GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

82 F/6 (East Half)

LEGEND

CENOZOIC

TERTIARY

12, 13 — **12.** *CORYELL PLUTONIC ROCKS: basic syenite; minor pulaskite*
13. *McGREGOR INTRUSIONS: shonkinite*

MESOZOIC

CRETACEOUS (?)
LOWER CRETACEOUS (?)

11 — *NELSON PLUTONIC ROCKS: mainly granite; minor granodiorite, quartz diorite and diorite*

JURASSIC
LOWER AND MIDDLE JURASSIC

10 — *HALL FORMATION: argillite and siltstone*

LOWER JURASSIC

9 — *ELISE FORMATION: andesite and basalt flows and flow breccia, agglomerate, augite porphyry;* **9a**, *tuff, siltstone, and argillite*

TRIASSIC (?) AND JURASSIC (?)
LOWER JURASSIC (?) AND OLDER
YMIR GROUP

8 — *Argillite, slate, argillaceous quartzite; minor limestone and shale;* **8a** *lava*

PALAEOZOIC

ORDOVICIAN
LOWER AND (?) MIDDLE ORDOVICIAN

6 — *ACTIVE FORMATION: black argillite, slate, quartzite;* **6a**, *grey limestone*

CAMBRIAN
MIDDLE CAMBRIAN

5 — *NELWAY FORMATION: black limestone, calcareous argillite, slate, and phyllite*

LOWER CAMBRIAN

4 — *LAIB FORMATION: phyllite, argillite, schist, micaceous quartzite; minor limestone;* **4a**, *limestone and dolomite; minor schist*

3 — *RENO FORMATION: argillaceous quartzite, argillite, micaceous schist*

2 — *QUARTZITE RANGE FORMATION: white, green, and pinkish quartzite; minor schist;* **2a**, *argillaceous, micaceous quartzite*

LOWER CAMBRIAN AND (?) LATER

7 — *Quartzite, schist, argillite, slate, limestone; minor igneous members;* **7a**, *white and grey quartzite,* **7b**, *black phyllite and schist*

PRECAMBRIAN

WINDERMERE (?)

1 — *THREE SISTERS FORMATION: green and grey grit and quartzite; minor schist and limestone;* **1a**, *conglomerate*

Heavily drift-covered area
Bedding, tops known (inclined, vertical, overturned)
Bedding, tops unknown (inclined, vertical)
Schistosity (inclined, vertical)
Gneissosity, stratiform foliation (inclined, vertical)
Lineation
Fault (defined, approximate, assumed)
Thrust fault (defined, assumed)
Fossil locality
Anticline
Syncline
Glacial striae
Mine

Geology by H.W. Little, 1947, and A.L. McAllister, 1948, with modifications based on field work by J.T. Fyles and C.G. Hewlett, British Columbia Department of Mines

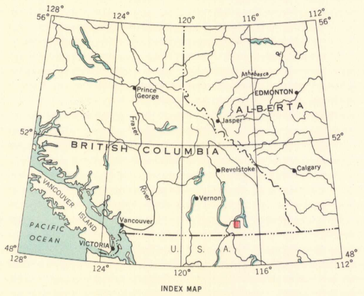
Descriptive notes by H.W. Little

Cartography by the Geological Survey of Canada, 1963

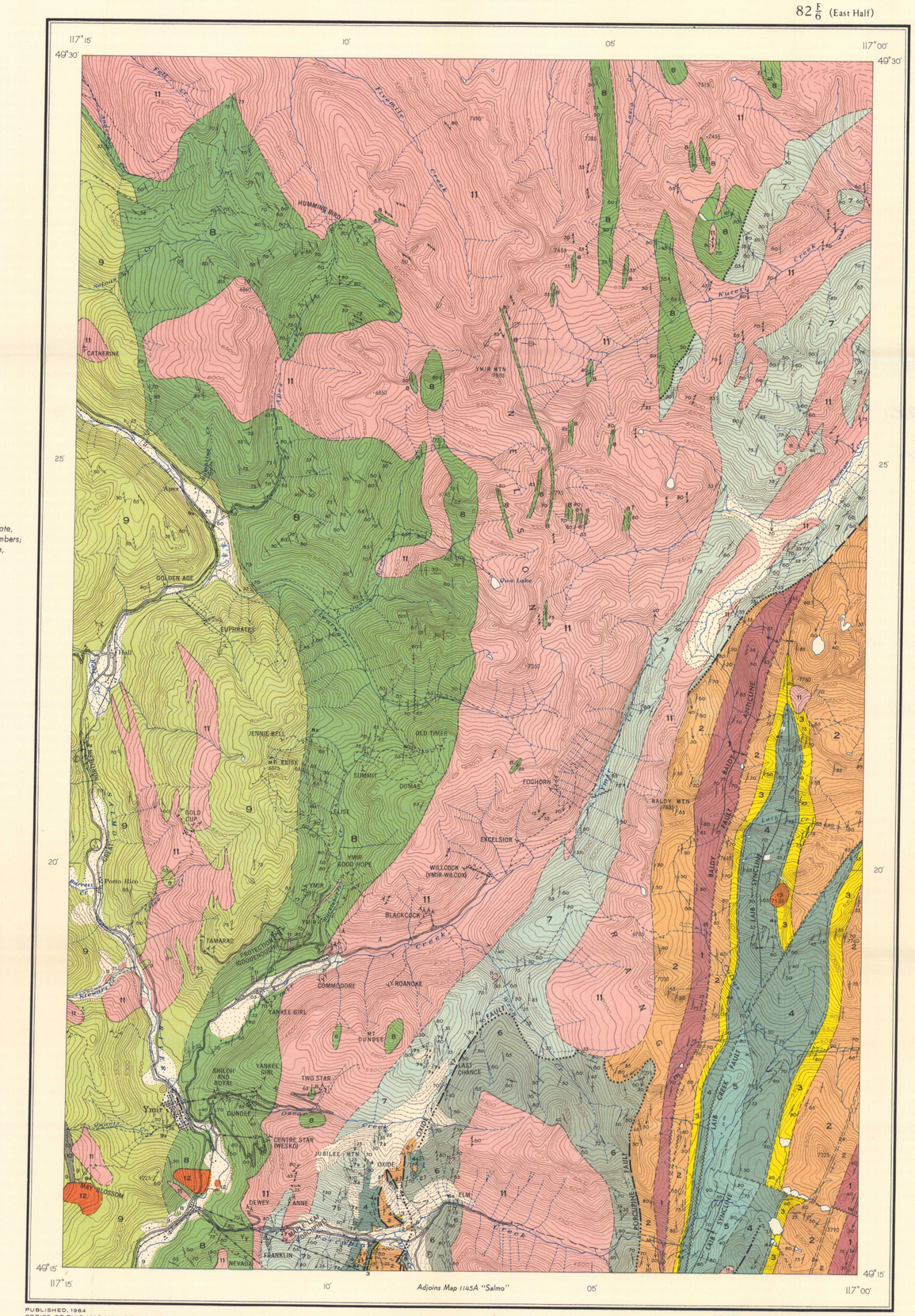
Main highway
Other roads
Logging roads
Trail
Railway
Aerial tramway
Power transmission line
Building
Church
School
Post Office
Intermittent stream
Marsh
Contours
Height in feet above mean sea-level

Base map by the Surveys and Mapping Branch 1958
Revisions to roads by the Geological Survey of Canada

Approximate magnetic declination, 21° 48′ East decreasing 2.9′ annually



INDEX MAP



PUBLISHED, 1964
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MAP 1144A

GEOLOGY

YMIR

(Nelson, East Half)

BRITISH COLUMBIA

Scale: One Inch to One Mile = 1/63,360

1 ½ 0 1 2 3 Miles

JUL 31 1964

DESCRIPTIVE NOTES

The Three Sisters Formation (1) is the youngest in the succession of the Precambrian Windermere system. In the southeast corner of the map-area the formation consists of coarse clastic rocks of which the upper 2,000 feet are exposed. Some 1,400 to 1,500 feet below the top is a band of coarse conglomerate (1a) which is 34 to 53 feet thick. To the northwest on the west limb of the Baldy anticline the formation comprises 2,610 feet of finer-grained, more argillaceous quartzites and minor schist and limestone. On the east limb the section is much thinner, but in neither locality is the base of the formation exposed.

The base of the Cambrian system has been placed at the contact between the Three Sisters and Quartzite Range (2) Formations. Because the Three Sisters Formation is equivalent to the upper part of the Horsethief Creek 'series' of the adjacent map-area to the east, this horizon, representing the Precambrian-Cambrian contact, can be traced more than 100 miles northward. Cambrian trilobites occur near the top of the Quartzite Range Formation just south of the International Boundary.

The Quartzite Range Formation (2) in the eastern part of the map-area comprises a striking unit of, mainly, white quartzite. There it is about 4,505 feet thick, and contains a 215-foot-thick band of light brown micaceous quartzite 1,580 feet above the base of the formation. Farther west on the limbs of the Baldy anticline the rocks are finer grained and thin bedded. The formation there is thinner, being 600-1,400 feet and 2,000-3,000 feet thick on the east and west limbs respectively, but on the former the lower part of the formation apparently is removed along the Baldy fault. A measured section on the west limb totals 2,190 feet, but the top is not exposed.

The Quartzite Range Formation is overlain by the Reno Formation (3) which represents a transition from clean clastic sediments through argillaceous to calcareous rocks of the basal part of the overlying formation. In the eastern part of the map-area the Reno is apparently 600-1,100 feet thick; a measured section near the south border of the map-area is 739 feet thick. On the east limb of the Baldy anticline, however, the formation is only 130 to 300 feet thick, but is poorly exposed, and it is not present on the west limb.

The Reno Formation is succeeded by the Laib Formation (4). The basal limestone (4a), which locally contains some dolomite and interbedded schist, is 30 to 188 feet thick, and is equivalent to the Reeves Member of Fyles and Hewlett in the Salmo lead-zinc belt. The Laib Formation, although it contains abundant arenaceous and calcareous rocks, is dominantly argillaceous. Near the south border of the map-area it is 3,172 feet thick, but it is thicker farther south.

Only the lower 1,000 feet or so of the Nelway Formation (5) is exposed in the map-area, and is distinguished from the underlying Laib Formation by the preponderance of calcareous rocks. Trilobites of middle Middle Cambrian age occur in the equivalent Metaline 'limestone' south of the International Boundary, but no diagnostic fossils have been found in the Nelway Formation.

Within the map-area the Active Formation (6) is in fault contact with other formations, but south of the International Boundary the equivalent formation overlies the equivalent of the Nelway Formation without angular discordance. There, graptolites of Lower and early Middle Ordovician age are abundant. In Ymir map-area only one collection of graptolites has been made. These, of probable Lower Ordovician age, were collected east of Active Creek. The thickness of the Active Formation is not known, but is probably at least 2,500 feet. The top of the formation is not exposed.

Map-unit 7 is a folded and faulted complex in which some members of units 2, 3, and 4 have been recognized by Fyles and Hewlett in Salmo map-area and in Porcupine Creek valley.

Units 1-6, which are apparently conformable, comprise the upper part of the Windermere — early Palaeozoic succession which was deposited in a miogeosynclinal environment. The Three Sisters, Quartzite Range, and Reno Formations (1-3) comprising thick, coarse, clastic rocks with abundant crossbeds in the east, become thin bedded and finer grained westward, away from the gradually subsiding geanticline. The upper part of the succession is dominantly argillaceous and calcareous.

The Ymir Group (8), although apparently unfossiliferous, is believed to be roughly equivalent to the Slocan Group which occurs some 50 miles to the north, and is of Triassic and probably early Lower Jurassic age. The upper part of the Ymir Group is correlated lithologically with the Archibald Formation which occurs roughly 15 miles southwest of Ymir. The Archibald Formation contains ammonites of early Lower Jurassic age. The thickness of the Ymir Group is unknown because its structure has not been studied in detail and the base is not exposed, the formation being in fault contact with map-unit 7.

Conformably overlying the Ymir Group is the predominantly volcanic Elise Formation (9). At one locality southwest of Ymir map-area the Elise Formation yielded fossils of lower Sinemurian (early Lower Jurassic) age, but at other nearby localities it rests upon lower Sinemurian beds. On highway 3A-6 about 1¼ miles south of Hall Creek, ammonites of Toarcian (late Lower Jurassic) age were discovered by H. Frebold of the Geological Survey in sedimentary beds near the top of the Elise Formation. In Ymir map-area, the Elise Formation appears to be 8,500-9,000 feet thick.

Only the lower part of the overlying Hall Formation (10) occurs within the map-area. Elsewhere the formation has yielded ammonites of Toarcian to Bajocian (early Middle Jurassic) and possibly younger age.

The Mesozoic assemblage (units 8-10), comprising interfingering volcanic and marine sedimentary rocks, was deposited in a eugeosyncline.

The Nelson plutonic rocks (11) consist mainly of granite, much of which is porphyritic. A large, sill-like body on the west slope of Mount Elise is composed of albite porphyry. Dykes of lamprophyre, aplite, and pegmatite, apparently related to larger bodies of Nelson rocks, occur throughout the area. The age of these rocks is post-Middle Jurassic. No upper limit to the age has been established by geological means, but biotite from a specimen of granodiorite collected in a quarry near Nelson was calculated by the K-Ar method to be 86 million years, i.e. Upper Cretaceous (?).

Two bodies of Coryell alkaline rocks (12) occur in the southwest corner of the map-area. Both consist of basic syenite in which euhedral phenocrysts of augite are conspicuous and biotite is common. In the plug near Salmo River the basic syenite grades into pulaskite of which small stringers cut the basic syenite. The pulaskite forms the core of the plug and is well exposed along the railway where it has been quarried.

Near the head of Laib Creek is a small plug of shonkinite that appears to be identical to the McGregor intrusions (13) farther east.

The Coryell rocks, from evidence obtained many miles west of the map-area, are of Tertiary age. The McGregor alkaline rocks, being similar mineralogically, are also believed to be Tertiary.

Ymir map-area is structurally within the Kootenay arc, which there trends slightly east of north. Owing to the greater abundance of granite relative to the Salmo map-area to the south, and the consequently higher grade of metamorphism, the structure is more difficult to interpret, and in many localities such interpretation is by analogy with Salmo map-area. There appear to be four structural units analogous to the "Eastern", "Black argillite", and "Mine" belts and the "Mesozoic volcanic rocks" block, of Fyles and Hewlett in the Salmo lead-zinc area. In Ymir map-area the four structural units are, from east to west, bounded successively by the Porcupine and Oxide faults and an assumed fault that forms the contact between map-unit 7 and the Ymir Group. These are probably thrust faults, formed late in the early period of deformation in which the largely isoclinal, locally overturned, folds, such as the Laib Creek syncline and Baldy anticline, were formed. This folding and faulting occurred prior to the emplacement of the Nelson plutonic rocks.

Except for the belt between the Porcupine and Oxide faults, older rocks are thrust upon younger rocks of the underlying fault slice. The faults were folded subsequently, but it appears that the above two faults are converging northward and may have joined where they are now obliterated by granite.

East-west faults of minor importance that offset the early thrust faults have been mapped by Fyles and Hewlett. Two similar faults, one of much greater displacement, that occur in the southwest corner of the map-area are probably also later than the early thrust faults, and may be younger than the granitic bodies. No evidence has been obtained to determine whether the Baldy and Laib Creek faults are early or late in the structural sequence, but as the latter is not offset by the east-west faults referred to above, it is probably late. Some recent movement along the Baldy fault has created small scarps.

The mines of Ymir map-area are primarily gold-producing, although important amounts of lead, zinc, and silver also have been produced. The mines have operated intermittently, mainly during the period 1900 to 1940, and since that time production has been almost entirely by lessees. Only two mines, the Yankee Girl and Ymir, have been relatively major producers, but the Centre Star (Wesko) and Protection (Goodenough) have been important. Other mines, in rough order of value of production, are the Dundee, Willcock, Blackcock, Euphrates, Catherine, Hummingbird, and Tamarac. Only a few tons of ore have been mined at the Golden Age, Commodore, Elise, Excelsior, Dewey, Maple Leaf (Porcupine), Nevada, Myrtle, Pilot-Good Hope, New Victor, and Arizona. The last four properties are not shown on the map because the locations of the workings are not known accurately.

For further details see the following selected publications:

Drysdale, C. W. (1917): Ymir Mining Camp, B.C., Geol. Surv., Canada, Mem. 94.

Frebold, Hans (1959): Marine Jurassic Rocks in Nelson and Salmo Areas, Southern British Columbia, Geol. Surv., Canada, Bull. 49.

Little, H. W. (1960): Nelson Map-area (West Half), British Columbia, Geol. Surv., Canada, Mem. 308.

Frebold, Hans, and Little, H. W. (1962): Palaeontology, Stratigraphy, and Structure of the Jurassic Rocks in Salmo Map-area, Southern British Columbia; Geol. Surv., Canada, Bull. 81.