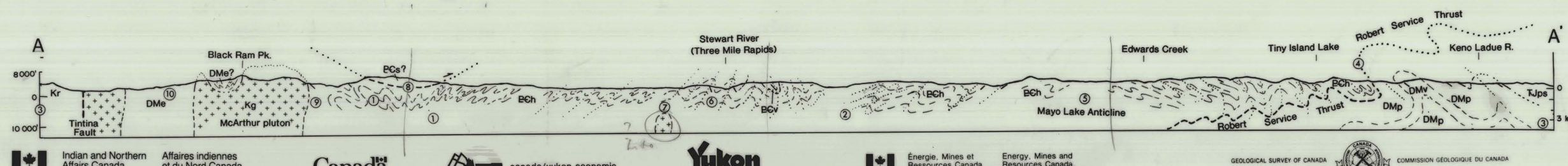

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LEGEND

NEOGENE

Q — Glacial drift, moraine and river deposits (unconsolidated)

CRETACEOUS

Kr — Rhyolite, trachyte intrusions

Kg — Biotite hornblende granite, quartz monzonite[1]

TRIASSIC

Hornblende-clinopyroxene diorite[2] to gabbro; typically foliated meta-diorite

TRIASSIC AND ?JURASSIC

TJs — Recessive, buff to grey weathering, calcareous slate, siltstone and sandstone; dark grey, finely crystalline limestone

MISSISSIPPIAN

"Keno Hill quartzite"[3]

Mq — Dark grey, thick-bedded to massive, vitreous quartzite; minor interbeds of carbonaceous schist; lenses of chloritic phyllite (interpreted as metavolcanic tuff[4]); includes abundant smaller meta-diorite intrusions (Td)

UPPER DEVONIAN AND MISSISSIPPIAN

(DMe continuous with Earn Group; correlative DMp and DMv (new unit) that includes the former "Lower schist"

DMe — Upper part: Black- and dark brown-weathering, sandstone, chert grit and thickly bedded chert-pebble conglomerate (circle pattern), light grey-weathering fissile mudstone and beige sandstone; Lower part: Black siltstone and mudstone with lenses of chert pebble conglomerate, chert breccia with baritic matrix and dark grey, felid limestone. At base: Brown-weathering, fine-grained sandstone and siltstone with chert pebbles

DMp — Dark blue-grey- to black-weathering, carbonaceous and locally baritic siliceous slate and chert; local fine-grained, dark grey- to orange-weathering, dark grey quartz arenite; local pebble to cobble conglomerate (circle pattern) with flattened clasts of chert and cobbles of quartz arenite; local chert sandstone associated with dark brown-weathering, medium grey to black slate; local bedded barite

DMv — Dark grey- to orange-weathering, foliated, aphanitic, dark grey to waxy green felsic meta-volcanic rocks and foliated quartz porphyry[5]

CAMBRIAN(?) TO LOWER DEVONIAN(?)

Road River Group

€Dr — Light grey- to blue-weathering, black or light grey chert, interbedded with black mudstone and dark brown and black quartz siltstone

MIDDLE ORDOVICIAN(?)

€O — Olive- and brown-weathering siltstone with black laminae, brown sandstone with thin interbeds of black bioturbated chert

UPPER PROTEROZOIC(?) AND LOWER CAMBRIAN(?)

Hyland Group (PCm, PCh, PCs, PCp; stratigraphic order unknown, except PCm may be youngest)

PCm — Maroon and green mudstone and siltstone, locally with white quartz sandstone interbeds; PCm' is foliated and phyllitic equivalent.

PCh — Grey-weathering, fine- to coarse-grained, locally calcareous, quartz meta-sandstone (psammite); pale green to grey phyllite. Minor white to grey, crystalline limestone and phyllitic limestone (hachure pattern)

PCs — Brown-weathering medium- to coarse-grained quartz-mica schist; compositional layering indicated by carbon or iron content, or friability (minor carbonate cement). Some layers contain 5-10% quartz granules. Forms well-stratified members >100m thick within PCh

PCp — Dark brown-weathering, black carbonaceous slate and minor interbedded, fine grained dark grey quartzite

PCv — Chloritic phyllite and meta-diorite

AGE UNKNOWN; POSSIBLY LATE PALEOZOIC

?l — Massive; white weathering, grey, non-crystalline and locally fetid limestone (Van Cleeves Hill, 10 km NW of Mayo Lake)

?q — White-weathering, grey vitreous quartzite, locally graded with siltstone laminae (5 km NW of Kalzas Twins)

Footnotes:

1 K-Ar age determinations from biotite separates (Ma):

Roop Lakes pluton	81.0	Leech et al. 1963
Mt. Haldane porphyry	89.0 ± 2.6	Stevens et al. 1982
Kalzas Twins hornfels	90.1 ± 1.4	Hunt et al. 1987
Two Buttes plug	97.1 ± 3.6	Stevens et al. 1981

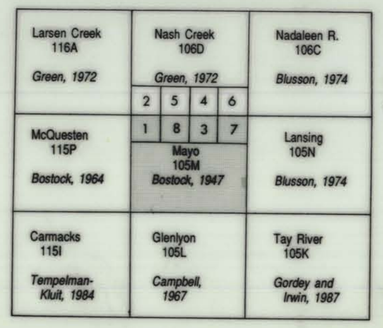
2 U-Pb zircon-baddeleyite age from a mafic sill intruding "Keno Hill quartzite" (in Ogilvie Mountains): 232.2 ± 1.5 Ma (Mortensen and Thompson, 1990)

3 Visean (middle Mississippian) conodonts from limestone lenses within "Keno Hill quartzite" in Dempster Highway area (M.J. Orchard, pers. comm., 1987)

4 Similar locally porphyritic felsic metavolcanic rock at MARG (3 km NE of Mayo map area) has been dated by U-Pb on zircon as Late Devonian or Early Mississippian (J. Mortensen, pers. comm., see Turner and Abbott, 1991).

5 Late Middle Devonian to Late Devonian U-Pb zircon age from foliated felsic schist 10 km NE of Mount Roop (J. Mortensen, pers. comm., see Gordey, 1990)

Regional Bedrock Geology maps



Numbered squares indicate 1:50 000 geology maps:

1,2 - Poole, 1965
3,4,5 Green, 1971
6 - Abbott, 1990
7 - Gordey, 1990
8 - Kindle, 1962; Murphy and Roots, 1992

CROSS SECTION NOTES

(These notes refer to circled numbers on the cross section)

1. Dotted form lines indicate orientation of foliation (S1). The foliation is folded by small and large scale folds.
2. Thin, solid form lines schematically indicate folded bedding. Observed folds have axial planes parallel with regional foliation. Inclined short, solid lines at surface of profile are true dips, where measured near line of section.
3. Bottom part of section is not to scale.
4. Robert Service Thrust surface was deformed both during and after motion on the Tombstone thrust. This interpretation is based upon:
   a. Rocks that appear to overlie the "Keno Hill quartzite" vary in composition and degree of deformation (Green, 1971, p. 55). Alternating layers of quartzite (Keno Hill) and schist (Hyland Group) near Sourdough Hill and Mount Hinton could be separated by tight folds or splays of the Robert Service Thrust (Roots and Murphy, 1992).
   b. Small lenses of DMp within Hyland Group south of Tiny Island Lake (Gordey, 1990) are interpreted as structural inliers of the footwall of Robert Service Thrust.
   c. Recognition of Keno Hill quartzite, in addition to DMv and DMp (Earn Group) in NW corner of map. This may be an inverted succession of footwall rocks, which implies that the overlying Robert Service fault surface is overturned.
   d. All Hyland Group rocks in the central part of the map area, and as far south as Avalanche Creek, are highly strained but no higher than lower greenschist grade. These rocks appear to have been deformed after they were raised to shallow depth; perhaps by northward thrust motion (Robert Service Thrust) over a ramp which currently underlies the northern limit of unstrained Paleozoic strata.
5. Mayo Lake anticline, recognized by Bostock (1947) and Green (1971), plunges SE at 25°. It probably formed after the Tombstone Thrust, and may be structurally related to the Roop Lakes pluton.
6. Isoclinal folds with both north- and south-vergence and 10-300 m amplitude are visible in outcrops along rapids of Stewart River.
7. Three granitic stocks and fine-grained felsic intrusions form a west-northwest trend across the map south of Stewart River.
8. A prominent break in slope in the Avalanche Creek area is here interpreted as a gently dipping thrust. The hanging wall consists of nearly flat-lying sandstone (cliffs 200 m high) but a topographic bench at their base exposes underlying steeply dipping, strongly deformed phyllite and schist. The contact has not been located. If it is a thrust, large klippen exist in Mayo map area. The contact might, however, be an angular unconformity, with implications for timing of deformation in the Hyland Group.
9. The metamorphic aureole (dark hornfels; may contain cordierite) obscures relations around McArthur pluton. The intrusive contact is vertical where observed in north-facing cirques.
10. These rocks have not been visited by the authors.

REGIONAL SETTING

This new synthesis incorporates the early work of Bostock (1947) in addition to the larger scale mapping in the north quarter of the area (see diagram), combined with new field observations in 1990 and 1991.

Mayo map area contains the eastern ends of two laterally extensive structural sheets that moved northward, first on the Robert Service thrust (Green, 1972) and later on the Tombstone thrust (Roots, 1991; Roots and Murphy, 1992). The southern structural sheet is the hanging wall of the Robert Service Thrust. It includes Hyland Group clastic rocks (Gordey, in press) and middle Paleozoic basinal strata. These units can be traced from the Macmillan Pass area (180 km to the southeast) across Mayo map area and are truncated by the Tintina Fault west of the the McArthur Group mountains. The Hyland Group is increasingly foliated and recrystallized northward (toward Mayo Lake); this may indicate that the Robert Service Thrust is relatively shallow beneath the central part of the map-area.

The northern third of the map-area is the hanging wall of the Tombstone Thrust (Mortensen and Thompson, 1990). It includes the Keno Hill quartzite and older Earn Group schist and phyllite that were mobilized northwest, then northeast (Roots and Murphy, 1992). Abundant Triassic mafic intrusions lie within this structural sheet, and all rocks are highly strained. The Tombstone Thrust may intersect the surface near the north edge of the map-area because rocks to the north (in the footwall) are only weakly deformed (Abbott, 1990).

Several quartz monzonite stocks intrude the structural sheets. In age and composition the stocks are similar to the Selwyn Plutonic Suite (Anderson, 1987), but metallic mineralization is less common. Ag-Pb-Zn vein mineralization in the Keno Hill camp is derived from a mesothermal system driven by the Roop Lakes pluton (Lynch, 1986, 1989) along faults and fractures of a northeast-trending sinistral brittle shear zone (Roots and Murphy, 1992).

SYMBOLS

- Geological contact (defined, approximate, assumed)
- Bedding (tops unknown, known, vertical, overturned)
- Foliation (inclined, vertical)
- Lineation (mineral streaking)
- Antiform or anticline (trace of axial plane; upright, overturned)
- Synform or syncline (trace of axial plane; upright, overturned)
- Fault, displacement unknown (exposed, inferred)
- Thrust fault (approximate, assumed, overturned)
- Mineral occurrence (Yukon Minfile number)

MINERAL OCCURRENCES[1]

1. UNITED KENO HILL (Ag,Pb,Zn veins; Holdings not shown; incl. of Keno and Galena hills)
2. FAITH (Ag,Pb - Vein)
3. DUNCAN (Ag,Pb - Vein)
4. GOLD QUEEN (Ag,Pb - Vein)
5. SILVER BASIN (Pb,Ag,Au - Vein)
6. NABOB (Ag,Pb - Vein)
7. MONUMENT (Ag,Pb - Vein)
8. COMSTOCK (Ag,Pb - Vein)
9. APEX (Ag,Pb,Zn - Vein)
10. VANGUARD (Ag,Pb - Vein)
11. HOMESTAKE (Ag,Pb - Vein)
12. CHRISTINE (Ag,Pb - Vein)
13. MO (Pb,Ag - Vein)
14. MAYBURN (Ag,Pb,Zn - Vein)
15. HOGAN (Ag,Pb - Vein)
16. RUNER (Ag,Pb - Vein)
17. WERNECKE (Ag,Pb,Zn - Vein)
18. FORMO (Ag,Pb,Zn - Vein)
19. NOMAD
20. PADDY (Ag,Pb,Zn - Vein)
21. EAGLE (Ag,Pb,Zn - Vein)
22. FISHER (Pb,Zn,Ag - Vein)
23. PARENT
24. CREAM and JEAN (Pb,Zn,Ag - Vein)
25. NORD (Ag,Pb - Vein)
26. GERLITZKI (Ag,Pb,Zn - Vein)
27. TITAN (Ag,Pb - Vein)
28. SHANGHAI (Ag,Pb,Zn - Vein)
29. WAYNE (Ag,Pb,Zn,Au,W - Vein)
30. ARGENT
31. STREBCHUK (Sn,Ag,Pb,W - Vein)
32. MT. HALDANE (Ag,Pb,Zn - Vein)
33. LAYSER (Ag,Pb - Vein)
34. COBALT (Ag,Pb - Vein)
35. PATTERSON
36. ETTA
37. GORDON (Sb,Ag - Vein)
38. TWO BUTTES (W,Mo - Ppy)
39. SIDESLIP (Cu - Skn)
40. GREAT HORN (W,Cu,Zn - Skn)
41. RAM
42. HOT SPRING (Ag,Pb - Vein)
43. LOST WERNECKE COPPER (Cu - Un)
44. ROOP (W - Skn)
45. ABLE
46. MOON (Ag,Pb - Vein)
47. MT. ALBERT (Ag,Pb - Vein)
48. MoKIM (Ag,Pb - Vein)
49. VACA
50. NERO (Ag,Pb - Vein)
51. FREIBEN (Cu,W - Skn)
52. MT. HINTON (Au,Ag - Vein)
53. AVENUE (Ag,Pb - Vein)
54. CHANCE (Sb - Vein)
55. YONO (Ag,Pb - Vein)
56. SUNDOWN (Ag,Pb - Vein)
57. GUSTAVUS (Ag,Pb - Vein)
58. HALFWAY
59. RANKIN
60. NEWRY
61. CHRISTAL (Ag,Pb,Zn - Vein)
62. SEGSWORTH (Ag,Pb,Zn - Vein)
63. IRONCLAD (Ag,Pb,Zn - Vein)
64. WALLINGHAM
65. NADAR
66. KALZAS (W,Sn - Vein)
67. CORKERY
68. NEAGEL
69. GAMBLER (Ag,Pb - Vein)
70. HAVRENAK (Au,Ag - Vein)
71. DRILL (W - Vein)
72. BELEY (Zn - Vein)
73. BEMA (Au,Ag - Vein)
74. BIRGIT
75. WHITEMAN
76. GOLDROCK
77. T-BIRD
78. FEED
79. TINY ISLAND (Ba - Form)
80. GORDEY (Ba - Form)

[1] Numbered with Yukon MINFILE reference numbers. (105M)

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

Open File 1992-4

GEOLOGY OF MAYO MAP AREA (105M)

by

Charles F. Roots and Donald C. Murphy
Geological Survey of Canada

This Open File map and Open File 1992-3 (Geology of Keno Hill) by D.C. Murphy and C. Roots are products of the Canada-Yukon Cooperation Agreement on Mineral Resources 1991-1996, administered by:

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