Canada

YUKON GEOLOGY PROGRAM

Yukon Government

Marginal Notes

The geology of the area was previously mapped by Cairnes (1910) at a scale of 1:126 720 and Tempelman-Kluit (1974, 1984) at a scale of 1:250 000. Modifications in this map include subdividing the Laberge Group and including coal seams mapped by Carne and Gish (1996).

Physiography

The study area includes two landforms that reflect underlying geology. Rounded hills with low to moderate relief cover most of the area and reflect the recessive strata of the Laberge Group and lower part of the Tantalus Formation. In contrast, a few larger landforms are underlain by thick conglomerate beds of the upper part of the Tantalus Formation. Bedrock exposure is limited to 5% with most streams and low-lying areas blanketed by thick glacial material. Exposures tend to be scattered along ridge crests, grassy slopes, and canyons where glacial material has been downcut or eroded. Best exposures occur at Teslin Creek, in both trenches and natural exposures, Joe Creek, Red Ridge Canyon, Vowel, Cub, Corduroy and Division Mountains.

Whitehorse Trough

The Mesozoic Whitehorse Trough is a northwest trending, southeast dipping synclinorium extending from northern British Columbia to south-central Yukon (Wheeler, 1961; Bultman, 1979). Volcanic and sedimentary strata of the Lewes River and Laberge groups comprise the trough. Lewes River Group strata were not observed in the mapped region.

Laberge Group

The oldest strata noted in the area mapped is the Early Jurassic Richthofen formation (basal Laberge Group). The Richthofen formation, only recognized near Joe Creek, is characterized by alternating grey shale, siltstone, and sandstone. Parallel- to cross-laminated sandstone beds are resistant and have sharp contacts with the siltstone and shale. Basal and upper contacts of the Richthofen formation were not observed.

Age equivalent Early Jurassic Nordenskiöld tuff and Conglomerate formation crop out on Belleview Mountain, Sock Mountain (name proposed here for geographic reference) and Joe Creek. The Nordenskiöld tuff is dominated by bluish- to brownish-grey tuff that is medium- to coarse-textured and moderately to well sorted. Individual grains of predominantly quartz and feldspar are crystalline to subcrystalline; the rock displays no obvious structures. The tuff locally has zones of differential weathering demonstrating colour mottling of light and dark grey.

Nordenskiöld tuff occurs in association with polymictic conglomerate assigned to the Conglomerate formation on Sock Mountain, although the contact relationship is not exposed. In outcrop, the contact of the polymictic conglomerate with neighbouring tuff and sandstone is sharp. The conglomerate is dark brown on the weathered surface, dark olive grey on the fresh surface and locally iron-stained. The poorly sorted conglomerate is clast-supported with clasts up to 30 cm across. Clast lithologies include felsic porphyritic, granitoid and very fine-grained maroon rocks. In the Division Mountain area, Conglomerate formation appears to underlie and interfinger the Nordenskiöld formation, although observations are based on limited exposure. On Belleview and Sock mountains, coarse- to very coarse-grained tuffaceous sandstone, with associated with conglomerate, appears to interfinger with Nordenskiöld. The sandstone is olive grey on the fresh surface, with a salt and pepper appearance made up of almost equal amounts of feldspar and quartz with lesser hornblende.

The Tanglefoot formation succeeds the Nordenskiöld and Conglomerate formations. Based on lithostratigraphic differences in the Division Mountain area, the Tanglefoot is divisible into two mappable units, here named the lower and upper members. The lower member is dominated by light olive grey to yellowish-grey sandstone, grit and conglomerate, within repeated fining-upward sequences on the order of 25 cm to 7.5 m. The sandstone and grit are friable and dominated by quartz with K-feldspar and plagioclase feldspar as well as minor biotite, lithic grains, and carbonaceous plant debris. The conglomerate is predominantly matrix-supported with clasts up to 30 cm across including massive quartz, buff to dark grey mudstone, as well as felsic granitic, metamorphic, and volcanic lithologies. The matrix is similar to the composition of the sandstone. Fine-grained lithologies of the lower member, consisting of laminated grey siltstone and very fine-grained sandstone alternating with coarser, thicker grey sandstone beds, are exposed best at Red Ridge Canyon. Common sedimentary structures in the fines include starved ripples and parallel- to cross-laminae.

The upper member of the Tanglefoot formation consists of sandstone, pebbly grit, siltstone, carbonaceous shale, and coal. The sandstone and grit, poorly sorted, are typically white and consist of quartz and lesser K-feldspar in a white to orange clay-altered cement. Within the grit, quartz and feldspar grains reach up to 1 cm across and occupy approximately five percent of the rock. The grit and sandstone are porous and preferentially weathered with conspicuous grains of quartz and feldspar giving the rock a stuccoed appearance. Finer grained lithologies, noted mainly in drill core intersections, include carbonaceous silty mudstone and shale, grey laminated siltstone and grey sandstone, as well as coal. Well-preserved plant debris (grasses, twigs, and ferns) are commonly compressed along bedding planes of the shale and siltstone.

The basal contact of the Tanglefoot formation in the study area is not exposed. The contact between the upper and lower members is concordant and only observed in drill core intersections from the east side of Division Mountain. On the east side of Vowel Mountain and the southwest side of Cub Mountain, the Tanglefoot formation underlies the Tantalus Formation, although the contact is locally obscured by andesite dykes and sills, as well as overburden.

Tantalus Formation

Above the Laberge Group, chert pebble conglomerate comprises the Late Jurassic to Late Cretaceous (?) Tantalus Formation. The conglomerate is resistant, forming Vowel, Division, Cub, and Corduroy mountains. The lower contact is concordant with the underlying Laberge Group and is observed only in drill core from the east side of Division Mountain. West of the Nordenskiöld River the contact with the underlying Tanglefoot formation is not observed.

The Tantalus Formation occurs as thickly bedded massive to low-angle cross-bedded conglomerate with lesser sandstone and shale. The overall colour of the unit is light grey to yellowish grey except where locally bleached or iron stained. Graded beds, as well as fining and less often coarsening up sequences, are common in the conglomerate; marked by changes in clast size and abundance. The conglomerate is comprised of moderate to well-rounded pebbles of chert, quartz, and a small percentage of quartzite, and felsic porphyry. Clasts are typically 1 to 5 cm in diameter, although locally up to 20 cm. Chert clasts are widely variable in colour, including white, black, green, greenish grey, buff, grey and pink. The clasts are subround to subangular, with moderate to high sphericity and often egg-shaped. The matrix consists of medium- to very coarse-grained sandstone made up of lithologies similar to the framework clasts, with a siliceous to locally calcareous cement. Discontinuous sandstone bands in the conglomerate, commonly up to 50 cm thick, consist of material similar to the conglomerate matrix.

In the Division Mountain area, the Tantalus Formation is divisible into two mappable units. The lower unit is a recessive weathering, matrix-supported chert pebble conglomerate; the upper is a resistant, clast-supported typical chert pebble conglomerate. Unfortunately, due to its recessive nature, the lower member is exposed only in trenches and intersections in diamond drill core on the east side of Division Mountain. The relationship between the upper and lower members was not observed in the field.

Another lithology associated within the Tantalus Formation, less common than the previous, is a greyish-red to greyish-brown fine-grained sandstone. The sandstone is quartz-rich, well-sorted, rich in plant debris and is characterized by its fine grain size and abundance of well-preserved plant material (ferns and grasses). The thickness of this sandstone is unknown as there were only two occurrences of the sandstone noted, both on the east side of Division Mountain.

Carmacks Group

The Late Cretaceous Carmacks Group is divisible into five mappable units in the Division Mountain area.

Unit 1 consists of feldspar-hornblende porphyritic andesite sills and dykes that intrude coal-bearing and underlying strata south of Cub Mountain, and west to Division and Vowel mountains. A large portion of the outcrop exposed between Cub Mountain and Vowel Mountain consists of these sills and dykes. Diamond drill hole intersections and road cut exposures indicate that the sills and dykes preferentially occur along or within shale and coaly intervals. Relationships observed of the sills and dykes with neighbouring strata suggests that they post-date deposition and folding of the Laberge Group.

Unit 2, noted only on the west side of Belleview Mountain, consists of dark maroon, andesitic feldspar porphyry flow. Plagioclase comprises 30 to 40 percent of the rock and hornblende, within a glassy groundmass.

Unit 3 crops out along the south side of Division Mountain. It is greyish-red feldspar porphyritic flow with 15 to 20 percent phenocrysts in a glassy groundmass. Some exposures are dominated by fragments up to 4 cm across. The fragments are buff weathered, very fine-grained, angular to rounded, with sharp contacts.

Unit 4, exposed southwest of Red Ridge Canyon, includes a dark brown weathering greyish-black, medium- to coarsely-crystalline monzodiorite intrusive rock.

Unit 5 includes exposures in the canyon south of Vowel Mountain and west of the Nordenskiöld River. The unit consists of dark grey to dark brown resistant weathering flows characterized by the presence of vesicles and calcite amygdules, that locally contain pyroxene and feldspar phenocrysts.

Major Structures

Laberge Group strata occur as several shallowly southeast plunging syncline-anticline pairs between the more resistant Tantalus Formation. The folds have wavelengths on the order of 2 to 7 km, although as small as 3 m (Carne and Gish, 1996) particularly in the shale and coaly strata. Northwest and northeast trending normal faults with minor dip slip displacement crosscuts the folds (Carne and Gish, 1996). The folded strata are crosscut by andesitic sills and dykes.

Economic Geology

Coal-bearing strata in the Division Mountain occur within the Tanglefoot formation, approximately 210 m to 240 m stratigraphically below the base of the Tantalus Formation (Long, 1986). Natural exposures of coal do not occur within the map area. Coal occurrences identified by trenching and drilling in the map area occur on the east side of Division and Vowell mountains, west side of Cub and Corduroy mountains as well as Teslin Creek. Mineable reserves are estimated at 52.9 million tonnes of high volatile bituminous B coal (Gish and Carne, 1998).

A reconnaissance study of the source rock potential in the map area indicates a potential for gas and perhaps modest amounts of oil source rocks in the upper Laberge Group, assuming suitable parameters are met. Thermal maturity indicators suggest that the strata lie at the beginning and beyond the oil window.

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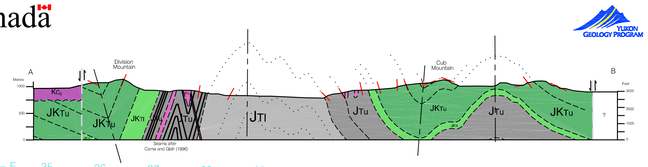
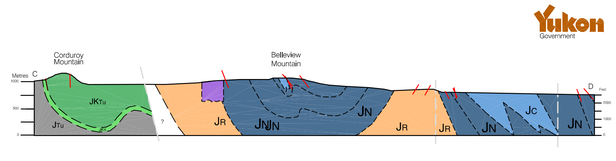
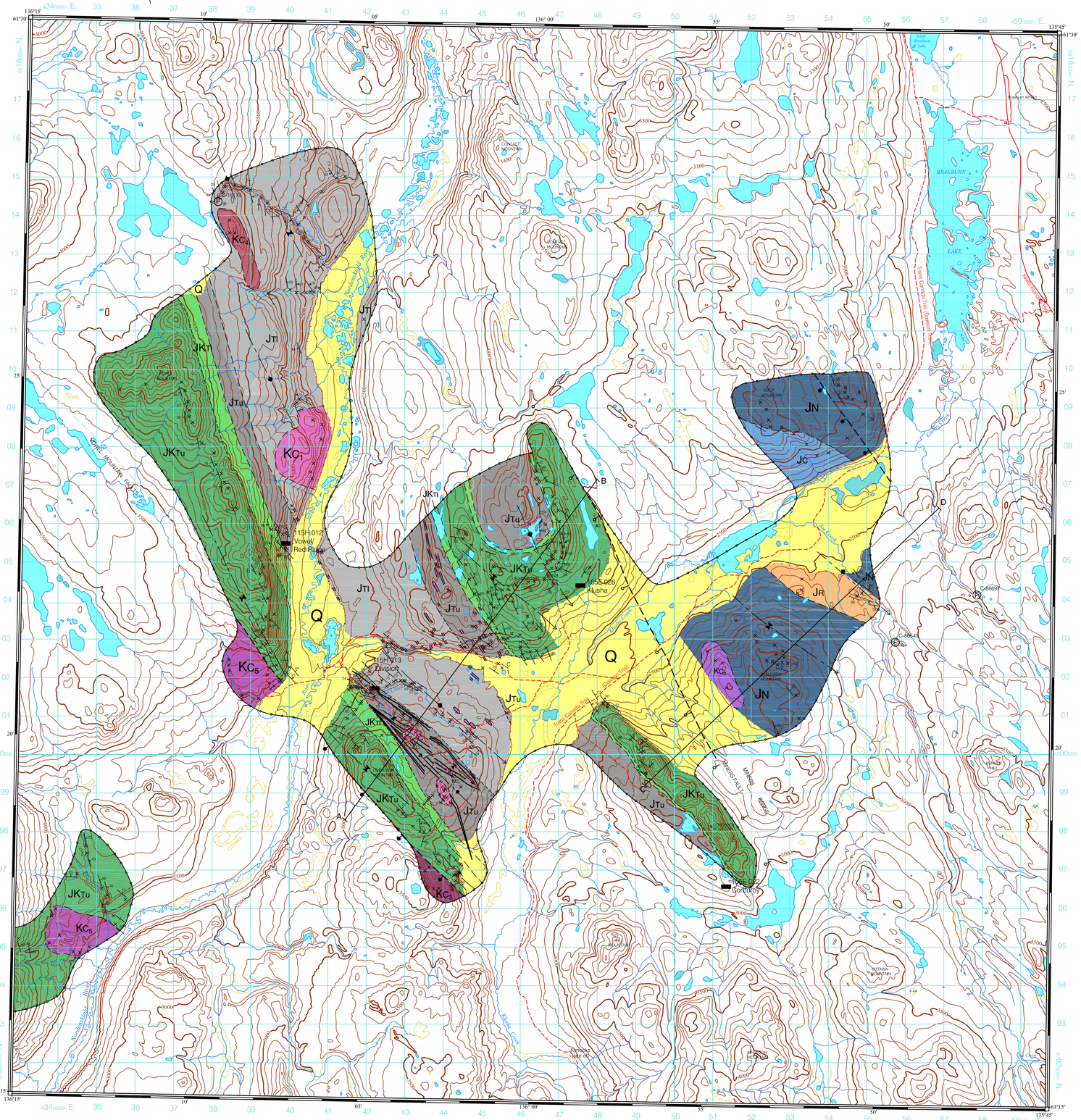
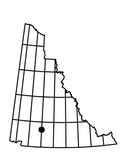






DIVISION MOUNTAIN
YUKON TERRITORY
SCALE 1:50 000



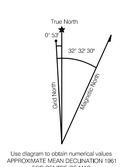
Topographic base produced by SURVEYS AND MAPPING BRANCH DEPARTMENT OF ENERGY, MINES AND RESOURCES

ONE THOUSAND METRE
Universal Transverse Mercator Grid
ZONE 8

Miles 1 0 1 2 3 Miles

Metres 1000 0 1000 2000 3000 4000 Metres

CONTOUR INTERVAL 100 FEET
Elevations in feet above Mean Sea Level
North American Datum 1983
Transverse Mercator Projection



Use diagram to obtain numerical values
APPROXIMATE MEAN DECLINATION 1961
FOR CENTRE OF MAP
Annual change decreasing 3'

115 H/10	115 H/09	105 E/12	105 E/11
115 H/07	115 H/08	105 E/05	105 E/06
115 H/02	115 H/01	105 E/04	105 E/03

THIS MAP

QUATERNARY

Q — Unconsolidated sand, silt and gravel

UPPER CRETACEOUS?

CARMACKS GROUP?

KC_1 — Green to light greyish-red feldspar and hornblende porphyry sills, dykes, and flows

KC_2 — Maroon feldspar porphyry

KC_3 — Greyish-red feldspar porphyry and breccia

KC_4 — Greenish black monzodiorite

KC_5 — Amygdaloidal to vesicular, basalt and extrusive flows

UPPER JURASSIC to LOWER CRETACEOUS

Tantalus Formation

JKTu — Upper Member - Clast-supported chert pebble conglomerate, resistant and thickly bedded, with intercalated medium- to coarse-grained sandstone beds made up of quartz, feldspar, and chert grains. Clasts are typically 1 to 3 cm across, subrounded to well-rounded and moderately to well-sorted.

JKTl — Lower Member - Matrix-supported chert pebble conglomerate, consisting of predominantly coarse- to very coarse-grained sandstone composed of quartz, feldspar, and chert grains. This member is recessive. Also contains subordinate fine-grained, grey to brown weathered, laminated, plant-rich sandstone.

LOWER to UPPER JURASSIC LABERGE GROUP

Tanglefoot formation

JTu — Upper Member - Yellowish-grey to bleached white, coarse- to very coarse-grained sandstone, grit, and pebbly grit with conspicuous quartz and feldspar granules within a white to buff chalky cement. Other lithologies include grey interlaminated siltstone and very fine-grained sandstone, carbonaceous shale, and coal seams.

JTl — Lower Member - Light olive grey, fine- to very coarse-grained quartz-rich sandstone, grit, heterolithic conglomerate, and laminated siltstone. Fining-up packages commonly include the above lithologies. Macerated plant debris is common at the top of sequences. The conglomerate is matrix- to clast-supported with clasts ranging from pebbles to boulders, subangular to rounded, and include vein quartz, felsic granite and porphyry.

Nordenskiold / Conglomerate formation

JC JN — JN - Steel grey to medium greenish grey tuff, weathers dark brown, medium- to coarsely crystalline, well-indurated, massive, and locally calcareous

JC - Olive grey, heterolithic conglomerate, clasts range from pebbles to boulders including predominantly granitic rocks up to 30 cm across and subrounded to well rounded

Richthofen formation

JR — Fine-grained grey sandstone, weathered buff, parallel- to cross-laminated, dark grey siltstone, recessive, platy to flaggy beds.

SYMBOLS

- Geological contact (defined, approximate, assumed)
- Fault, displacement unknown (defined, approximate, covered)
- Bedding (top known, top unknown) — 12, 45
- Station Location — ×
- Fold axis (anticline, syncline)
- Coal seam, outcrop — C
- Limit of mapping
- Sill, dykes
- Roads, Trails
- Limit of outcrop
- Line of cross section — A B
- Fossil Locality — P: GSC Locality Number (A=ammonite, P=bivalve)

MINERAL OCCURRENCES (Yukon Minfile, 1997)			
105 E/022	Corduroy	Coal
105 E/028	Klusha	Coal
115 H/012	Vowel / Red Ridge	Coal
115 H/013	Division	Coal

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Digital cartography and drafting by Jason Adams, Yukon Geology Program.

RECOMMENDED CITATION

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Any revisions or additional geological information known to the user would be welcomed by the Yukon Geology Program.

Copies of this map, the accompanying report and Yukon Minfile may be purchased from the Geoscience Information and Sales, c/o Whitehorse Mining Recorder, Indian and Northern Affairs, Canada, Room 102-300 Main St. Whitehorse, Yukon, Y1A 2B5. Ph. 867-667-3266 Fx. 867-667-3267.

Keep this map in a dark area to keep colours from fading.

Indian and Northern Affairs Canada
Exploration and Geological Services Division
Yukon Region

Open File 2001-3

Preliminary geological map of Division Mountain area (NTS 105 E/5 W½ & 115 H/8 E½), central Yukon

by
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