

Coal River – New Bedrock Geology Map for Southeast Yukon Highlights Au and Base Metal Potential

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Summary

A new bedrock geology map for the Coal River map area (95D) in southeast Yukon more precisely defines the bedrock geology, with significant revisions to structure, stratigraphy and mineral potential. Base and precious metal mineral potential is enhanced with the discovery of several high-level intrusions emplaced into carbonate rocks. Our refinement of the stratigraphy requires re-assessment of the early Paleozoic tectonic setting of southeast Yukon. The Silurian to Devonian Road River Group is the only sedimentary succession conforming to the traditional definition of Selwyn basin in the eastern part of the map area; other lower Paleozoic rocks previously mapped as Selwyn Basin are carbonate platform facies.

Introduction

Coal River map area is located in southeast Yukon at the south margin of Selwyn Basin and the southeast end of the Tintina Gold Belt. Although favourably situated for mineralization, it is under-explored due to extensive forest cover restricting helicopter access, lack of roads, less than 10% bedrock exposure and old framework geology maps.

Regional bedrock geological mapping of the Coal River map area (95D) was undertaken in 2009 as a collaborative project between the Yukon Geological Survey and the Geological Survey of Canada. Field work extended for approximately 5 weeks with a core team of three bedrock geologists.

Stratigraphy

Neoproterozoic to Triassic strata constitute five miogeoclinal sedimentary rock successions deposited on the passive margin of Laurentia. The oldest Neoproterozoic-Lower Cambrian succession 1 consists predominantly of phyllite, siltstone and sandstone with minor interbedded limestone. Upper Cambrian-Lower Ordovician succession 2 exhibits an east-west facies change from silty limestones in the west to quartzose sandstones in the east, indicating a paleogeographic high at the eastern edge of the area. The Lower to Middle Ordovician succession 3 consists of interbedded dolostone and limestone which was deposited upon a shallow platform that extended across the eastern 2/3 of the area. Silurian-Middle Devonian strata of succession 4 contain the major facies change from carbonate rocks of Macdonald platform in the south to marine carbonaceous shales of Selwyn basin in the north. The carbonaceous shale in this succession constitutes the only strata conforming to the traditional definition of Selwyn basin in this area. Middle Devonian-Triassic strata of succession 5 record three transgressive and regressive clastic cycles.

Submarine alkali basaltic flows and lapilli tuffs occur in at least three stratigraphic horizons in the first three successions. The lowermost of these volcanic intervals is intruded by mafic diabase. The volcanic rocks are interpreted as being rift-related.

A post-orogenic extensional half graben along the Rock River preserved Eocene fluvial mudstone, silt and sand with coal seams, constituting succession 6.

Intrusions

Nine small, previously unmapped Cretaceous-Paleogene(?) granitic stocks were found in the northern and central portions of the map area, bringing the total number of known intrusions in the map area to 15. Most intrusions within the map area are very magnetic and coincide with intense positive aeromagnetic anomalies, suggesting that other positive anomalies may correspond to buried or unmapped intrusions.

Immediately to the north, areally extensive plutons have been variously assigned to the Tay River, Tombstone and Tungsten suites within the Tintina Gold Belt.

Deformation and Metamorphism

Jurassic-Cretaceous contractional deformation is manifested primarily by widely spaced thrust faults separated by large amplitude, asymmetric folds. Structural trends for faults and folds ranges from northwest to northeast. Granitic intrusions are late syn- to post-kinematic. Intensity of deformation increases from east to west, with penetrative fabrics only well developed in the west. Rocks in the western part of the map area also locally exhibit refolded folds with an axial planar crenulation cleavage. Metamorphic grade ranges from sub-greenschist in the east to upper greenschist and locally lower amphibolite in the west.

Extensional deformation is manifest in late stage normal faults. The largest of these extensional features is the Rock River fault, forming a syn-late Eocene, north-trending, half graben with possibly up to 1100 m of vertical displacement.

Deformation is considered to be part of the Cordilleran orogeny, resulting from the amalgamation of Laurentia with allochthonous terranes along the Laurentia western margin.

Mineralization

Strata-bound mineralization is exhibited at several mineral occurrences in the map area. Carbonaceous shales assigned to succession 1 have extensive ferricrete related to weathered pyrite-quartz interbeds in the southwest corner of the map area. Succession 2 contains epigenetic MVT or Irish-type barite-sphalerite-galena occurrences in carbonate. Mississippian strata contain bedded barite locally.

Prospects for intrusion-related mineralization are considered to be high because the intrusions are barely unroofed and many intrude thick carbonate successions. The McMillan Pb-Zn-Ag replacement deposit and the Hyland Gold Au occurrence are inferred to be associated with buried intrusions. Placer Au occurrences are spatially associated with intrusions in the northern part of the area. W skarns are common north of the map area.

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