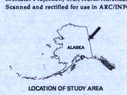
Base modified from U.S. Geological Survey D-1 (1956) 1:63,360 Quadrangles, Alaska. Universal Transverse Mercator Projection, 1927, North American Datum. Scanned and rectified for use in ARC/INFO GIS system.



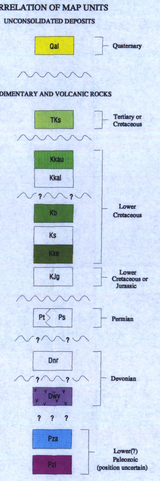
LOCATION OF STUDY AREA

APPROXIMATE MEAN DECLINATION, 1956

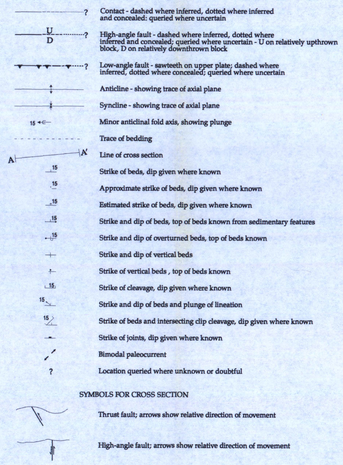
SCALE 1:63,360

Based on field investigations in June 1995 and supplemented by interpretation of 1:63,360-scale false-color aerial photographs taken in 1982 and 1986 and 1:65,000-scale black and white aerial photographs taken in 1950. Bedrock geology by J.G. Clough, R.R. Reifenstuhl, C.G. Mull, S.A. Liss and G.M. Laird. Surficial geology by D.S. Pinney. Petrography by R.R. Reifenstuhl and J.G. Clough. Thermal Alteration Indices (T.A.I.) by Michael B. Mickey and Hildeyo Haga, Micropaleo Consultants. Digital Cartography by L. Katherine Queen with assistance from Peggy J. Young. Digital topographic base edited by Glen R.C. Graham. We acknowledge the previous geologic mapping of Brabb and Churkin (1969, 1:250,000-scale), Dover and Miyaoka (1988, 1:250,000), and Dover (1992, 1:100,000-scale). Supported by the U.S. Geological Survey, Department of the Interior, under assistance Award No. 1434-94-A-1221.

CORRELATION OF MAP UNITS



EXPLANATION OF MAP SYMBOLS



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Dover, J.H., 1992, Geologic Map and Fold and Thrust Belt Interpretation of the southeastern part of the Charley River Quadrangle, east-central Alaska: U.S. Geological Survey Miscellaneous Investigations Map I-1942, scale 1:1000,000, 2 sheets.

Dover, J.H., and Miyaoka, R.T., 1988, Reinterpreted geologic map and fossil data, Charley River Quadrangle, east-central Alaska, U.S. Geological Survey Miscellaneous Field Studies Map 2004, scale 1:250,000, 2 sheets.

DESCRIPTION OF MAP UNITS[1]

Qal — QUATERNARY ALLUVIUM

Unconformity

TKs — SEDIMENTARY ROCKS UNDIVIDED - Poorly consolidated lithic sandstone, carbonaceous shale, and conglomerate. In the southeast C-1 Quadrangle these rocks have iron-stained sand- to gravel-size matrix with subrounded to rounded pebble-size clasts of dominantly Biederman Argillite, Keenan Quartzite, and Kathul Graywacke. Here, the rocks are only 1 m thick, overlain by about 30 cm of soil and tree roots with clay, silt and sand, and unconformably underlain by highly fractured Biederman Argillite. Nonmarine(?). In the southeast D-1 Quadrangle this unit is mapped by aerial photogrammetry based on its similar topographic expression to undivided sedimentary rocks mapped in the Charley River B-1 Quadrangle. Thickness in the southeastern Charley River Quadrangle is 65 to at least 1000 m (Brabb and Churkin, 1969).

Unconformity

Kkau — KATHUL GRAYWACKE, upper part (Lower Cretaceous)(Brabb, 1969)- Medium-gray to medium greenish gray to dark charcoal gray, fine- medium- and coarse-grained, calcite-cemented lithic graywacke, with interbedded black shale, mudstone, and conglomerate. Our informal 'upper part' of the Kathul Graywacke is mapped based on the amount of volcanic lithic content relative to the 'lower part'. The upper Kathul contains far less volcanic component: pyroxene, hornblende, plagioclase, and volcanic lithics. Sandstone beds are commonly rhythmically layered from 1 to 60 cm thick with common flute casts, ripple marks, and scour and channel-erosion features. Calcite veining locally abundant. Shale is black, fissile, locally thick, limy, or with chert nodules to 50 cm, with rare sulfides. Mudstone is dark gray, tan weathering, contains local mud cracks, carbonate, and locally grades to silty limestone. Conglomerate is matrix-supported, and contains subrounded pebble- to cobble-size clasts of shale, chert (white, black, and green). Locally conglomerate is 20 cm thick and 20 to 30 m wide with local pinch-and-swell of channelization. Folds include one meter- and smaller isoclinal folds (with local quartz and rare sulfides in fold noses), to kilometer-scale folds. Thickness of lower and upper units combined is about 1000 m. Possibly correlative to nonmarine rocks with plants of probable Albian age (Brabb and Churkin, 1969).

Kkal — KATHUL GRAYWACKE, lower part (Lower Cretaceous)(Brabb, 1969)- Dark-green to light green, fine- to very coarse-grained, dominantly volcanic clast sandstone and conglomerate with minor interlayered shale. Our informal 'lower part' of the Kathul Graywacke is mapped based on the greater amount of volcanic lithic content relative to the 'upper part'. The lower Kathul contains far more clasts of volcanic provenance. Petrographic estimates are: 5 to 10% pyroxene, 3 to 8% hornblende, 30% plagioclase, 15 to 20% volcanic lithics, 20% chert, 10 to 20% quartz, and 2 to 5% meta-sedimentary rock fragments and trace zircon and white mica. Sandstone is poorly sorted and sub-rounded with beds typically from 6 cm to 1 m thick; locally crossbedded. Pebbly sandstone includes clasts of white to light-green volcanic rocks, argillite, and to dark-green to black chert, aphanitic volcanic rocks and shale to 4 cm. Crossbedding, carbonized plant material, and pyrite locally. Conglomerate is dark-green, coarse- to very coarse-grained matrix-supported, with subrounded to rounded cobbles to large boulders (1 to 2 m). Beds commonly greater than 1 m thick or amalgamated. Shale is black and thin. Carbonate occurs on fracture surfaces and in veins to 25 cm thick. Lower part of Kathul includes far less shale than upper part. Locally well developed turbidity current deposits; sandstone to shale ratio > 100:1. Thickness of lower and upper units combined is about 3000 m. Possibly correlative to nonmarine rocks with plants of probable Albian age (Brabb and Churkin, 1969).

Kanayut Conglomerate

Ks — BIEDERMAN ARGILLITE (Lower Cretaceous)(Brabb, 1969) - Rhythmically interbedded argillite, siltstone and sandstone. Sandstone dark-gray to dark greenish gray, weathers mottled light-brown, orange-brown or red-brown, fine- to medium-grained, hard, dense, silica and carbonate cemented, chert-quart arenite. Beds are locally 1 to 40 cm thick and rarely to 80 cm, locally graded. Argillite dark-gray to black, siliceous, hard, dense, with local carbonate veins and breccia. Cleavage is typically well developed and pervasive. Petrographic estimates of clasts include monocrystalline quartz 50%, chert 20%, cherty-argillite 15 to 30%, plagioclase 1%, and trace glauconite, white mica, and zircon. Cement is dominantly carbonate, siderite, with local silica and iron oxide (to 10%). Thickness greater than 1500 m. TAI = 3.0(?).

Kjg — INDIAN GRAVE SHALE (Lower Cretaceous)- Informal name for black- to light-gray-weathering shale and phyllitic shale with pervasive cleavage. Mapped 2 km northwest of Indian Grave Mountain where shale forms rubble dip slope. Two samples were barren of foraminifera; yielded no palynology or TAI results. Thickness is about 50 m. This unit is in the same stratigraphic position as the informal pebble shale unit of Hauterivian to Barremian age on Alaska's North Slope.

Kjk — KEENAN QUARTZITE (Lower Cretaceous)(Brabb, 1969)- Light-gray to white, fine- to medium-grained quartz-arenite quartzite, with rare argillite and siltstone. Typically massive and resistant, forming prominent ridges, but locally bedding ranges from 10 to 50 cm thick, typically 15 to 25 cm, with parallel lamination, low-angle crossbedding, bioturbation (vertical and horizontal), amalgamation, and rare channelization. Petrographic estimates of clasts include monocrystalline quartz 80 to 90%, chert 5 to 20%, cherty argillite 0 to 8%, plagioclase 1%, glauconite 0 to 5%, rare tripolitic chert, and trace zircon and white mica. Cement is silica with local carbonate, and iron oxide (to 10%). On Kandik River in southern-most D-1 Quadrangle contains beds with abundant pelecypods (fluchal). Locally contains abundant fluchia 'eublaevis' of Valanginian age (Brabb and Churkin, 1969). Thickness from 150 to 300 m. TAI = 3.0 and 3.0(?).

Kjg — GLENN SHALE (Lower Cretaceous to Middle Triassic)(Brabb, 1969)- Very dark gray to grayish-black carbonaceous phyllitic shale, slate, semischist, and very fine grained lithic sandstone; contains pyrite, and common clay ironstone. Sandstone to shale ratio is > 100:1. Weathers to orange-brown platy rubble and cleavage is the dominant rock fabric, particularly in the Indian Grave Mountain area. Conformably to disconformably underlies the Keenan Quartzite and unconformably overlies the Permian Step Conglomerate and Tahkandit Limestone. Cleavage is pervasive. South of the map area contains Middle Triassic to Early Cretaceous (Jurassic to Valanginian) fossils, however, within the Charley River C-1 and D-1 Quadrangles age of Glenn Shale is Jurassic to Early Cretaceous (Brabb and Churkin, 1969). The Glenn Shale is at least 1700 m thick in the map area. TAI analysis yielded no results.

Unconformity(?)

Ps — STEP CONGLOMERATE (Permian)(Brabb, 1969)- Light-gray, very fine grained to pebbly chert-arenite sandstone, clast-supported, chert-pebble conglomerate and minor bioclastic limestone and siltstone. Facies equivalent of Tahkandit Limestone. Chert clasts are subangular and rounded, medium gray (60%), dark gray (5-10%), and black (8%). Clasts include fossil debris (coral, crinoid, brachiopod, pelecypod, bryozoan), and organic imprints to 8 cm long. Petrographic clast estimates include chert (80-95%), quartz (5-20%), and minor cherty argillite. Cement is dominantly carbonate, and locally siderite. Thickness is 650 m.

Pt — TAHKANDIT LIMESTONE (Permian)(Brabb and Churkin, 1969)- Tan to light gray, fine- to coarse-grained bioclastic limestone weathering to gray to dark gray. Coeval with Step Conglomerate and occurs in map area in vicinity of Step Mountain, southwestern C-1 and northwestern B-1 Quadrangles. Contains abundant brachiopods, solitary corals, crinoids, and bryozoa fragments. Locally cryptocrystalline and unfossiliferous. Contains abundant rounded chert pebbles where interbedded with Step Conglomerate in southeast C-1 Quadrangle. Thickness is about 135 m.

Dnr — NATION RIVER FORMATION (Devonian)(Brabb and Churkin, 1967)- Yellow-brown to light-brownish medium-gray, chert-arenite sandstone and chert pebble- to cobble-conglomerate. Conglomerate is clast supported, rounded to subangular, with gray dark gray, and black chert in a quartz and chert sand-size matrix; locally white weathering tripolitic chert clasts are common. Weathers brown to blocky lichen-covered talus. The Nation River Formation conglomerate is well sorted, has more rounded clasts, more chert clasts, is more siliceous, and is more clast-supported than Step Conglomerate. Petrographic estimates are: chert (70-85%), cherty argillite (15%), quartz (10-20%), tripolitic chert (0-10%), with silica, and iron oxide cement. Contains Devonian plant fragments and spores (Brabb and Churkin, 1969). Thickness up to 1300 m.

Dwv — WOODCHOPPER(?) VOLCANICS (Lower or Middle Devonian?)(Brabb and Churkin, 1969)- Dark-green to very dark green, porphyritic mafic volcanic rock. Weathers very dark green and orange-brown. Phenocrysts comprise 50 percent of rock and consist of fine- and medium-grained orthopyroxene and plagioclase, and lesser hornblende. Matrix includes carbonate, chlorite, and opaque minerals. Age uncertain. Similar to Woodchopper Volcanics interbedded with Lower Devonian limestone in vicinity of the mouth of Woodchopper Creek, Charley River B-5 Quadrangle. Thickness as much as 600 m.

Unconformity(?)

STRATIGRAPHIC POSITION UNCERTAIN

Pzs — PHYLLITIC ARGILLITE (Paleozoic?)- Black to dark gray argillite, weathering to dark gray and yellowish-tan to light gray to white banded argillite. Black to dark gray argillite is foliated with numerous phyllitic partings. Banded argillite fabric is dominated by abundant cleavage surfaces and suggestive of turbidity current deposits. Unit occurs in northern D-1 Quadrangle adjacent to Woodchopper(?) Volcanics. Age uncertain but this unit contains late Paleozoic age goniatites near intersection of Wood and Black Rivers (Brabb and Churkin, 1969). Thickness is at least 600 m.

Psl — LIMESTONE AND DOLOMITE (Paleozoic?)- White recrystallized limestone and dolomite weathers to very light gray. Petrographically consists of coarse mosaic of interlocking calcite and dolomite rhombs with abundant vugs, locally silicified. Unit occurs in northern D-1 Quadrangle associated with Paleozoic(?) argillite and adjacent to Woodchopper(?) Volcanics. Age uncertain but contains a few poorly preserved brachiopods and crinoids (Brabb and Churkin, 1969) and corals, bryozoa and brachiopods (Dover and Miyaoka, 1988). Thickness is at least 60 m.

[1]Map units and symbols are described for the Charley River D-1, C-1, and part of the B-1 quadrangles but may not be present on a given map of the group. Map units not present on the map sheet are shown without color in the explanation.

INTERPRETIVE BEDROCK GEOLOGIC MAP OF THE CHARLEY RIVER D-1 QUADRANGLE, EASTCENTRAL ALASKA

By

J.G. Clough, R.R. Reifenstuhl, S.A. Liss, and D.S. Pinney

1995

Department of Natural Resources
Division of Geological and Geophysical Surveys
Geologic Data Modeling System

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