Descriptive Notes

The Mount Hare 1:50 000 scale map area lies within the Eagle River 1:250 000 scale map area (Norris, 1981). Targeted fieldwork augmented by new biostratigraphy and airphoto analysis has refined the map distribution of stratigraphic units and clarified the location and significance of major structures. Mount Hare map area is dominated by four Paleozoic successions: the middle Cambrian Slats Creek Formation, the middle Cambrian to Devonian, carbonate-dominated Road River Group, the regionally persistent but thin Canol Formation, and the Late Devonian and Carboniferous Imperial and Tuttle Formations. The Road River Group is subdivided into four formations (Cecile et al., 1982; Cecile et al., in press). They comprise, in ascending order, the Cronin Formation (Cambrian and Ordovician carbonate units), the Mount Hare Formation (Ordovician and Silurian cherts and graptolitic shales), the Tetlit Formation (Silurian argillite and dolostone), and the Vittrekwa Formation (Silurian and Devonian graptolitic dark shale and limestone). Here we further subdivide the Cronin Formation by distinguishing a less resistant, shalier lower member (Cambrian shale unit of Cecile et al., 1982) from the thicker, more resistant, carbonate-dominated upper member. Also, a recessive, shale- and siltstone-dominated upper member of the Slats Creek Formation is provisionally distinguished (Cecile et al., 1982). The lower and middle members of the Late Devonian Imperial Formation can be distinguished, and together they occupy much of the western half of the map area. The poorly exposed lower member consists of dark grey shale and siltstone, with thin locally developed fine sandstone beds. In contrast, the middle member contains abundant resistant sandstone intervals that can be traced for several kilometres and which outline local structures. The upper member of the Imperial Formation and the Devonian and Carboniferous Tuttle Formation are locally preserved in the footwall of the Deception Fault along the western edge of the map area. The Imperial Formation was deposited as a southward-prograding turbiditic succession eroded from the Ellesmerian Orogen, the front of which lies within 15 km north of the map area (Lane, 2017).

The map extends across the western limb of the Richardson anticlinorium. Significant map-scale folding is uncommon below the interlayered sandstone-shale succession of the Imperial Formation middle member. The lower Paleozoic successions form a west-dipping homocline across much of the map area. The Cronin Formation, a thick-bedded carbonate succession, dominates the map area in the north but its outcrop trace thins southward, due to generally steeper dips in the south. A set of northeast-striking faults occurs predominantly in the Mount Hare to Canol part of the section. Most of the faults have dextral strike-separations of bedding, but their kinematics are unstudied. Two easterly striking faults show sinistral strike-separations. At the south margin of the map is a complex west- to northwesterly striking fault bundle with subsidiary folds, all of which occur in the Silurian-Devonian part of the succession, adjacent to the northern tip of the Mount Raymond Fault which projects into Hare River from the adjacent Mount Raymond map area to the south (Lane, 2020). This bundle of structures may be kinematically linked to the northern tip of the Mount Raymond Fault. The structural complexity there is undoubtedly greater than shown, due to poor outcrop quality. Although the orientations and kinematics of the various transverse faults were not studied for this project, they might be a useful target for future analysis. Two north-striking steep reverse faults also project into the map area from the south (Norris, 1981; Lane, 2020). However, they appear to die out within 5 km of the southern boundary. The map-scale structures dominating the map area are products of Cretaceous-Cenozoic regional orogenesis (Lane, 1998).

Acknowledgments

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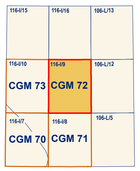
Norris, D.K., 1981. Geology, Eagle River, Yukon Territory; Geological Survey of Canada, Map 1523A, scale 1:250 000. https://doi.org/10.4095/109352

Abstract

The Mount Hare map area extends across the western limb of the Richardson anticlinorium in the southern Richardson Mountains, northern Yukon. It is underlain by four Paleozoic sedimentary successions: middle Cambrian Slats Creek Formation, middle Cambrian to Early Devonian Road River Group, Devonian Canol Formation, and Late Devonian to Carboniferous Imperial and Tuttle formations. The Richardson trough depositional setting of the first three successions is succeeded by a deep-marine, turbiditic Ellesmerian orogenic foredeep setting for the Imperial-Tuttle succession. The carbonate-dominated Road River Group defines a west-dipping homocline which is transected by oblique transverse faults in its upper part. In the overlying Imperial-Tuttle succession, map-scale folds can be defined where shales are interbedded with thick persistent sandstone units. The structural geometry reflects Cretaceous-Cenozoic regional Cordilleran tectonism.

Résumé

La région cartographique de Mount Hare s'étend au flanc ouest de l'anticlinorium de Richardson, dans la partie sud des monts Richardson (nord du Yukon). Quatre successions sédimentaires du Paléozoïque forment son sous-sol : la Formation de Slats Creek du Cambrien moyen, le Groupe de Road River du Cambrien-Dévonien précoce, la Formation de Canol du Dévonien et les formations d'Imperial et de Tuttle du Dévonien tardif-Carbonifère. Au cadre sédimentaire de la cuvette de Richardson dans lequel se sont mises en place les trois premières successions sédimentaires a succédé le cadre de milieu marin profond à dépôt turbiditique de l'avant-fosse de l'orogenèse ellesmérienne dans lequel s'est déposée la succession d'Imperial-Tuttle. Le Groupe de Road River, à prédominance de roches carbonatées, définit un homoclinal à pendage ouest, qui est recoupé dans sa partie supérieure par des failles transversales obliques. Dans la succession d'Imperial-Tuttle, des plis à l'échelle de la carte peuvent être définis là où d'épaisses et persistantes unités de grès sont interstratifiées dans les shales. La géométrie structurale est un reflet du tectonisme régional de la Cordillère au Crétacé tardif-Cénozoïque.



National Topographic System reference and index to adjoining published Geological Survey of Canada maps

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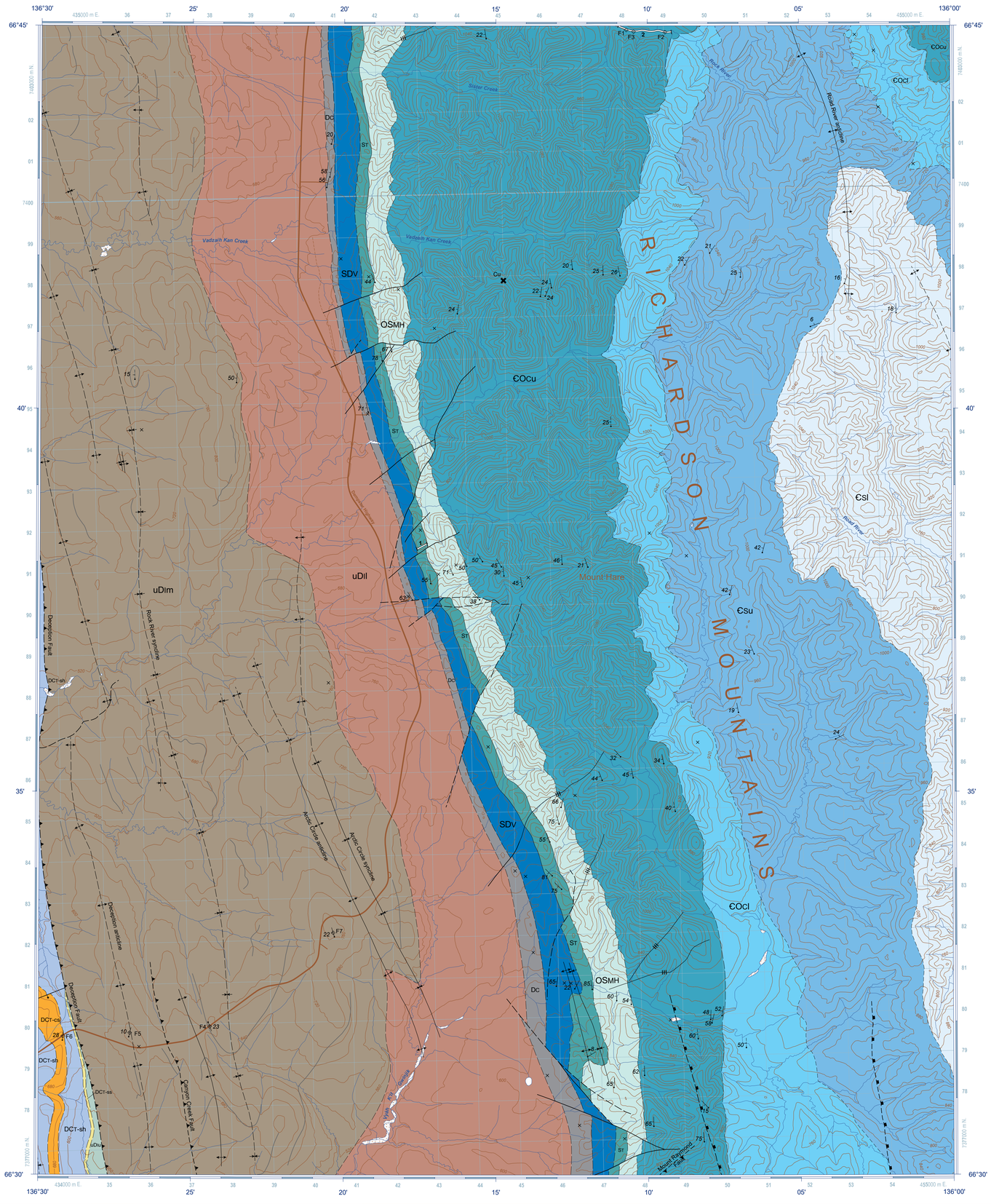
Natural Resources Canada | Ressources naturelles Canada

CANADIAN GEOSCIENCE MAP 72
BEDROCK GEOLOGY
MOUNT HARE
Yukon
NTS 116-I/9
1:50 000



DEVONIAN AND CARBONIFEROUS

TUTTLE FORMATION: conglomerate, sandstone, and shale; three lithofacies distinguished with no stratigraphic significance; rapid lateral thickeness changes; erosional bases and channel geometry observed in seismic-reflection profiles.

DCT-sh — **Tuttle Formation (shale unit):** shale-dominated lithofacies: dark grey, locally with siltstone beds.

DCT-ss — **Tuttle Formation (sandstone unit):** sandstone-dominated lithofacies: quartz- and chert-dominated, chert commonly trypolitic, light grey to white, local woody debris, porous.

DCT-cs — **Tuttle Formation (sandstone and conglomerate unit):** sandstone- and conglomerate-dominated lithofacies: quartz and chert, light grey to white, local woody debris, lacks fine-grained matrix.

DEVONIAN

IMPERIAL FORMATION: shale and siltstone, laminated; sandstone, turbiditic; divisible into three informal members.

uDlu — **Imperial Formation (upper member):** shale, dark grey, laminated; weathers medium grey; siltstone, dark grey; minor sandstone, pyritic.

uDlm — **Imperial Formation (middle member):** shale, dark grey, siliceous; siltstone, dark grey, laminated and ripple crosslaminated, weathers rusty; sandstone, dark grey, fine-grained, poorly sorted, turbiditic.

uDll — **Imperial Formation (lower member):** shale, dark grey to black, siliceous; siltstone, dark grey, laminated, weathers rusty; sandstone, rare.

Dc — **Canol Formation:** shale, black, siliceous, locally cherty, weathers light grey.

MIDDLE CAMBRIAN TO EARLY DEVONIAN

ROAD RIVER GROUP

SDv — **Vittrekwa Formation:** shale, black, may be pyritic, calcareous, siliceous, or cherty; graptolitic, locally bioturbated; limestone, locally shaly, locally ripple crosslaminated; dolostone, black, pyritic.

ST — **Tetlit Formation:** argillite, green, grey, weathers brown; dolostone, light grey, weathers orange, local bioturbation and traces.

OSMH — **Mount Hare Formation:** chert, black, thin- to thick-bedded, locally brecciated, graptolitic; shale, siliceous, locally calcareous or pyritic, graptolitic; limestone, grey, medium- to thick-bedded calcarenite, locally shaly or cherty, locally ripple crosslaminated, locally intraclast conglomerate.

€Ocu — **Cronin Formation (upper member):** limestone, grey to black, weathers yellow, thin- to thick-bedded, local chert nodules or discontinuous beds, locally ripple crosslaminated; limestone, black, thin-bedded, shaly; fauna – brachiopods, conodonts, sponge spicules, graptolites, bioturbation.

€Ocl — **Cronin Formation (lower member):** shale, black, laminated; limestone, medium grey, beds 2 to 20 cm thick; siltstone.

MIDDLE CAMBRIAN

€Su — **Slats Creek Formation (upper member):** shale and siltstone interbedded, sandstone; finer lithologies dominate.

€Sl — **Slats Creek Formation (lower member):** sandstone, weathers reddish brown to orange; maroon and orange siltstone; local solitary beds of sandy chert-pebble conglomerate; few scattered limestone mounds.

Geological contact: *Defined*; *Approximate*; *Inferred*

Traces: *Bedding-form line*; *Lineament, defined*

Faults: *Motion undefined, defined*; *Motion undefined, approximate*; *Motion undefined, inferred*; *Thrust fault, approximate*; *Thrust fault, inferred*; *Reverse, approximate*; *Reverse, inferred*; *Normal, defined*

Folds: *Anticline, upright, defined*; *Anticline, upright, approximate*; *Anticline, upright, inferred*; *Monocline, anticlinal bend, upright, approximate (short arrow is steeper limb)*; *Monocline, synclinal bend, upright, approximate (short arrow is steeper limb)*; *Syncline, upright, defined*; *Syncline, upright, approximate*

Station

Bedding: *Inclined, measured, younging known*; *Inclined, estimated, younging known*

Fossil locality: *Fossil*

Copper mineral occurrence

Measured section

Table 1. Fossil localities

Label	Curation	Sample Name	Location	Easting NAD83	Northing NAD83	Unit Name	Report	Fossil Type	Age
F1	C-104219	82CJA-03-F2	290–292 m above base of section	448100	7403910	Cronin	B.S. Norford, unpub. GSC Paleontological Report C-D 16-BSN-1982, 1982	graptolites	Late Cambrian to Carboniferous
F1	C-104220	82CJA-03-F3	310 m above base of section	448100	7403910	Cronin	B.S. Norford, unpub. GSC Paleontological Report C-D 16-BSN-1982, 1982	graptolites	Late Cambrian to Carboniferous
F2	C-104171	82CJA-03-MF1	0–100 m above base of section	449020	7403810	Cronin	G.S. Nowlan, unpub. GSC Paleontological Report 010-GSN-1983, 1983	conodonts	indeteminate
F3	C-104173	82CJA-03-MF3	200–300 m above base of section	448270	7403850	Cronin	G.S. Nowlan, unpub. GSC Paleontological Report 010-GSN-1983, 1983	conodonts	Middle or Late Cambrian
F4	C-432260	2006LHA1-3	outcrop sample	437509	7379949	Imperial	J. Utting, unpub. GSC Paleontological Report 06-JU-2006, 2006	spores	Frasnian
F5	C-432261	2006LHA1-4A	outcrop sample	435564	7379837	Imperial	G. Dolby, unpub. GSC Paleontological Report MISC-1-Dolby-2011, 2011	spores	Famennian
F6	C-432263	2006LHA1-5A	outcrop sample	433936	7379786	Tuttle/Ford Lake	G. Dolby, unpub. GSC Paleontological Report MISC-1-Dolby-2011, 2011	spores	Viséan
F6	C-432264	2006LHA1-5B	outcrop sample	433936	7379786	Tuttle/Ford Lake	J. Utting, unpub. GSC Paleontological Report 06-JU-2006, 2006	spores	Late Famennian to Tournaisian
F7	C-486270	2009LHA003A01	outcrop sample	440551	7382160	Imperial	G. Dolby, unpub. GSC Paleontological Report MISC-1-Dolby-2010, 2010	spores	probably Famennian

Table 2. Stratigraphic sections

Label	Section Name	Measured by	Year	Unit	Reference
1	82MPC-1	M.P. Cecile	1982	Tetlit	Cecile et al., (1982); Cecile et al., (in press)
2	82MPC-3 (in part)	M.P. Cecile	1982	Cronin	Cecile et al., (1982); Cecile et al., (in press)

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CANADIAN GEOSCIENCE MAP 72

Geological Survey of Canada
Canadian Geoscience Maps

Authors: L.S. Lane and M.P. Cecile

Geology by D.K. Norris, 1962 to 1984; M.P. Cecile, 1982; L.S. Lane, 2006 to 2010; T.L. Allen, 2006 to 2010. Compilations using airphoto and satellite imagery by L.S. Lane and M.P. Cecile, 2009 to 2019.

Geology conforms to Bedrock Data Model v. 4.0

Cartography by L.S. Lane, C. Deblonde, and K. Rentmeister

Scientific editing by A. Weatherston

BEDROCK GEOLOGY
MOUNT HARE
Yukon
NTS 116-I/9
1:50 000

1 0 1 2 3 4 km

Initiative of the Geological Survey of Canada, conducted under the auspices of the Yukon Sedimentary Basins project as part of Natural Resources Canada's Geo-mapping for Energy and Minerals (GEM) program

Map projection Universal Transverse Mercator, zone 8
North American Datum 1983

Base map at the scale of 1:50 000 from Natural Resources Canada, with modifications
Elevations in metres above mean sea level

Magnetic declination 2021, 20°00'E, decreasing 20.2' annually

CANADIAN GEOSCIENCE MAP 72
BEDROCK GEOLOGY
MOUNT HARE
Yukon
NTS 116-I/9