

**DESCRIPTION OF MAP UNITS**

**Qu** UNDIFFERENTIATED UNCONSOLIDATED DEPOSITS (QUATERNARY)—Includes alluvium, colluvium, landslide deposits, and glacial drift. Boundary approximate and in places estimated from topography

**KJf** GRAYWACKE AND ARGILLITE (LOWER CRETACEOUS AND/OR JURASSIC)—Flyschoid volcanic graywacke, argillite, and phyllite exposed north of the Talkeetna-Broxson Gulch fault system. Includes cobbly mudstone and conglomerate of rounded, pebble- to boulder-size clasts of greenish-gray graywacke and mafic volcanic and granitic rocks exposed on spur between Pass Creek and South Fork of Pass Creek. At head of Eldorado Creek flysch is intruded by alkali gabbro from which K-Ar dates of  $130 \pm 4$  m.y. on biotite and  $143 \pm 4$  m.y. on hornblende are reported by Smith and Turner (1973)

**Rc** ROCKS OF CLEARWATER TERRANE (UPPER TRIASSIC, AT LEAST IN PART)—Tectonic mixture of chlorite schist, foliated gray marble, impure marble and calcareous grit, volcaniclastic rocks, green phyllite and argillite

**R1** LIMESTONE (UPPER TRIASSIC)—Thin- to medium-bedded dark-gray lime mudstone and bioclastic lime wackestone. Probably originally overlying Nikolai Greenstone, but exposed only in a fault sliver between upper Nikolai Greenstone (Rna) and pre-Nikolai sedimentary rocks (RPs)

**Rn** NIKOLAI GREENSTONE, UNDIFFERENTIATED (UPPER AND/OR MIDDLE TRIASSIC)

**Rna** Amygdaloidal basalt—Chiefly dark green to maroon gray subaerial amygdaloidal basalt flows. Sparsely porphyritic with saussuritized plagioclase phenocrysts (about  $Al_{20}$ ) in an intergranular to interstitial groundmass of plagioclase laths, clinopyroxene, minor opaque minerals and, locally, dark cryptocrystalline material. Amygdale minerals are: quartz, calcite, chlorite, and apatite. Unit locally includes masses of pillow basalt and non-amygdaloidal flows

**Rnf** Non-amygdaloidal basalt—Dark-gray-green massive non-amygdaloidal basalt flows with subordinate flow and pyroclastic breccias, tuffs, and pillow flows, all probably of submarine origin. Massive flows petrographically similar to Rna, but lack amygdales and commonly exhibit columnar jointing. Pyroclastic breccias contain lithic fragments (as large as 5 cm) of breccia and basalt, crystal fragments of shattered alkali feldspar, saussuritized plagioclase, phlogopite(?) mica, and occasional fragments of non-deformed pumice, devitrified to cryptocrystalline material, all in a cryptocrystalline matrix flooded with secondary quartz, calcite, and chlorite. Tuffs generally contain albitized plagioclase in a matrix of fibrous actinolite and cryptocrystalline material

**Rns** Volcaniclastic rocks—Bedded volcaniclastic rocks, chiefly pebble conglomerate, sandstone, and siltstone

**Rnp** Pillow basalt—Massive light- to medium-gray-green pillow flows and interlayered light-gray to gray-green tuffs. Pillow flows are sparsely porphyritic with small plagioclase phenocrysts and stubby clinopyroxene crystals in a cryptocrystalline groundmass containing patches of clinzoisite, opaque minerals, and actinolite. Tuffs generally cryptocrystalline, locally with feathery aggregates of actinolite and plagioclase crystals replaced by albite. Unit includes massive basalt flows and gabbro sills

**Rnb** Basalt breccia—Dark-gray-green massive bedded basalt breccias with subangular to rounded clasts, as much as 20 cm in diameter, of plagioclase- and clinopyroxene-bearing basalt in a matrix of cryptocrystalline material altered to chlorite, zoisite, and pumpellyite. Individual breccia units as much as 10 m thick. Commonly exhibits crude columnar joints

**Rg** GABBRO (UPPER AND/OR MIDDLE TRIASSIC)—Dark-greenish-gray, ophitic to subophitic, fine- to medium-grained gabbro containing fresh clinopyroxene molded around laths of saussuritized plagioclase with interstitial chlorite, clinzoisite, opaque minerals, and locally cryptocrystalline material. Mostly in sill-like bodies related to basaltic extrusive rocks of Nikolai Greenstone

**RPs** SEDIMENTARY ROCKS (LOWER PERMIAN, OR POSSIBLY UPPER PENNSYLVANIAN, TO MIDDLE TRIASSIC)—Lower and principal part of unit is black argillite with laminae and thin interbeds of volcanic sandstone and minor interlayered crinoidal-limestone turbidite and mafic volcanic breccia as much as a few tens of meters thick. Argillite is interstratified with and overlain by gray-green, red, and black thin-bedded radiolarian chert. Unit is equivalent in part to the Mankone Group of the eastern Alaska Range

**PPrv** VOLCANIC ROCKS (PENNSYLVANIAN, POSSIBLY LOWER PERMIAN IN UPPER PART)—Medium-gray-green to light-gray-green massive volcanic flows, probably largely of andesitic composition; volcanic breccias, locally exhibiting a weak foliation; and minor volcaniclastic rocks

- GEOLOGIC MAP SYMBOLS**
- STRIKE AND DIP OF STRATA—All stratification demonstrably upright according to depositional structures and succession of units
  - - - DEPOSITIONAL CONTACT—Dashed where approximately located, dotted where concealed
  - - - FAULT—Dashed where approximately located, dotted where concealed
  - - - THRUST FAULT—Dashed where approximately located, dotted where concealed; sawtooth on upper plate
  - FOSSIL LOCALITY—See table 1 for description of fossil localities
  - △ PALEOMAGNETIC SAMPLING SITE—Results of paleomagnetic study described by Hillhouse and Gromme (1981)

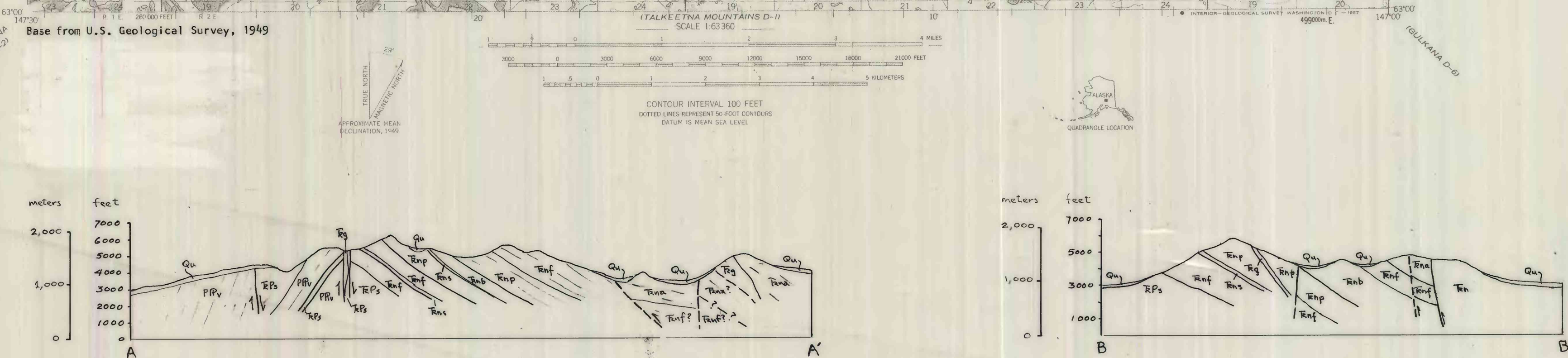
**REFERENCES CITED**

Hillhouse, J.W., and Gromme, Sherman, 1981, Paleolatitude of Triassic basalt in the Clearwater Mountains, south-central Alaska: U.S. Geological Survey Circular 823-B, p. B55-B56.

Smith, T.E., and Turner, D.L., 1973, Geochronology of the Maclaren metamorphic belt, south-central Alaska: a progress report: Isochron/West, no. 7, p. 21-25.

**Table 1.—Description of fossil localities**

Map number	Map unit	Sample number	Description
1	Rc	79ARh2R	Heterostridium: Upper Triassic, upper Norian.
2	R1	USGS Mesozoic loc 6750	Tropites cf. T. kellyi and Halobia cf. H. suberba; Upper Triassic: upper, but not uppermost, Karnian (= loc. 9 of Smith and Turner, 1973).
3	RPs	79S151	Conodonts including Neospathodus cf. N. pakistanensis Sweet (identified by B.R. Wardlaw); Lower Triassic, upper Dienerian to lower Smithian.
4	RPs	79JCh1 through 79JCh3	Upper Pennsylvanian to Lower Permian radiolarians overlain within about a 10 m thickness of chert by Lower Permian (Leonard) radiolarians and conodonts.
5	RPs	78JCh24	Radiolarians; Triassic.
6	RPs	78JCh30	Radiolarians; Permian.
7	RPs	78S502	Brachiopods assigned to the Lower Permian by B.R. Wardlaw.



**GEOLOGIC MAP OF THE BEDROCK PART OF THE HEALY A-1 QUADRANGLE SOUTH OF THE TALKEETNA-BROXSON GULCH FAULT SYSTEM, CLEARWATER MOUNTAINS, ALASKA**

By  
N. J. Silberling, D. H. Richter, D. L. Jones, and P. C. Coney  
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