocks within the map-area, quartzite, siltstone, and shale of the Fort Steele Formation (F) have a thickness in excess of 2 000 metres. The Fort Steele Formation is comprised of at least three upward-fining sequences that grade from coarse, cross-bedded quartzites at the base to finely laminated siltstone at the top. Within each of these major cycles are numerous smaller scale, upward-fining cycles. Sedimentary structures within the coarser sandstones at the base of the cycles indicate that these are fluvial deposits displaying generally a northerly transport direction. The argillite and siltstone at the top of the cycles may be flood deposits on mudflats removed from the main fluvial channels. These contain abundant desiccation cracks.

The siltstones and argillites of the Fort Steele Formation grade upward into dark grey to black argillite at the base of the Aldridge Formation. The lower unit of the Aldridge (A-1) includes 1 800 to 2 500 metres of dark argillite, buff-coloured siltstone, a prominent dolomite unit near the base (included as part of the Fort Steele Formation by Rice, 1937; Leech, 1960) and a distinctive buff-coloured siltstone-argillite unit near the top that hosts both the Estella and Kootenay King deposits. This latter unit is comprised of thin, graded

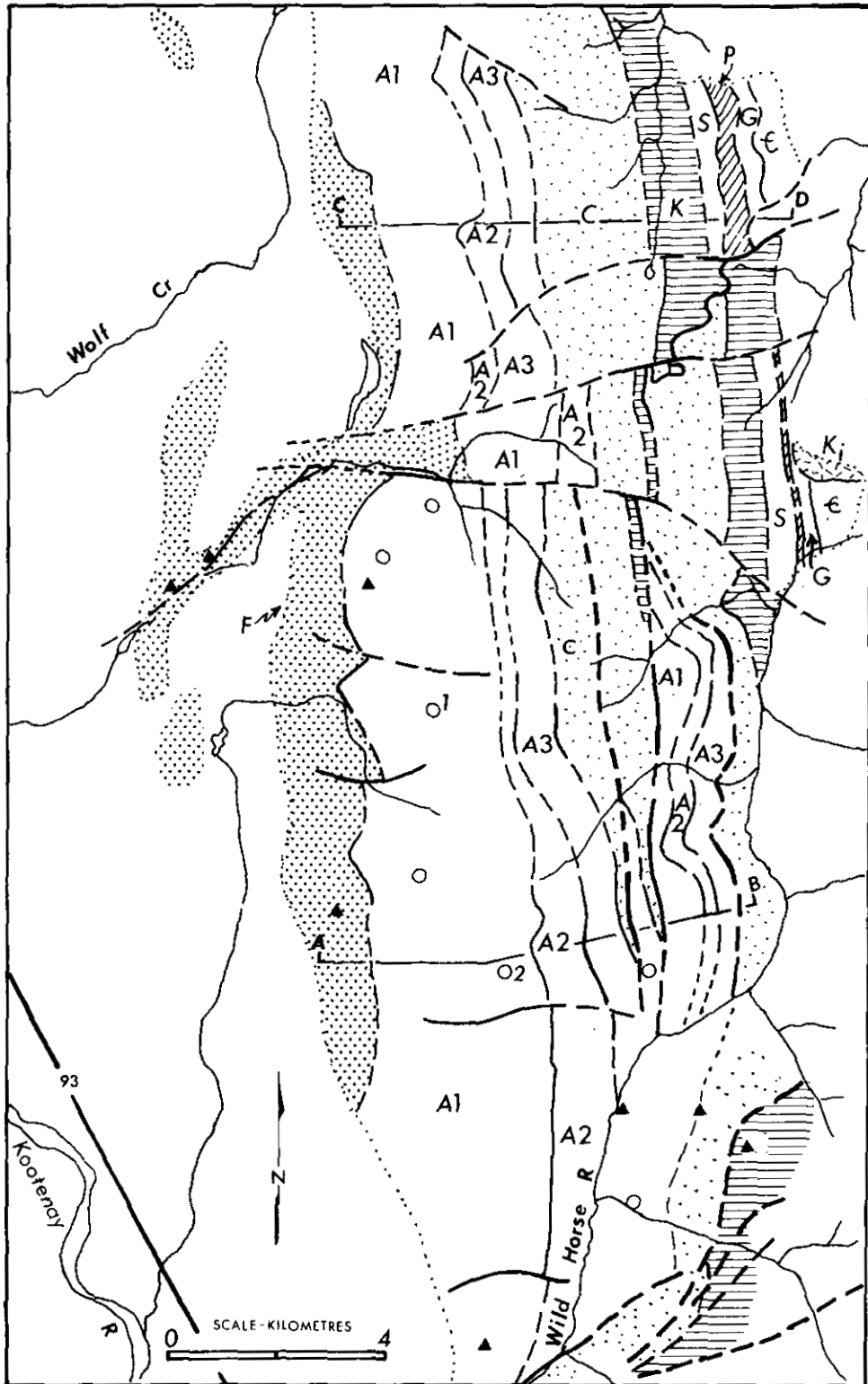
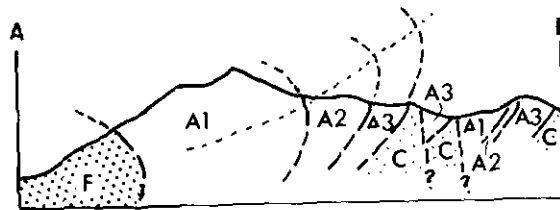
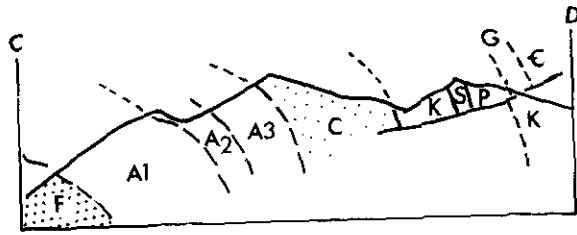


Figure 2. Geology of the Estella-Kootenay King area.



LEGEND

CRETACEOUS (?)

K; QUARTZ MONZONITE, SYENITE

CAMBRIAN

€ - DOLOMITE

HELEKIAN

G - GATEWAY FORMATION

P - PURCELL LAVA

S - SIYEH FORMATION

K - KITCHENER FORMATION

C - CRESTON FORMATION

A - ALDRIDGE - A1 - ARGILLITE, SILTSTONE; MINOR DOLOMITE, QUARTZITE

A2 - QUARTZITE, SILTSTONE, ARGILLITE

A3 - ARGILLITE, MINOR SILTSTONE

F - FORT STEELE FORMATION



GEOLOGICAL CONTACT - DEFINED, APPROX., ASSUMED



FAULT - DEFINED, APPROX.

MINERAL OCCURRENCE.

▲ CU, (PB)

○ PB, ZN, AG, AU

1 - ESTELLA

2 - KOOTENAY KING

siltstone layers, finely laminated layers, and layers with numerous small sedimentary structures such as convolute bedding, scours, and ripple cross-laminations. Associated with these units are occasional coarse, graded quartzite layers; the buff unit is interpreted to consist dominantly of distal turbidite deposits and interlayered pelagic beds.

A-2 comprises approximately 500 metres of interlayered massive to graded siltstone-quartzite and dark argillite. These are interpreted as being more proximal turbidites (AE beds in the Bouma model; Walker, 1976).

A-3 consists of 500 to 800 metres of finely laminated dark argillite and siltstone. It grades upward into the Creston Formation, through several hundred metres of interlayered argillite and light green siltstone.

The Creston Formation (C) includes approximately 1 500 metres of green, purple, and white quartzite, siltstone, and argillite. These are fan delta and mudflat deposits. They are overlain conformably by 700 to 1 000 metres of green dolomitic argillite, buff-weathering dolomite, limestone, and minor quartzite of the Kitchener Formation (K), approximately 400 metres of more argillaceous dolomite and argillite of the Siyeh Formation (S), and massive, porphyritic, or amygdaloidal lava flows. The Purcell lavas thin from approximately 500 metres in the north to less than 100 metres in the central part of the area.

The lithologies and depositional environments of the Creston, Kitchener, Siyeh, and Purcell lavas as well as the overlying Gateway Formation, will be described more fully in a preliminary map and report intended for release early in 1978.

Economic Geology: Two important lead-zinc showings and numerous smaller lead-zinc and copper showings occur within the map-area (Fig. 2). The Estella deposit is 'a replacement by sphalerite, galena, and pyrite' (Hedley, 1951, p. 186) in a zone of fracturing and shearing adjacent to a small 'syenite' stock that has intruded the buff-weathering unit of A-1 (see description in 'stratigraphy' section). The Estella deposit, mined intermittently from 1951 to 1967, produced 120,724 tons of ore grading: lead, 4.73 per cent; zinc, 8.97 per cent; silver, 1.74 ounces per ton.

The Kootenay King is a stratiform lead-zinc deposit. Galena, sphalerite, and pyrite occur as fine laminations at the top part of a coarse sandstone unit in the buff-weathering unit of A-1. Total production, in 1952 and 1953, was 14,617 tons grading: lead, 5.36 per cent; zinc, 6.65 per cent; silver, 1.94 ounce per ton.

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