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DEPARTMENT OF MINES AND TECHNICAL SURVEYS

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# McQUESTEN LAKE AND SCOUGALE CREEK MAP-AREAS YUKON TERRITORY

(106 D/3 and 106 D/2)

(Report, Map 8-1958 and Map 9-1958)

By

L. H. Green

OTTAWA
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*Price, 50 cents*

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The southern boundary of the map-areas is just over 6 miles north of the village of Keno Hill, which is connected with Mayo Landing by gravel roads. Float-equipped aircraft based at Dawson and Whitehorse can operate from the Stewart River at Mayo Landing. The trails shown originate at Keno Hill and are suitable for use by pack-horses.

Mountain groups separated by wide connecting valleys are characteristic of the area. These lie near the margin of the Yukon Plateau, and the upland surface is visible only in Davidson Range and near the western margin of McQuesten Lake map-area. The large open valleys were produced in Pleistocene time by ice flowing from the east towards the south and west. Conspicuous kame terraces and ice marginal stream channels are common along the sides of the major valleys at elevations up to 5,000 feet. Some of these features may indicate the highest elevation attained by the ice of the last advance, but many appear to represent periods when the level was relatively stabile during the thinning of the ice.

Much of the area is underlain by a thick assemblage of quartzite, phyllitic quartzite, schist, graphitic phyllite, and minor limestone that has been tentatively assigned to the Yukon group (1, 2, 3 and 4). The rocks of this group are divided on the basis of lithology into map-units that are believed to be arranged in order of age, but repetitions of rock types within and between the map-units may be due to structural complexities.

In Patterson and Davidson Ranges, map-unit 1 is characterized by thinly bedded, grey to black quartzites, phyllitic quartzites and graphitic phyllites. Minor amounts of quartz-muscovite and quartz chlorite schist are also present. Greenstone sills (6, 6a) are far more numerous in unit 1 than in other map-units.

Map-unit 2 is well exposed in Patterson and Davidson Ranges. It is the most competent of the sedimentary rocks and forms most of the higher ridges. Individual beds of massive quartzite are up to 6 feet thick but are commonly on the order of 1 foot. In Davidson Range many of the quartzite bands over 1 foot thick may contain sufficient muscovite to produce partings 2 to 3 inches apart. The percentage of muscovite required to produce such a parting is extremely small and the development of the parting may indicate a difference in structural and metamorphic conditions in this part of the area rather than a fundamental difference in composition from the massive quartzites elsewhere.

The quartzite beds are separated by bands of graphitic phyllite most of which are only a few inches thick. In the southeast part of Scougale Creek map-area, map-unit 2a, consisting principally of phyllitic quartzite, has been differentiated from the massive quartzite of map-unit 2. Similar units might be differentiated in the northwest corner of the map-area if sufficient information were available. In Davidson Range, map-unit 2 appears to be interbedded with map-unit 1 rather than overlying it as in the southeast corner. The rocks (2) are very similar lithologically in the two areas, but map-unit 2 in Davidson Range may represent a lower zone. If so this lower zone extends southeast from East McQuesten River to Davidson Range and the upper in an arc from Mount Haldane to Mayo Lake and Patterson Range. Only the eastern end of the latter arc would lie within the map-areas.

Southwest of the zone of numerous limestone bodies (4), map-unit 3 consists of massive greenish grey to light buff quartzites, phyllitic quartzites, commonly chloritic, and lesser amounts of black, green, and maroon slates. The quartzites commonly contain grains of quartz up to 4 mm. in size but generally less than 1 mm., which contrast with the fine-grained matrix. Throughout most of the map-unit the original bedding appears to have been almost totally destroyed and only a crude foliation remains. Northwest of the limestone zone map-unit 3 is characterized by black graphitic phyllite, thin-bedded grey quartzite, and dark grey to black, thinly bedded chert, as well as minor amounts of chloritic phyllite and pebbly quartzite. No structural discordance was observed between the two lithologies. West of McQuesten Lake, the predominant rock types of map-unit 3 include massive pebbly quartzite, buff to green phyllitic quartzite, chloritic and graphitic phyllite and bands of grey limestone. The rocks in this area have been correlated with the remainder of map-unit 3 on the basis of lithology.

The limestones (4) display a wide range of colour including blue-grey, grey, black, and white. They commonly show some degree of banding produced by layers of contrasting colours a few millimetres apart. Individual limestone lenses commonly thin and disappear to be replaced by similar limestones in overlying or underlying horizons.

Rocks of map-unit 5 outcrop in the northeast corner of Scougale Creek map-area. The base of the unit consists of a limestone conglomerate with pebbles and boulders up to 1 foot, but commonly less than 1 inch, in diameter in a matrix of fine-grained, buff weathering, grey limestone. Most of the pebbles are limestone but a few are of phyllitic material similar to that of the underlying Yukon group. Aside from this conglomerate and a few bands of buff weathering intraformational conglomerate, the remainder of map-unit 5 is composed of light grey to white weathering, cream-coloured dolomite. A small pod of limestone immediately to the north of Scougale Creek map-area yielded fossils of Silurian to Devonian age. Map-unit 5 is believed to coincide with the southern-most band of limestone mapped by Cockfield (1925, p. 6A) in the Beaver River area.

Numerous sill-like bodies of greenstone (6, 6a) have intruded map-unit 1 and to a lesser extent map-units 2 to 4. In the southeastern part of Scougale Creek map-area a few more basic sills (6a) have been altered to serpentine and carbonate. The original composition of the greenstones is believed to have been hornblende and plagioclase, much of which has subsequently been altered to secondary amphiboles, and albite and epidote respectively. The larger bodies show much of their original texture whereas the thinner bodies have developed a foliation in the secondary minerals paralled to the foliation of the enclosing sediments. Most of the greenstone bodies are lens-shaped, but a few in Davidson Range appear to be much more continuous.

The granodiorite (7) is medium grained and equigranular. Biotite is the common mafic mineral although lesser amounts of hornblende were observed. The small bodies on the south side of Davidson Range are somewhat finer grained and contain muscovite and minor hornblende rather than biotite.

A few thin sill-like bodies of quartz porphyry (8) are present. They consist of fine-grained quartz and alkali feldspar with phenocrysts of quartz and more rarely feldspar. In one case, where one of these intrusions could be followed for some distance, it was found alternately to parallel the bedding and to cut it at a low angle.

The largest structural feature in the map-area is a big isoclinal fold, outlined by the quartzites (2) and the greenstones (6), in the centre of Davidson Range. The axis of this fold has a bearing of S55°W and plunges 20°SW. In addition to this major feature a number of smaller features suggest that the area has had a complex structural history. Several of the larger greenstone bodies terminate in isoclinal folds and it has been possible to trace the bedding around the noses of these structures. Outstanding examples of these structures are shown by the greenstone sills exposed in the cirque approximately 2 miles northwest of Mount Patterson and the large greenstone sill east of the lake on Cameron Gulch of Scougale Creek. Small complex isoclinal folds are common in the massive quartzites (2). In many of these folds thinner beds of quartzite, commonly 2 to 3 inches thick, have been deformed plastically into isoclinal folds whose axial planes are parallel to the bedding. In folds of this type individual beds may be repeated many times in a single outcrop. The axes of these folds plunge southwest in Davidson Range and southeast in Patterson Range. In addition, the rocks of map-units 1 to 3 show a strong foliation. This foliation is frequently parallel to the bedding but in many cases it was observed to cross the bedding at an angle thus cutting the original beds into discontinuous segments. This foliation has also been developed in some of the thinner greenstone sills. Both the minor folds and the foliation are indicative of extensive movement parallel to the bedding of the type that might be expected in areas that have undergone complex isoclinal folding. Complex structures might account for apparent thickening of map-units and repetitions of similar lithologies.

In addition to the above features lineations, shown by wrinkles on the bedding planes and crumples in the less competent members, are common. These commonly plunge to the southeast and they may be related to the large open anticline that has been mapped (Bostock, 1947; Green, 1957; Kindle, 1955) to the south of the map-areas.

In the northeastern part of Scougale Creek map-area, map-unit 1 is believed to have been thrust upon map-units 3 and 4. In the northwestern part of McQuesten Lake map-area, map-unit 3 appears to overlie map-unit 2 conformably. However, a great deal of local deformation was observed near this contact and the possibility of a major fault can not be excluded.

Numerous occurrences of iron-cemented conglomerate are shown on the map. The conglomerate contains pebbles and boulders of the adjacent country rock in a limonitic matrix. These bodies are commonly of very local extent and few exceed 200 feet in diameter. Exceptions to this are found in Philip Gulch of Scougale Creek and the creek southwest of Mount Cameron where extensive deposits of conglomerate have formed in the creek bottom. The source of the iron was not observed for any of the conglomerates but the location of most of the bodies near the base of a slope suggests that they were formed by solutions carrying iron derived by the oxidation of iron sulphides higher up the slopes. The sulphides may be present as lenses or disseminated through the country rock.

A number of showings containing silver, lead, and zinc have been investigated in Davidson Range. The most important of these are on Stand-to Hill, Rambler Hill, and at the head of Alverson Gulch off Scougale Creek. Little work has been done on any of these properties since they were described by Cockfield (1921, pp. 4A-6A). All are mineralized with galena, sphalerite, and minor chalcopyrite. The gangue is siderite, commonly altered to limonite and manganese oxides, and minor quartz. The silver content of the ores from these properties appears to be lower than those of Keno and Galena Hills. The highest silver to lead ratio obtained by Cockfield (1922, p. 6A) in Davidson Range was 1.33 oz. of silver per 1 per cent of lead as contrasted to assays from Keno and Galena Hills which are commonly at least 3 to 4 oz. of silver per 1 per cent lead. This difference in the silver content may be related to the fact that in Davidson Range most of the copper occurs as chalcopyrite whereas in the Keno and Galena Hill areas it occurs as argentiferous tetrahedrite or freibergite.

The massive quartzites of map-unit 2 and the adjacent sediments are probably the most likely rocks to contain mineral deposits. The quartzites of Davidson Range have been prospected in the past, but there is very little evidence of prospecting elsewhere within the map-area.

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