



LEGEND

PRELIMINARY SERIES

- TERTIARY**
- MIOCENE (?)**
- 21 Basalt; minor olivine basalt
- OLIGOCENE (?)**
- 20 CORYELL PLUTONIC ROCKS: syenite, granite; minor monzonite and shonkinite
- Eocene or Oligocene**
- 19 Andesite, trachyte, minor basalt; locally, interbedded tuff and shale; 19a, andesite and trachyte flows and agglomerate; 19b, conglomerate, sandstone, shale, tuff; minor agglomerate and breccia; coal; 19c, andesite and trachyte; 19d, agglomerate and conglomerate
- PALEOCENE OR EOCENE**
- 18 Porphyritic granite and rhyolite
- 17 Conglomerate, sandstone, shale, tuff
- CRETACEOUS (?)**
- 16 VALHALLA PLUTONIC ROCKS: granite, granodiorite
- 15 NELSON PLUTONIC ROCKS: granodiorite, quartz diorite, diorite; granite, quartz monzonite, syenite, monzonite
- JURASSIC (?)**
- 14 14a, pyroxenite; 14b, hornblende; 14c, serpentinite
- TRIASSIC OR JURASSIC**
- 13 Limestone
- TRIASSIC**
- UPPER TRIASSIC**
- NICOLA GROUP**
- 12 Greenstone, tuff, quartzite, limestone, argillite, and schist
- TRIASSIC OR EARLIER**
- 8-11 8. BARLOW FORMATION: argillite
9. INDEPENDENCE FORMATION: chert, greenstone
10. SHOEMAKER FORMATION: chert, some tuff and greenstone
11. OLD TOM FORMATION: greenstone, minor diorite
- PERMIAN AND/OR TRIASSIC**
- ANARCHIST GROUP**
- 7 Greenstone, quartzite, greywacke, limestone; locally paragneiss
- PERMIAN AND (?) PENNSYLVANIAN**
- 5, 6 5. CACHE CREEK GROUP: greenstone, quartzite, argillite, limestone
6. BLIND CREEK FORMATION: limestone; limy argillite
- CARBONIFEROUS (?)**
- KOBAU GROUP**
- 4 Quartzite, schist, greenstone
- PRE-PERMIAN**
- 3 OLD DAVE INTRUSIONS: serpentinitized ultrabasic rocks
- 2 CHAPPERON GROUP
Chlorite schist, quartzite
- 1 MONASHEE GROUP
Layered gneiss (paragneiss); minor schist, amphibolite, quartzite, marble, and pegmatite

- Drift-covered area
- Geological boundary (defined, approximate)
- Bedding (horizontal, inclined)
- Bedding, tops unknown (inclined, vertical)
- Gneissosity (inclined, vertical)
- Schistosity (inclined, vertical)
- Fault (defined, approximate, assumed)
- Lination
- Glacial striae
- Fossil locality
- Mineral property

INDEX TO MINERAL PROPERTIES

- 1 Horn Silver (Canadian Radium Corporation Limited) Ag-Au
2 Fairview (The Consolidated Mining and Smelting Co. of Canada, Ltd) sc-Au
3 Cariboo-Amelia (H & W Mining Company Limited) Au
4 Belchrope (Belair Mining Corporation Limited) Cr
5 Highland-Bell (Highland-Bell Limited) Ag-Pb-Zn-Cd
6 Bounty Fraction (Sheritt Lee Mines Limited) Ag-Pb-Zn
7 Galcanda (Keremeos Mines Limited) Cu-Mo

MINERAL SYMBOLS

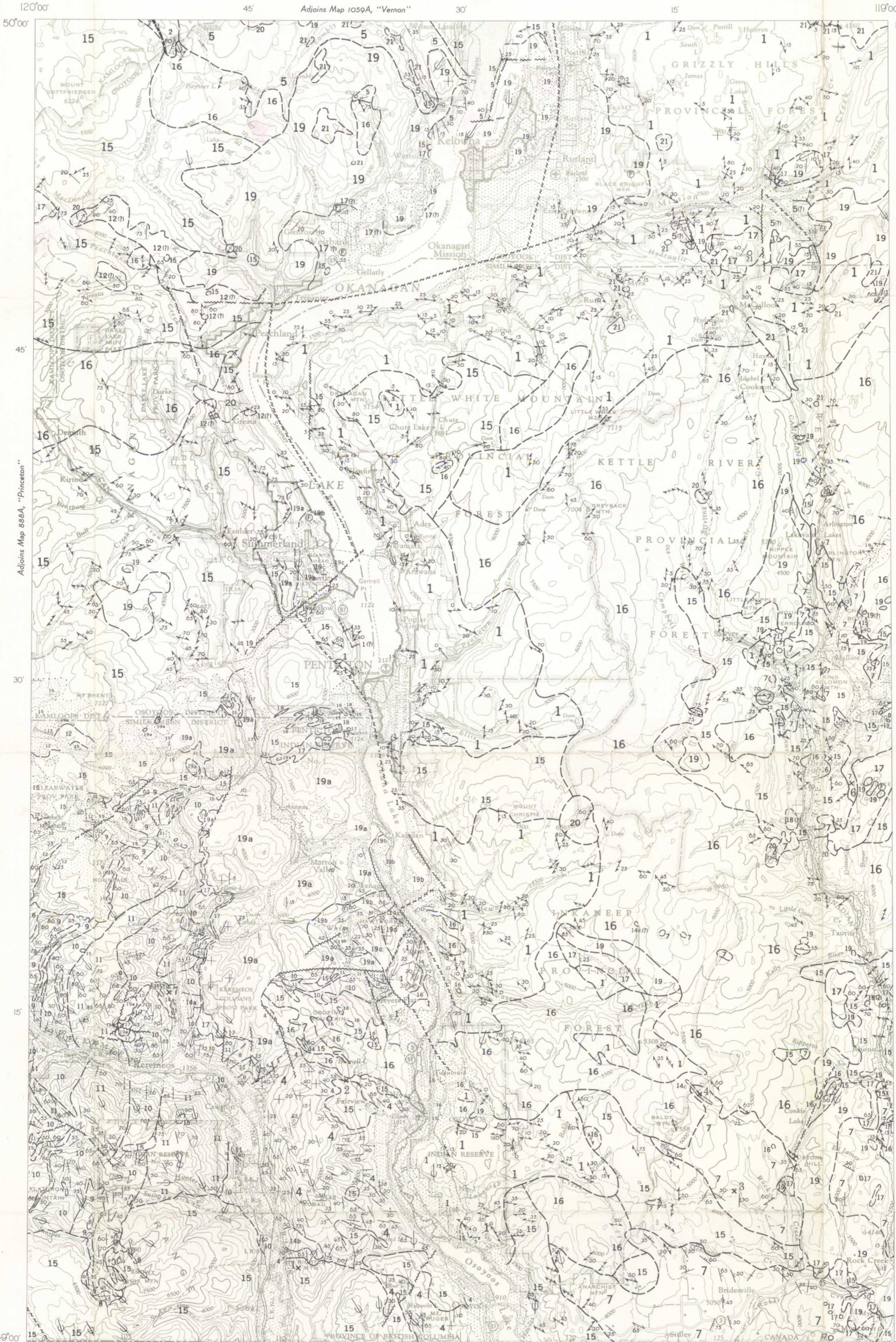
Cadmium Cd	Lead Pb
Chromium Cr	Molybdenum Mo
Copper Cu	Silica sc
Gold Au	Silver Ag
Zinc Zn	

Geology by H. W. Little, 1958 and 1959

Cartography by the Geological Survey of Canada, 1961

- Main roads
- Other roads (all weather, dry weather)
- Trail
- Railway
- Abandoned railway
- Building
- Post Office
- Power transmission line
- International boundary and boundary marker
- District boundary
- Indian Reserve, provincial park and forest boundary
- Horizontal control point
- Intermittent stream
- Marsh
- Contours (interval 500 feet)
- Height in feet above mean sea-level

Base-map prepared by the Surveys and Mapping Branch, 1957. Revisions to roads etc. by the Geological Survey of Canada from maps published by the Department of Lands and Forests, British Columbia



This map shows a revision of the geology compiled on Map 538A by Cairnes from field work done by himself and others. The writer spent a total of 5 months in 1958 and 1959 mainly on a study of the structure, but some of the stratigraphy was revised, particularly that of the Tertiary rocks. The plutonic rocks were subdivided on the same genetic basis as that established in the map-area to the east^{1,2}, and several mineral properties were examined.

The Monashee Group (1)—regarded by Jones³ as the oldest unit within the Shuswap terrane—consists mainly of layered gneiss, but locally contains zones of less-metamorphosed sedimentary rocks, particularly in Okanagan Valley. Rocks of the Chapperon Group (2) also regarded as part of the Shuswap terrane, occur only in the northwest corner of the map-area, and are intruded by serpentine dykes of the Old Dave Intrusions (3). The Koba Group (4) which occurs northwest of Osoyoos, was regarded by Bostock⁴ as older than the fossiliferous Blind Creek Formation (6) and also the Barlow, Independence, Shoemaker, and Old Tom Formations (8-11). In the western part of the map-area, near Hedley, the latter appear to underlie the Upper Triassic Nicola Group (12).

Rocks of the Cache Creek Group (5), which north of the map-area contain fossils of Permian age⁵, occur in the northern part of the map-area; where they are adjacent to the gneisses of the Monashee Group (1) the contacts are either faults or are not exposed.

The Anarchist Group (7), which occurs in the southeastern part of the map-area, cannot be distinguished with confidence from other formations that range in age from possibly Carboniferous to Upper Triassic. A few brachiopods of indeterminate age are the only fossils so far obtained from the Anarchist Group (7) within the map-area. Corals and pelecypods of Upper (?) Triassic age were collected near Phoenix, about 25 miles east of the map-area, but rocks of different age may be included. Rocks west of Peachland are questionably referred to the Nicola Group (12) because they appear to be roughly continuous with similar rocks mapped as such by Rice⁶.

Basic and ultrabasic rocks of map-unit 14 are correlated with similar rocks to the east of the map-area that intrude Jurassic strata but are cut by dykes of Nelson rocks (15). The latter, and the Valhalla plutonic rocks (16), have been distinguished from one another largely on a lithological basis. Where the relationships could be observed within the map-area, the Valhalla is everywhere younger than the Nelson, but in Nelson area⁷ the contacts are commonly granitic.

Map-unit 17, in the southeastern part of the map-area is known as the Kettle River Formation, in Beaverdell area as the Curry Creek Formation, and in the southwestern part as the Springbrook Formation. Although several collections of fossil plants have been made from this unit, a definite age has not yet been established.

Map-unit 18 occurs in Shingle Creek immediately southwest of Penticon and is apparently contemporaneous with part of unit 17.

In the southeastern part of the area, map-unit 19 is composed almost entirely of volcanic rocks and was named "Midway Volcanic Group" by Daly. On Map 6-1957 it was erroneously called Phoenix Group when the name "Midway" was discarded because of prior use. In the western part of the map-area unit 19 has been subdivided into a basal volcanic sub-unit (19a, Marron Formation), a middle sedimentary sub-unit (19b, White Lake Formation), and an upper, unnamed volcanic and, near White Lake, sedimentary sub-unit⁸.

The Coryell plutonic rocks (20), consisting mainly of syenite and granite, have, since the publication of Map 6-1957, been shown to cut the volcanic rocks of map-unit 18 within the map-area.

Basalt (map-unit 21), which commonly shows columnar structure, occurs in various parts of the area but is most abundant in the plateau between Beaverdell and Mission Creeks, and everywhere is flat lying. In the railway cut between the forks of Kio Creek, the lava is underlain by 30 to 40 feet of unconsolidated sediments that appear to be unfossiliferous.

Throughout the Monashee Group (1), lineations are predominantly east-west, as is the case in Vernon map-area to the north⁹. Along Okanagan Valley a chain of N-E-SW faults separates this unit from the late Palaeozoic and early Mesozoic rocks to the west. Some of these faults are, however, assumed. So far as can be determined the faults dip steeply and are presumed to be normal, although most of the displacement may be strike slip. In either case the displacement must be large. Intense shearing was observed also in the valleys of Peachland and Joe Rich Creeks and in the unnamed creek immediately south of Belgo Creek. A fault of undetermined magnitude underlies Conkle Lake and strikes along the valley of upper Conkle Creek. Primary structures other than beddings are rare.

Preserved in the sedimentary rocks, thus the structural data obtained was insufficient to delineate folds within the map-area, other than those indicated by Bostock's more detailed mapping. In the 1890's, mining activity centred in Fairview and McKinney camps but later shifted to Beaverdell where the Highland-Bell mine, which produces mainly silver, is the most important in the map-area. Other properties on which mining or exploration has been done in recent years are indicated on the map.

For further details regarding the geology of this and adjoining areas the reader is referred to the following selected publications:

¹Reinecke, L.: Ore Deposits of the Beaverdell Map-area; Geol. Surv., Canada, Mem. 79 (1915).
²Bostock, H. S.: Keremeos, B.C.; Geol. Surv., Canada, Map 341A (1940).
³Bostock, H. S.: Okanagan Falls, B.C.; Geol. Surv., Canada, Map 627A (1941).
⁴Bostock, H. S.: Olalla, B.C.; Geol. Surv., Canada, Map 628A (1941).
⁵Cairnes, C. E.: Kettle River (West Half), B.C.; Geol. Surv., Canada, Map 538A (1940).
⁶Rice, H. M. A.: Geology and Mineral Deposits of the Princeton Map-area, British Columbia; Geol. Surv., Canada, Mem. 243 (1947).
⁷Little, H. W.: Nelson (West Half), B.C.; Geol. Surv., Canada, Map 3-1956 (1957).
⁸Little, H. W.: Kettle River (East Half), B.C.; Geol. Surv., Canada, Map 6-1957 (1957).
⁹Jones, A. G.: Vernon Map-area, British Columbia; Geol. Surv., Canada, Mem. 296 (1959).

Map-unit 18 occurs in Shingle Creek immediately southwest of Penticon and is apparently contemporaneous with part of unit 17.

In the southeastern part of the area, map-unit 19 is composed almost entirely of volcanic rocks and was named "Midway Volcanic Group" by Daly. On Map 6-1957 it was erroneously called Phoenix Group when the name "Midway" was discarded because of prior use. In the western part of the map-area unit 19 has been subdivided into a basal volcanic sub-unit (19a, Marron Formation), a middle sedimentary sub-unit (19b, White Lake Formation), and an upper, unnamed volcanic and, near White Lake, sedimentary sub-unit⁸.

The Coryell plutonic rocks (20), consisting mainly of syenite and granite, have, since the publication of Map 6-1957, been shown to cut the volcanic rocks of map-unit 18 within the map-area.

Basalt (map-unit 21), which commonly shows columnar structure, occurs in various parts of the area but is most abundant in the plateau between Beaverdell and Mission Creeks, and everywhere is flat lying. In the railway cut between the forks of Kio Creek, the lava is underlain by 30 to 40 feet of unconsolidated sediments that appear to be unfossiliferous.

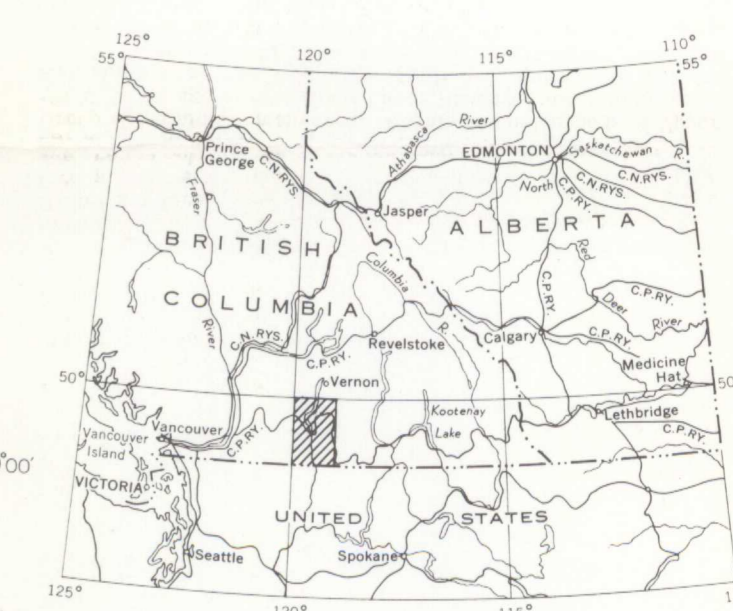
Throughout the Monashee Group (1), lineations are predominantly east-west, as is the case in Vernon map-area to the north⁹. Along Okanagan Valley a chain of N-E-SW faults separates this unit from the late Palaeozoic and early Mesozoic rocks to the west. Some of these faults are, however, assumed. So far as can be determined the faults dip steeply and are presumed to be normal, although most of the displacement may be strike slip. In either case the displacement must be large. Intense shearing was observed also in the valleys of Peachland and Joe Rich Creeks and in the unnamed creek immediately south of Belgo Creek. A fault of undetermined magnitude underlies Conkle Lake and strikes along the valley of upper Conkle Creek. Primary structures other than beddings are rare.

Preserved in the sedimentary rocks, thus the structural data obtained was insufficient to delineate folds within the map-area, other than those indicated by Bostock's more detailed mapping. In the 1890's, mining activity centred in Fairview and McKinney camps but later shifted to Beaverdell where the Highland-Bell mine, which produces mainly silver, is the most important in the map-area. Other properties on which mining or exploration has been done in recent years are indicated on the map.

For further details regarding the geology of this and adjoining areas the reader is referred to the following selected publications:

¹Reinecke, L.: Ore Deposits of the Beaverdell Map-area; Geol. Surv., Canada, Mem. 79 (1915).
²Bostock, H. S.: Keremeos, B.C.; Geol. Surv., Canada, Map 341A (1940).
³Bostock, H. S.: Okanagan Falls, B.C.; Geol. Surv., Canada, Map 627A (1941).
⁴Bostock, H. S.: Olalla, B.C.; Geol. Surv., Canada, Map 628A (1941).
⁵Cairnes, C. E.: Kettle River (West Half), B.C.; Geol. Surv., Canada, Map 538A (1940).
⁶Rice, H. M. A.: Geology and Mineral Deposits of the Princeton Map-area, British Columbia; Geol. Surv., Canada, Mem. 243 (1947).
⁷Little, H. W.: Nelson (West Half), B.C.; Geol. Surv., Canada, Map 3-1956 (1957).
⁸Little, H. W.: Kettle River (East Half), B.C.; Geol. Surv., Canada, Map 6-1957 (1957).
⁹Jones, A. G.: Vernon Map-area, British Columbia; Geol. Surv., Canada, Mem. 296 (1959).

- ¹Reinecke, L.: Ore Deposits of the Beaverdell Map-area; Geol. Surv., Canada, Mem. 79 (1915).
²Bostock, H. S.: Keremeos, B.C.; Geol. Surv., Canada, Map 341A (1940).
³Bostock, H. S.: Okanagan Falls, B.C.; Geol. Surv., Canada, Map 627A (1941).
⁴Bostock, H. S.: Olalla, B.C.; Geol. Surv., Canada, Map 628A (1941).
⁵Cairnes, C. E.: Kettle River (West Half), B.C.; Geol. Surv., Canada, Map 538A (1940).
⁶Rice, H. M. A.: Geology and Mineral Deposits of the Princeton Map-area, British Columbia; Geol. Surv., Canada, Mem. 243 (1947).
⁷Little, H. W.: Nelson (West Half), B.C.; Geol. Surv., Canada, Map 3-1956 (1957).
⁸Little, H. W.: Kettle River (East Half), B.C.; Geol. Surv., Canada, Map 6-1957 (1957).
⁹Jones, A. G.: Vernon Map-area, British Columbia; Geol. Surv., Canada, Mem. 296 (1959).



MAP 15-1961
(REVISION OF MAP 538A)
GEOLOGY
KETTLE RIVER
(WEST HALF)
BRITISH COLUMBIA

Scale: One Inch to Four Miles = 1/253,440 Miles
Approximate magnetic declination, 23° 00' East

MAP LIBRARY / CARTOTHEQUE
Library / Bibliothèque
Geological Survey of Canada
Commission Géologique du Canada
Ottawa, Canada K1A 0E8

Air photographs covering this area may be obtained through the National Air Photographic Library, Topographical Survey, Ottawa

G
3401
.05
1956
G4
omvfc
c.1

MAP 15-1961
KETTLE RIVER
BRITISH COLUMBIA
SHEET 82 E (West Half)