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GEOLOGY
CLARKE PEAK AREA
YUKON TERRITORY
ATLAS EXPLORATIONS LIMITED

-by-

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SUMMARY

The Clarke Peak area is within the eastern belt of stratified rocks of the southern Yukon. The rocks of the map area are described as Devonian and Carboniferous (mainly Mississippian) conglomerate, quartzite, graywacke, chert, slate, younging to the south and trending east-west.

The regional structural pattern to the north, which appears to continue into the area, is of E.N.E. and E.S.E. folds, with anticlines being followed by valleys, and synclines forming the intervening plateaus. The faulting is atypical, perhaps reflecting the complexity of regional structure.

The economic interest is in a limonitic (gossan?) conglomerate on the south flank of Clarke Peak. The origin of the gossan is unknown and no other areas are noted.

INTRODUCTION

The Clarke Peak area is one of several selected for exploration by Atlas. The present photogeologic study is based on published data.

The area, location and access

The area of immediate interest lies on the south slopes of Clarke Peak which is about 3 miles northwest of Lat. 63°N , Long. 135°W . Aerial photographs have been studied for the area between Clarke Creek and Macmillan River.

The Clarke Hills, which culminate in Clarke Peak are in the eastern part of the cordilleran region of southern Yukon Territory, on the north flank of the Pelly Mountains. Clarke Peak is 60 air miles south of Keno Hill and 160 air miles north of Whitehorse. Pelly Crossing, on the Whitehorse to Dawson and Keno Hill road, is 45 miles to the west. The old way into the area was by canoe up the Pelly and Macmillan to the Kalzas, then by trail up the Kalzas.

Previous work

Even before the Russians first came to the Yukon River, in 1834, there were whispers of gold, but both they and the Hudson's Bay Company traders who invaded the Yukon valley at mid-century, were interested in furs. Robert Campbell, one of the company's most industrious explorers, found traces of gold at Fort

Selkirk, where the Pelly joins the Yukon, but the discovery did not intrigue him. (P. Berton "Klondike" McELelland and Stewart, 1958).

The first of the gold seekers was Arthur Harper, who came via the Peace and Mackenzie valleys, reaching the Yukon in 1873. He explored four of the major tributaries which later yielded fortunes, including the Stewart, the next major river north of the Clarke Hills. Gold placers were reported on the Stewart River as early as 1894, and in the summer of 1898 many hundreds of prospectors made their way up it as an offshoot of the Klondike rush. Some of them would undoubtedly return by crossing the watershed of the Nogold and Kalzas plateaux, and so down Kalzas River, past Clarke Peak, and the Macmillan River and so back to the Pelly and Yukon, but the Macmillan watershed never had the same interest as the Stewart.

The Summary Report of the Geological Survey of Canada for 1902 (in Ann. Rept. vol. XV, p.12A, 1906) and republished in Mem. 284, gives sufficient reason for the lack of interest in the Macmillan. It was examined by Mr. R.G. McConnell, and in his note which accompanies McConnell's report, Dr. Robert Bell, Director, succinctly notes: "Samples were collected from a number of quartz veins and it was hoped that

some of these would be found to contain gold, but on assay in the laboratory of the Survey, none was detected". McConnell too noted that the river had been more or less prospected along its whole course, but although fine colours are present everywhere, no pay bars were worked: the formations cut by the Macmillan are younger than the old quartz-bearing schist and gneiss.

During the 1930's systematic mapping of the southern Yukon was begun by A.S. Bostock. Publication by the G.S.C. has been on the 4 mile scale. The Mayo Sheet, which includes Clarke Peak, was published in 1947 as map 890A. The Kalzas Range, which lies to the south of Clarke Peak, is in the Glenlyon area, mapped by R.B. Campbell and J.O. Wheeler and published in 1960 as Map 25-1960.

These works were incorporated in the Geological Map of the Yukon Territory, Map 1048A, published by the G.S.C. in 1957 in Gabrielse and Wheeler's "Tectonic Framework of Southern Yukon and N.W. British Columbia", G.S.C. paper 60-24, published in 1960 and in Map 30-1963, Geology, Yukon Territory and N.W.T.

Aeromagnetic maps cover much of the southern Yukon but all are south of the present area, between 60° and 62°N.

No record of recent private work is known.

General Geology (after Gabrielse and Wheeler)

The part of the Cordilleran region which includes the southern Yukon Territory may be divided into three northwesterly trending belts of relatively unmetamorphosed stratified rocks separated by two zones of crystalline metamorphic and granitic rocks.

The Clarke Peak area falls within the eastern belt of stratified rocks which embodies the Pelly, Cassiar, and northern Rocky Mountains. It is underlain mainly by Mississippian and older rocks in regularly bedded formations traceable for many miles. Pre-Upper Devonian rocks in this belt are essentially non-volcanic. Upper Devonian and Lower Mississippian strata contain abundant volcanic material and attain great thicknesses.

The area is at the northwest end of a synclinal belt of Devonian and Mississippian sediments which forms part of this eastern belt. This syncline is part of a eugeosyncline with accompanying volcanism, ultramafic intrusion and tectonic activity, which suddenly developed on an area that had been relatively stable in late Proterozoic and early Palaeozoic time, and in which great thickness of volcanic and sedimentary material was deposited in a short time.

Angular unconformities occur with the early Mississippian of the belt, indicating deformation and uplift from time to time during sedimentation in

the Devono-Mississippian eugeosyncline. It is not known whether metamorphism and granitic intrusion accompanied these orogenic movements.

The 450 mile long Tintina Trench trends northwest at the southwest corner of the area, crossing the intersection of the Kalzas and Macmillan rivers. It has many of the features considered characteristic of transcurrent faults, for example, remarkable linearity, trench-like form, the separation of rocks of different age and lithological character along most of its length, and the occurrence of younger rocks, first on one side of the trench and then on the other. Related (?) faults commonly carry ore: the fault passes close by the Vangorda and Klondike fields.

Smaller structures in the eastern belt may be related to uplift of the Pelly Mountain crystalline belt and a consequent sliding off to the northeast of the Palaeozoic formations.

LOCAL GEOLOGY

Lithology

The legend of the geological map of Yukon Territory and N.W.T. (Map 30-1963) provides the most succinct description of the rocks of the entire area: Devonian and Carboniferous (mainly Mississippian) conglomerate, quartzite, greywacke, chert, slate.

For the north sheet the 1947 Mayo map (890A) describes almost all the rocks, but chert first in the sequence, as Mississippian or earlier. For the south sheet the following units are shown on Map 25-1960, Glenlyon:

- 19: Andesitic and Basaltic flows, breccia and tuff; diorite; slate, phyllite, slaty limestone, chert, and carbonaceous shale.
- 15: Thin bedded chert, argillite, and quartzite; minor limestone.
- 14: Dark grey and black crystalline limestone, minor argillite and chert.
- 9: Grey and brown chert pebble and cobble conglomerate and breccia; minor quartzite, slate, and bedded chert.
- 8: Dark bedded chert, varicoloured slate, sandstone, quartzite, limestone, and conglomerate.

The conglomerate on the south side of Clarke Peak contains great blocks of sandstone and of other nearby formations cemented by limonite and has the aspect of a gossan.

Structure

The Glenlyon sheet shows formations becoming younger to the south, and this accords with cross-section A-K on the Mayo sheet.

In the Mayo map area some of the important valleys follow anticlinal structures and in many places

synclines occupy the intervening plateaus. The main fold direction is E.N.E., and in the Clarke Hills is a series of E.S.E. trending folds (section J-K). The topography indicates that these fold systems continue into the present area, and the surface traces plotted from the aerial photographs support the concept, at least in part. Where the dips interpreted do not accord, one suspects that estimates were taken on joint planes or cleavage.

Of the two major assumed faults which cross the area, only the southeast part of the southern one is verified on the aerial photographs.

Although the formations trend fairly uniformly east-west, the fault pattern is not one of simple pressures. The folds and cross-folds indicate a complexity and the area is on the west end of a major change in strike that extends northeast to Smith Arm, the northwest arm, of Great Bear Lake, 400 miles distant. Most faults are N.E. or N.W, and abundant short N-S faults appear typically tensional.

ECONOMIC GEOLOGY

Interest focuses on the limonitic gossan conglomerate on the south flank of Clarke Peak. The unit is clearly visible on the aerial photographs, but no other area is recognised.

The origin of the conglomerate is unknown
and there is no other evidence of economic importance
at this time.

Respectfully submitted,
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