CANADA

DEPARTMENT OF MINES AND TECHNICAL SURVEYS

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PRELIMINARY MAP

DEWAR CREEK

BRITISH COLUMBIA

By

J. E. Reesor

OTTAWA
1954

Price, 25 cents

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(Descriptive Notes)

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DESCRIPTIVE NOTES FOR DEWAR CREEK MAP, BRITISH COLUMBIA

INTRODUCTION

The map-area is accessible by road from Marysville, up St. Mary River, and from Torrent, up Skookumchuck Creek; it can be traversed by pack-horses along the main valleys, but back-packing is necessary elsewhere within its boundaries.

The area lies on the east flank of the Purcell Mountains, and is characterized by deeply dissected, irregular mountain masses, which exhibit no tendency to form well-defined ranges. Local relief varies from 3,000 to 5,000 feet, with maximum elevations rising to 9,600 feet. The main valleys, where not burned over, are thickly forested, below 4,500 feet, by spruce, Douglas fir, and some cedar, and at higher levels by spruce, balsam, and jack pine. Open larch stands are common just below timber-line at 7,500 feet.

GENERAL GEOLOGY

Summary

Sedimentary formations of the Lower Purcell(1-6)* and Upper Purcell(7) Series comprise 30,000 feet of fine-grained, mainly clastic rocks of Proterozoic age. They are the oldest rocks in the area. Following their deposition, they were invaded, generally conformably, by the basic, mainly sill-like, Moyie intrusions, formerly referred to as "Purcell intrusives". All these rocks were then folded, faulted, and partly metamorphosed, and into this assemblage was intruded the granitic rocks of the White Creek composite batholith, resulting in considerable further deformation and contact metamorphism. In addition, a small part of the Fry Creek[1] batholith(15) outcrops in the northwest corner of the map-area. It similarly modifies surrounding structures and has altered the sedimentary rocks.

Sedimentary Rocks

Lower Purcell Series

Aldridge Formation. The Lower division(1) of this formation consists of rusty weathering, light-coloured, very fine-grained, thin-bedded quartzite and argillaceous (sericitic) quartzite.

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*Numbers in parentheses are those of map-units on the accompanying geological map.

The base is nowhere exposed in the Dewar Creek area, but as much as 5,800 feet of the division is exposed north of the White Creek batholith. Crossbedding is common, and rare scour and fill features may be noted on a minor scale. The rusty weathering and closely spaced laminae in the quartzites distinguish the division from other formations in the Lower Purcell Series.

The Middle Aldridge division(2) consists essentially of a grey to purplish grey, grey to white weathering, fine-grained quartzite in beds that range in thickness from 2 inches to 2 feet, separated by thin partings of black argillite and argillaceous quartzite. These rocks have an aggregate thickness of not less than 10,000 feet, and comprise the most competent Lower Purcell unit in the map-area.

The Upper division(3) of the Aldridge is a very rusty weathering, thin-bedded, platy, white-lined, black or grey argillite, but includes some very fine-grained, black, argillaceous quartzites. In the western part of the map-area, the unit is represented by crenulated phyllites and quartzites of Middle Aldridge type, which comprise up to 50 per cent of the section. It is, therefore, not so clearly distinguished from the Middle Aldridge in the more highly deformed area in the west. This division varies in thickness from 1,500 feet in the east to about 1,000 feet in the west.

Creston Formation. The lower, mud-cracked member (4A) is not extensive, but serves as an excellent marker horizon above the Aldridge formation in the southeastern part of the map-area. It reaches a thickness of 1,500 feet in the area eastward from White Creek, but is missing in the western part of the map-area. It consists primarily of black to grey weathering, very dark, fine-grained, recrystallized equivalents of siltstones and mudstones. The more argillaceous beds show widespread mud-cracks and other shallow-water features.

The remainder of the Creston formation(4), 4,000 to 5,000 feet thick, is characterized essentially by grey, green, purple, and white, argillaceous quartzites and argillites, which weather to similar or somewhat lighter shades. Primary, shallow-water features such as wave ripple-marks, crossbedding, minor intraformational breccias, and scour and fill features are common throughout the section. Thin, dark grey or purple laminae, up to 1/8 inch wide, are common in many of the quartzite beds; they may be very regular or may be minutely contorted and discontinuous, giving a mottled appearance to the surface of the rock.

Kitchener Formation(5). The characteristic feature of this formation is the presence of carbonate; though most beds contain some carbonate, a few consist of pure limestone or dolomite, and almost all sections contain abundant quartz. The main rock types are: fine-grained, reddish weathering quartzites; buff

weathering, sandy dolomites and dolomites; black argillaceous limestone; and black, grey, and green argillites. Beds are invariably thin. Though little lithological variation may be noted in the formation, yet the lower part is characterized by the presence of the green argillites, and the upper part by black, and black and white argillite. The aggregate thickness of the Kitchener, measured along the east boundary of the map-area, is not less than 4,700 feet.

Siyeh Formation(6). This formation consists of about 2,800 feet of very thin-bedded, green, purple, and grey argillites, slates, and argillaceous quartzites. It is characterized in particular by its content of light and dark green, thin-bedded slates, and is distinctly less limy than the underlying Kitchener or overlying Dutch Creek formations.

Upper Purcell Series

Dutch Creek Formation(7). This is the only formation of the Upper Purcell Series exposed in the map-area. It is separated from the underlying Siyeh by a thin section of tuffs, which are considered to be the equivalent of the "Purcell lava"[2] and are not indicated separately on the map. In this area, the Dutch Creek consists of about 1,000 feet of sedimentary rocks similar to those in both the Siyeh and the Kitchener formations. It contains, as well, thin sections of light-coloured, fine-grained quartzite, which serve to distinguish it from the underlying formations.

Intrusive Rocks

Moyie Intrusions(A)

Sills and minor dykes referred to as the Moyie sills[3], Purcell sills[4], and Purcell intrusives[5] occur throughout the Lower Purcell Series of the map-area, and are most abundant in the Middle and Lower divisions of the Aldridge formation. They consist essentially of meta-diorite or meta-quartz diorite in which most of the original pyroxene has been replaced by amphibole, and in which the plagioclase is partly to completely albitized.

These sills, although not found in the Dutch Creek formation in this map-area have been found to occur throughout the Lower and Upper Purcell Series elsewhere in this general region[6], and, in addition, have been involved in all the folding and faulting affecting the enclosing sedimentary rocks. Tentatively, they are considered to be of post-Upper Purcell, late Proterozoic age.

The small body of serpentinized rocks(B) east of Dewar Creek is of uncertain origin; it appears to intrude Creston and Kitchener formations but is itself cut by apophyses and pegmatite dykes from the White Creek batholith.

White Creek Composite Batholith

The White Creek batholith outcrops over an area of about 140 square inches in the central part of the map-area. Roughly oval in its surface dimensions, with its long axis trending northeast, the mass consists of a rudely concentric succession of rock types. Around its margin, in the western half of the batholith, is a band of biotite granodiorite(8), within which lies a body of hornblende-biotite granodiorite(9). Inward from this again, and forming most of the eastern half of the batholith, is a large body of porphyritic biotite granodiorite(10), which contains variable quantities of microcline phenocrysts (porphyroblasts?). The interior of the batholith is composed of quartz monzonite(11), varying in texture from coarsely granitoid to finely aplitic. Contacts between rocks of the above types are gradational. West of the upper part of White Creek, a mass of fine-grained equigranular granodiorite(12) intrudes the older granodiorites of the batholith, and minor intrusions of aplite(13) and pegmatite(14) occur throughout the marginal area of the batholith and, rarely, beyond its boundaries.

Internal structural details of the White Creek batholith have been studied. Foliation is shown in some places by the parallel arrangement of biotite tablets and feldspar phenocrysts, and in others by disk-shaped inclusions in the granodiorite, and has been found to conform with the contact between the batholith and the surrounding sedimentary rocks. Lineation is in many places shown by elongate or cigar-shaped inclusions, and is generally vertical.

METAMORPHISM

Regional Metamorphism

The sedimentary rocks in the least deformed parts of the map-area, along its south and east boundaries, are least metamorphosed. Quartzites there are recrystallized so that original textures are no longer recognizable, and chlorite, sericite, and biotite have formed in the argillitic members. On the other hand, the more deformed Creston rocks in the western part of the map-area have been metamorphosed to phyllites and phyllitic quartzites, and primary structures, so readily observable in the east and south, have been entirely destroyed.

Contact Metamorphism

In contrast with the widespread evidence of structural deformation, the metamorphic aureole about the White Creek batholith is recognizable for only about 3,000 feet from the batholithic contact and is intense for 1,000 feet or less. Within this aureole the grain size of the intruded rocks increases as the contact

is approached, but the metamorphic types produced depend on the original composition of the rocks. Oligoclase-quartz-mica schists, biotite schists, tourmaline-quartz schists, and cordierite-quartz-mica schists are common. Pure quartzites are merely recrystallized to a coarser grain. Adjacent to the contact, along the western edge of the batholith, massive Creston quartzites have been altered to mica-feldspar-quartz gneisses, the relatively high content of quartz and feldspar preventing the formation of a well-marked schistosity so common elsewhere near the contact.

STRUCTURAL GEOLOGY

Within the map-area, three structural provinces, related to the bounding limits of certain rock types, may be recognized. The first, including, and occurring east of, the competent Middle division of the Aldridge formation, is characterized by broad, open folds intersected by minor faults; the second, west of the outcrop area of Middle Aldridge, exhibits intense deformation, with isoclinal folds sheared and metamorphosed; and the third, superimposed on the first two, surrounds and is consequent upon the intrusion of the White Creek batholith, around which variously trending formations have been pushed into conformity with the granitic contact.

Hall Lake Fault. This fault has been named from its occurrence at Hall Lake in St. Mary River map-area to the south. West of White Creek, rocks of the Lower division of the Aldridge formation have been faulted against the Creston formation along White Creek, indicating an upward movement on the west side of not less than 15,000 feet. The fault plane dips steeply west to vertically, and curves eastward just south of the contact with the White Creek batholith. It is clearly truncated by the batholith.

Findlay Creek Fault. This fault, or fault zone, lies west of the main branch of Findlay Creek. The relative displacement along it, within the undifferentiated rocks of the Middle division of the Aldridge formation, could not be determined, but it has a width of more than a hundred yards, and like the Hall Lake fault is truncated at the batholithic contact.

ECONOMIC GEOLOGY

No significant mineral deposits have yet been discovered within the map-area. The Sullivan lead-zinc orebody, which lies a few miles south of the southeast corner, occurs near the top of the Lower division of the Aldridge formation, and may be in part stratigraphically, in part structurally, controlled. This horizon may be traced throughout Dewar Creek map-area, but no evidence of lead-zinc mineralization has yet been observed along it.

Minor vein showings of chalcopyrite, galena, and sphalerite were observed in the southwest corner of the map-area. It is probable, however, that the most favourable area for further prospecting for mineral deposits lies north of White Creek batholith, in the area underlain by the Aldridge formation.

Great Dane. This prospect lies north of St. Mary River in the southwest corner of the map-area, at an elevation of 6,900 feet. An adit has been driven about 65 feet in a pod of galena, sphalerite, and chalcopyrite in Creston argillaceous quartzite. Minor occurrences of chalcopyrite were found on the north slope of the same ridge almost directly north of the Great Dane, and on the strike of the bedding in the Creston rocks.

Granitic pegmatites north of Skookumchuck Creek contain small amounts of beryl and shattered tourmaline.

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[1]Rice, H. M. A.: Geology of Nelson Map-area, East Half; Geol. Surv., Canada, Mem. 228, p. 34 (1941).

[2]Daly, R. A.: Geology of the North American Cordillera at the Forty-ninth Parallel; Geol. Surv., Canada, Mem. 39, pp. 207-220 (1912).

[3]Daly, R. A.: op. cit., pp. 226-255.

[4]Schofield, S. J.: Geology of Cranbrook Map-area, British Columbia; Geol. Surv., Canada, Mem. 76, pp. 56-75 (1915).

[5]Rice, H. M. A.: op. cit., p. 24.

[6]Rice, H. M. A.: op. cit., p. 27.