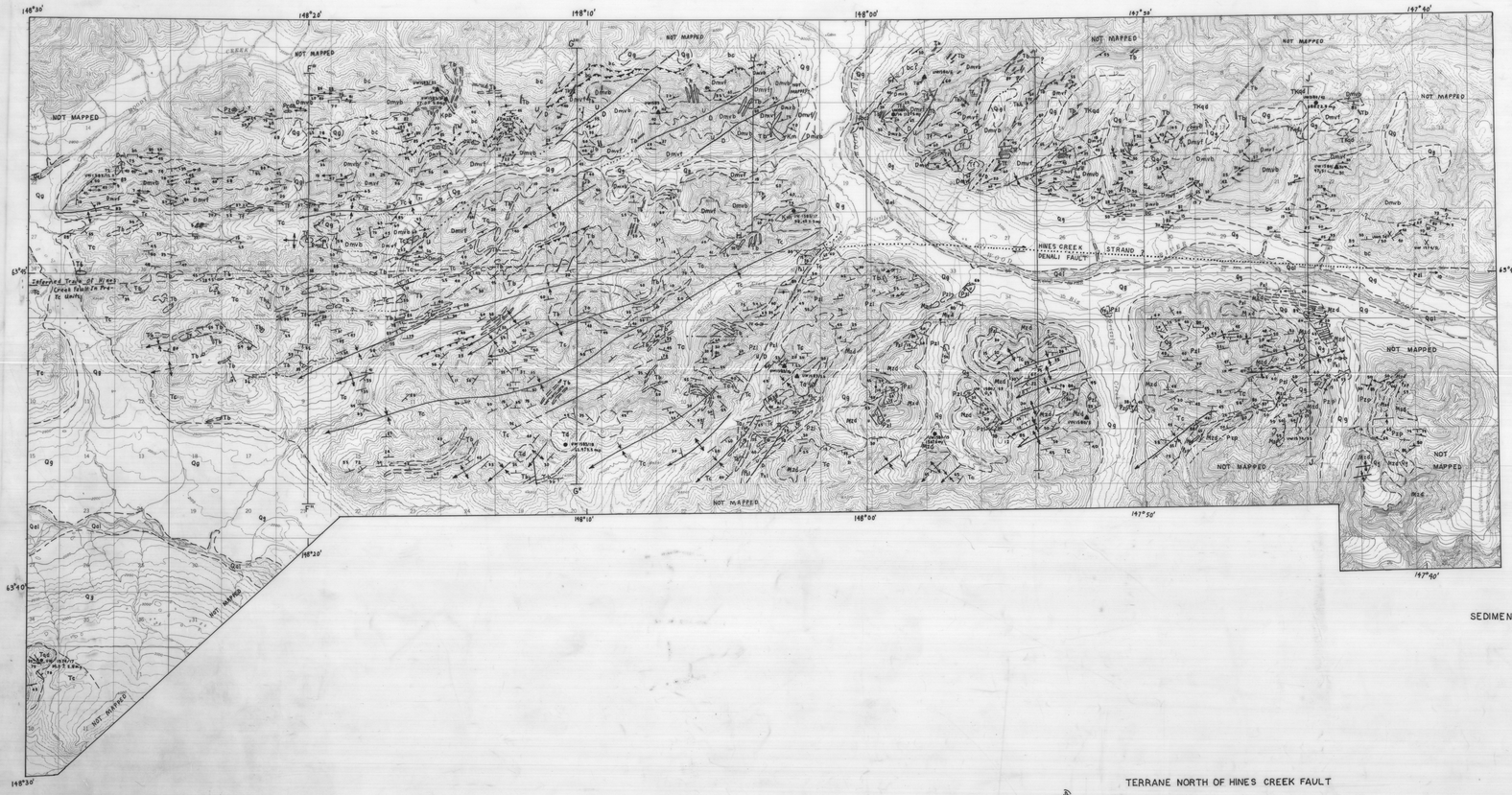
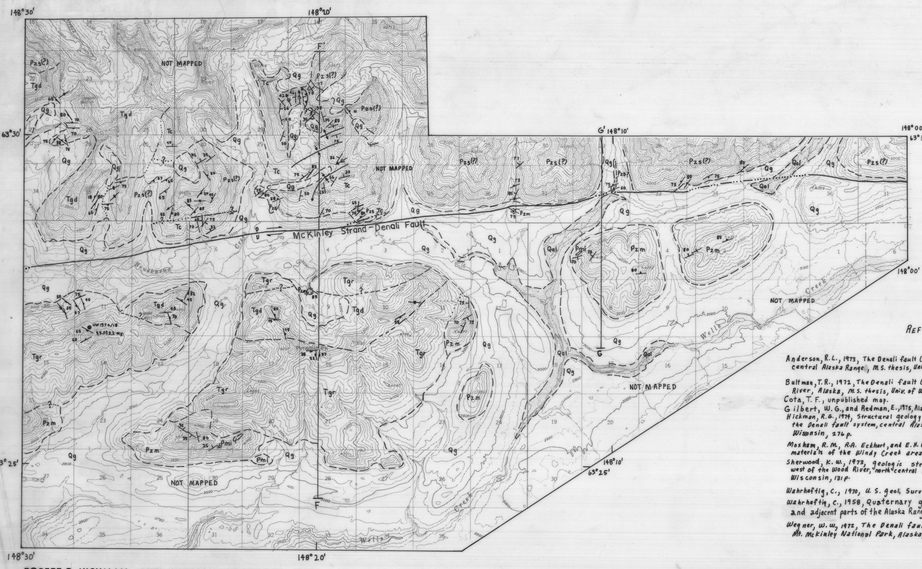
GEOLOGIC MAP OF PART OF CENTRAL HEALY QUADRANGLE, ALASKA

SHEET I





ROBERT G HICKMAN AND CAMPBELL CRADDOCK, 1975

Topographic base from U.S. Geological Survey Healy B-2, B-3, C-2, C-3, D-2, D-3 quadrangles.

APPROXIMATE MEAN DECLINATION, 1975

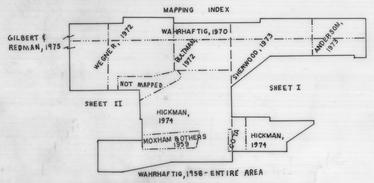
MAP LOCATION

SCALE 1:63360

1 1/2 0 1 2 MILES

1 1/2 0 1 2 3 4 KILOMETERS

MAPPING INDEX



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NOTE – The table to the right is not intended to compare the relative ages of Tertiary fine-grained intrusive rocks to coarse-grained intrusive rocks or to correlate similar rock types across major faults.

EXPLANATION

ANALYTICAL DATA FOR K-Ar AGE DETERMINATIONS

Univ. of Wis. #	Unit	Mineral	Ar^{40}_{rad}, ppm	K^{40}, ppm	Age (m.y.)
UW1574/17	Tgd	Amphibole	0.00889	0.926	35.7 ± 2.8
UW1593/4	Tgd	Biotite	0.0194	6.476	38.1 ± 1.9
UW1553/7	Tgd	Biotite	0.0227	6.961	58.3 ± 2.0
UW1683/3	Tb	Whole Rock	0.007926	2.353	53.2 ± 2.8
UW1543/4	Tb	Whole Rock	0.003210	0.717	58.8 ± 3.0
UW1683/2	Tv	Whole Rock	0.007163	2.988	49.5 ± 2.1
UW1542/8	Tv	Whole Rock	0.00841	2.581	55.1 ± 2.3
UW1542/9	Tv	Whole Rock	0.005932	1.682	59.3 ± 2.7
UW1574/18	Tgr	Biotite	0.01860	5.621	55.7 ± 2.2
UW1583/18	Td	Amphibole	0.00983	0.848	62.7 ± 3.3
UW1583/10	Tpb	Amphibole	0.001627	0.306	77.0 ± 6.1
UW1574/6	Td	Amphibole	0.003806	0.770	83.4 ± 4.3
UW1574/1	TKgd	Biotite	0.02861	6.860	70.0 ± 2.4
UW1580/12	TKqd	Biotite	0.01525	3.717	68.4 ± 2.8
UW1574/3	TKqd	Biotite	0.006494	1.453	76.4 ± 3.5
UW1583/17	Km	Amphibole	0.003357	0.568	98.9 ± 5.5
UW1589/15	Mzd	Feldspar	0.008930	1.933	134 ± 4
UW1574/15	Pzg	Pyroxene	0.002138	0.255	*137 ± 11
UW1574/6	Pzg	Pyroxene	0.002079	0.196	*307 ± 42
UW1562/1	Mg	Pyroxene	0.002876	0.124	*365 ± 49
UW1562/2	Mg	Whole Rock	0.003128	0.184	*314 ± 30
UW1580/6	Dmvb	Muscovite	0.0121	2.853	111 ± 5
UW1568/1	bc	Amphibole	0.009905	0.224	307 ± 25

* Age believed unreliable.

CONTACT — Dashed where approximate, dotted where concealed, queried where probable or inferred.

HIGH ANGLE FAULT — U, Upthrown side; D, downthrown side. Arrows indicate lateral movement.

THRUST FAULT — Sawteeth on upper plate

FOLD AXES — anticline, syncline, overturned, flexure. Arrow shows plunge direction

MINOR FOLD AXES — anticline, syncline, small-scale folds (crenulations). Arrow shows plunge direction

STRIKE AND DIP OF BEDS OR FOLIATION — Inclined, Vertical, Overturned, Estimated from topography, Horizontal, Coincident with bedding

STRIKE AND DIP OF SLIP CLEAVAGE OR KINK BAND (kb) — Inclined, Vertical

STRIKE AND DIP OF JOINTS — Inclined, Vertical

SITE OF K-Ar AGE DATE — Age given in millions of years

SPECIMEN LOCALITY

FOSSIL LOCALITY — Letter indicates geologic period

MINERAL PROSPECT

SEDIMENTARY, METAMORPHIC, AND BEDDED VOLCANIC ROCKS

Holocene

Qal — Alluvium: Unconsolidated sands and gravels recently deposited along larger streams.

Qt — Travertine: Spongy tan deposits forming around and downstream from springs along the McKinley strand of the Denali fault.

unconformity

Pleistocene and Recent

Qs — Glacial and Surficial Deposits: Areas of thick surficial deposits, including glacial and glaciofluvial deposits, rock glaciers, colluvium, alluvial fans, landslides and terrace deposits. Largely poorly-sorted unconsolidated deposits including sands, gravels and silts.

unconformity

TERRANE NORTH OF HINES CREEK FAULT

Pliocene (?)

Tn — Nenana Gravel

unconformity

Oligocene to Miocene

Tcb — Coal-bearing Group

unconformity

Paleocene

Tc — Cantwell Sedimentary Rocks: Well to moderately consolidated medium gray to tan sandstones and pebble conglomerates, dark gray siltstones, and minor beds of bituminous coal. Sandstones are lithic arenites and arkoses. Conglomerate lenses form massive, resistant beds. Major clast types are white quartz, gray chert and light-colored quartzites. Plant fossils are common.

unconformity

TERRANE BETWEEN HINES CREEK AND MCKINLEY FAULTS

Pliocene (?)

Tn — Nenana Gravel: Reddish-brown to tan, poorly consolidated pebble and boulder conglomerates with thin sandstone lenses and lignite beds.

unconformity

Oligocene to Miocene

Tcb — Coal-bearing Group: Poorly consolidated quartz-pebble conglomerates, white-weathering, thin-bedded quartz sandstones, and minor dusky brown subbituminous coal beds

unconformity

Paleocene (?) to Eocene (?)

Tv — Cantwell Volcanic Rocks: Olive gray to black amygdaloidal olivine basalt and basaltic andesite flows and agglomerates, minor pyroclastic rocks and interbedded volcanic sandstones. Flows are 10- to feet thick. Three K-Ar dates of whole-rock samples range from 49.8 - 57.3 m.y.

Paleocene

Tc — Cantwell Sedimentary Rocks:

unconformity

Upper Triassic, Karnian or Norian

Ŧs / Ŧl — Well consolidated, medium gray graywackes, dark gray argillite limestones, poorly sorted chert-pebble conglomerates, and minor gabbro sills and dikes. Fossils include the pelecypods Megalodon (?) sp. and Myophoria sp. (Moxham and others, 1959), belemnites, a probable impression of the ammonite Sagenites, and U. Triassic conodonts. Ŧl, Thicker beds of dark gray limestone composed of recrystallized calcite and carbonaceous material.

unconformity?

Permian-Pennsylvanian, Strata may be as old as Mississippian

Pzs — Red, black and green argillites and slates, dark gray chert-pebble conglomerate, minor graywackes and dark-gray bedded cherts. May be interbedded with Permian or Pennsylvanian unit, Pzs.

unconformity

Permian-Mississippian, Strata may be as old as Devonian

Pzs / Pzs — Pzs, Dark gray graywackes and chert-pebble conglomerates, dark gray, iron oxide-stained argillites and slates, minor gray bedded cherts, fine stones and lithic tuffs. Graywackes show graded bedding. Unit is strongly deformed to the east. Fossils include crinoidal breccia beds, solitary corals and bryozoans. Pzs, greenish black altered pillow basalt, subaqueous flow breccias, and associated gabbro sills. K-Ar dates for gabbro are 307 m.y. and 137 m.y. Gabbro may be equivalent to Mg.

unconformity

Devonian

Dv — Light olive altered vesicular andesite or basalt flows(?) interbedded with Da/Dl unit.

Da / Dl — Da, Light gray limestones, medium gray graywackes, argillites, slates, and boulder conglomerates west of Windy Creek. Deformed limestones and conglomerates and metagraywacke schists along Slate Creek are also included in the Dl unit. Fossils include Thamnopora cf. T. caespitosa de Blainville, Amphipora cf. A. ramosa Phillips, Stromatoporoids cf. S. alberstadensis Stein. Dl, thicker limestone beds.

unconformity?

Devonian or Silurian

pDa — Thinly bedded red and light gray argillites and grayish green calcareous argillites which are overlain (?) by Devonian limestones and conglomerates.

unconformity?

Ordovician or Silurian

Psl / Psp — Black argillites, medium gray cross-bedded calcarenites, black and light green phyllites, gray argillites and bedded cherts. Psp, thicker sequences of black phyllite. Unit is metamorphosed to the greenschist facies in the extreme eastern map area. Fossils include possible Maymyaella type graptolites and echinoderm spines.

unconformity?

Precambrian(?) or Lower Paleozoic

bc — Light greenish gray quartz-sericite schists, quartzites, and quartz-sericite-carbonate schists, black carbonaceous and pyritic phyllites, green chloritic and epidotic schists, minor gray limestones and greenish-black weakly foliated rocks. Rocks are metamorphosed to the greenschist facies. An amphibole separate, from a metagabbro yielded a metamorphic K-Ar age of 307 m.y.

TERRANE SOUTH OF MCKINLEY FAULT

Jurassic or Cretaceous

JKq — Dark gray to black argillites and pebbly mudstones, gray pebble conglomerates and graywackes, minor black limestone. Conglomerate clasts are largely dark chert, quartzite, and quartz. Small coal beds occur in some argillites and graywackes. Sandstones and conglomerates are most common west of Foggy Pass. Fossils include Cucullaea sp., belemnites, and brachiopods (?).

unconformity

Triassic (?)

Trv — Lenticular unit of greenish-black, altered porphyritic andesite and basalt flows(?), and minor interbedded mafic tuffs.

Paleozoic or Precambrian (?)

Pzm / Psi — Pzm, Poorly exposed, contact-metamorphosed cherts, argillites, slates and limestones. Probably equivalent to parts of the Ds/Dsl and PMc units. Near granite intrusions these rocks have been metamorphosed to the albite-epidote hornfels facies. Psi, contact-metamorphosed porphyritic mafic intrusives.

Paleozoic or Precambrian

PMc — Thinly-bedded dark gray argillites and black, gray and green cherts with minor beds of chert-pebble conglomerate and gray limestone.

unconformity?

Middle or Upper Silurian

Ds / Dsl — Ds, Light gray to black limestones, dark gray slates, graywackes, and pebble conglomerates; Dsl, thicker limestone beds. Limestones locally contain corals, stromatoporoids, a wide assortment of brachiopods, bryozoan and crinoid fragments, and body spicules of Astraea spongia sp.

INTRUSIVE IGNEOUS ROCKS

Tf — Tan, porphyritic rhyolite, dacite, and latite which form plugs and dikes.

Tvb — Vent breccia composed of tan, highly-altered equant rock fragments 25 large as 20 cm in diameter.

Tb — Greenish black basalt and diabase dikes. A single K-Ar whole rock analysis yielded an apparent age of 53.1 m.y.

TKqd — Light gray, medium-grained hornblende-biotite quartz diorite forms a stock north of the Wood River. Microlites occur along the partly concordant stock contact. A biotite separate yielded a K-Ar date of 68.9 m.y.

Kpb — Black, porphyritic basalt(?). A single K-Ar age determination yielded a date of 77.0 m.y.

Km — Gray, fine-grained monzonite dikes. An amphibole separate yielded a K-Ar date of 98.4 m.y.

Pzdb — Small bodies of dusky brown metamorphosed igneous rock now composed of stilpnomelane, plagioclase, actinolite, chlorite, zoisite, apatite and ilmenite. Relict textures and relict grains suggest that the parent rock was a diabase. The rock intrudes Devonian metavolcanic rocks.

Tf — Tan, porphyritic rhyolite and dacite which form dikes, sills, and small intrusive bodies.

Tvb — Vent breccia composed of tan, highly altered equant rock fragments. Fragments are cemented by travertine and chalcedony.

Tb — Black to gray diabase and black basalt sills, dikes and irregularly-shaped intrusive bodies. A single K-Ar whole-rock analysis yielded an apparent age of 58.8 m.y.

Ta — Light-gray porphyritic andesite containing phenocrysts of hornblende and/or plagioclase. The andesite forms sills, dikes, and plugs. A hornblende separate yielded a K-Ar date of 81.4 m.y.; stratigraphic relationships suggest a slightly younger age.

Tqd — Medium-grained, altered, light gray hornblende quartz diorite intrudes Devonian strata in the upper Windy Creek valley. Medium-gray hornblende quartz diorite porphyry forms Pyramid Mountain. K-Ar dating of a hornblende separate from this stock yielded an age of 55.1 m.y.

Tgd — White, medium-grained biotite-hornblende granodiorite with an hypidiomorphic-granular texture forms two stocks east of Panorama Mountain. Stock contacts are discordant. A biotite separate from the eastern stock yielded a K-Ar date of 58.1 m.y.

Td — Light-gray hornblende-augite diorite porphyry forms two small stocks near Grizzly Creek. A hornblende concentrate from the porphyry yielded a date of 42.9 m.y.

TKqd — Medium-gray, medium-grained biotite granodiorite near McKinley Village and biotite-augite-hornblende granodiorite(?) near Riley Creek. A biotite separate from the former yielded a K-Ar date of 76.6 m.y.; from the latter a date of 70.0 m.y. was obtained.

Sp — Black to greenish black serpentine in small (1-10 m) bodies near the McKinley strand of the Denali fault. Relic orthopyroxene and diallage grains and mesh and bastite structures indicate that the parent rock was a peridotite, probably a lherzolite or harzburgite.

Mzd — Dark greenish diabase and gabbro sills and dikes south of the Wood River. An altered plagioclase concentrate yielded a K-Ar date of 250 m.y. The diabase is overlain by Paleocene rocks. Outside the map area, the diabase intrudes Upper Triassic strata.

Mg — Elongate stocks of greenish gray, medium-grained gabbro near the Teklanika River. Two pyroxene concentrates yielded K-Ar dates of 307 m.y. and 327 m.y., but the gabbro intrudes strata of probable U. Triassic age and may be equivalent to Mzd.

Tf — Tan, porphyritic rhyolite and dacite which form dikes.

Tb — Black basalt and porphyritic diabase dikes and sills.

Ta — Gray porphyritic hornblende andesite sills and plugs.

Tqd — Fine-grained, medium-gray quartz diorite forms a small intrusive body in the western Reindeer Hills.

Tgd — White, coarse-grained biotite granodiorite with an hypidiomorphic-granular texture forms a stock near Foggy Pass. Locally the granodiorite contains coarse Carlsbad twins of orthoclase. The stock contacts are partly discordant and partly concordant. A biotite separate yielded a K-Ar date of 58.3 m.y. Light gray hornblende-biotite granodiorite forms the core of a composite stock near Pyramid Peak. The granodiorite is intruded by biotite granite.

Tgr — White and pink, medium-grained biotite granite forms most of a stock at Pyramid Peak. The granite intrudes a core of granodiorite and concordantly intrudes surrounding country rocks. A biotite separate yielded a K-Ar date of 56.7 m.y.

CENOZOIC

MESOZOIC

PALEOZOIC

PRECAMBRIAN(?)

TERTIARY

TERTIARY OR MESOZOIC

MESOZOIC

PALEOZOIC

AOF 95